

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

CREATION RESEARCH SOCIETY QUARTERLY

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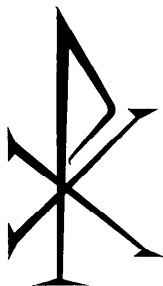


TABLE OF CONTENTS

(All manuscripts submitted should be prepared according to the "Guidelines for Contributors" published in June, 1972)

	Page
Nitrogen Fixation and Encystment Created	
Bacterial Characteristics	135
Gerald D. Cagle	
Report on the Velikovsky Symposium	142
Ian MacIver	
A Quantitative Analysis of the Life Spans of the Genesis Patriarchs	149
James E. Strickling	
Entropy Prior to the Fall	154
Robert E. Kofahl	
Response to Robert Kofahl	156
Emmett L. Williams	
Another Reply to Robert Kofahl	157
Henry M. Morris	
Natural Theology Is a Scientific Subject	158
Howard B. Holroyd	
Comments on Scientific News and Views	162
Harold Armstrong	
Evolution and Molecular Biology	166
Julio Garrido	
"The King Is Naked"	169
Jerzy Z. Hubert	
Review of Creationist Astronomy	170
George Mulfinger, Jr.	
Other Book Reviews (6)	176
Letters to the Editor	182

COVER ILLUSTRATION

This is an electron micrograph of a frozen-etched, mature cyst of the bacterium, *Azotobacter*. The cyst seems more like a roughly hewn stone than a living, not inactive, metabolic organism. One is fully amazed that structure such as this in a supposedly "primitive" organism provides the greatest number of stable bonds and the lowest amount of free energy. How much more complex then is the life observed in metazoan animals? See Gerald Cagle's article in this issue.

SPECIAL ANNOUNCEMENT

According to Article III of the Constitution of the Creation Research Society, an election will be held on March 1, 1974 for the purpose of selecting persons to replace six members of the Board of Directors whose terms will terminate in 1974, as recorded in the "Report of the 1973 Board of Directors Meeting," September, 1973 issue, on page 125. The following have been nominated for three year terms: Harold Armstrong, Thomas G. Barnes, Larry Butler, Duane T. Gish, William J. Tinkle, and Emmett Williams, Jr. Other nominations may be sent to Secretary Wayne Frair, The King's College, Briarcliff Manor, New York 10510. A duplicate copy of the Constitution was mailed to each voting member as a Supplement to this *Quarterly* issue.

ERRATA

The Editors request that readers make the following changes in the C. E. A. Turner article, "Trace Elements in the Creation," in the September, 1973 issue: (1) On page 87, left column, ninth line from bottom, change 0.0004% to 0.00004%; and (2) on page 88, right column, line 13 of the "Conclusions," change the Scriptural reference to II Peter 3:13.

Also the following changes should be made in "A Mathematical Formulation of a Creationist-Flood Interpretation of Radiocarbon Dating" by Ray Hefferlin in the June, 1972 issue: (a) In the last two lines of Equation 13, the C should read C_2 , and M_1 should read M_2 in that equation; (b) Equation 14 should have the following extra term as a multiplicative terms: $[1 - e^{-\lambda_1 t}]$; and (c) In Equations 15, 16, and 17, replace $\lambda_2(t - t')$ with $\lambda_2(t' - t_r)$. This correction was suggested to the author by Dr. Dowell Martz of Pacific Union College, Angwin, California.

NITROGEN FIXATION AND ENCYSTMENT CREATED BACTERIAL CHARACTERISTICS

GERALD D. CAGLE*

Life in most ecosystems depends upon continual circulation of nutrient chemical from the earth to the biosphere, termed the "biogeochemical cycles." One of these cyclic element processes, the nitrogen cycle, is examined in relation to one bacterium, Azotobacter, which is capable of initiating the primary reactions of this cycle, namely the conversion of atmospheric nitrogen to ammonia. These bacteria, which are also capable of forming protective structures, termed cysts, are discussed in relation to their part of the perfect plan of God as revealed in life. The author also refers to the even more resistant forms produced by other independent, or non-symbiotic nitrogen fixers, of the genus Clostridium, and concludes that the resting cells which these bacteria have are a created advantage which is necessary for the perpetuation of the nitrogen cycle and life which is a result of it, and of the other cyclic processes.

Introduction

Azotobacter (meaning nitrogen rod) is the name assigned to several species of bacteria which possess the capacity to fix nitrogen, without necessary association with another organism; this is termed "non-symbiotic nitrogen fixation." These organisms were not of the early bacteria to be isolated since they are not responsible for disease production in any animal or plant, as far as is known. In fact, attempts to group members of this genus taxonomically by serological typing have met with only limited success, because of the feebleness of the organism in producing antibody in an experimental animal; they are poor antigens.¹ These organisms are members of a relatively small group of bacteria which are directly beneficial to man, especially in agriculture, and to the entire biosphere as well.

Elemental Circulation

On inspection of an ecosystem one finds that there is a continual flow of energy in the system and that the very existence of the individual members of the system depend on one another. To the observer, at least, it appears as if each contributor were following a small part of a larger, intricate plan for the continuance of life.

In a system in which plants and animals reside there is a continual flow of nutrient chemicals from the earth to the plants. These nutrients are then returned to the soil directly or indirectly after being digested and excreted by other organisms, or being assimilated into life and then returned to the earth upon death and decay of the organism. However, it is apparent a continual flow of these essential chemicals exists and that they are constantly being recycled.

The term biogeochemical cycle has been used to describe this circulation of chemical nutrients through biological organisms and the surface of the earth. A large number of the cycles have been studied, with the carbon and water cycles

being best understood at present, and perhaps the nitrogen cycle being the most complex of these circulatory processes. Nitrogen, like carbon, phosphorus, and numerous other minerals, is necessary for the continuance of life, and is contained most importantly in amino acids, porphyrins, nucleic acid bases, and some vitamins.

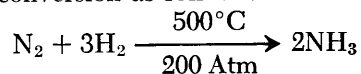
Although a plentiful gaseous element, N₂ cannot be directly assimilated by the vast majority of living things. For nitrogen to be bio-utilized it must be transformed into an assimilable form. The process is termed nitrogen fixation, and is accomplished by some fungi, numerous algae, and to some degree by a number of bacteria.

The conversion of N₂ into fixed nitrogen, which appears initially to be ammonia (NH₃), is carried out with a relatively high rate of efficiency in two groups of bacteria: the symbiotic and non-symbiotic nitrogen fixers.

The symbiotic nitrogen fixing organisms which reside in root nodules of leguminous plants are members of the genus *Rhizobium*. This unique relationship, in which neither the plant nor the bacteria is capable of fixing nitrogen independently, illustrates cooperation found in nature and the delicate balance by which life functions. There is also a marked specificity between species of plant in the legume family and the strain of *Rhizobium* which resides symbiotically in the root nodules.

The second group of bacteria which are capable of nitrogen fixation is the non-symbiotic, or independent nitrogen fixers. Two bacterial genera, the anaerobic spore-forming members of the genus *Clostridium*, and the aerobic cyst-forming members of the genus *Azotobacter* already mentioned are well known examples of this type of nitrogen fixation.

The process of converting elemental N₂ into NH₃ is a difficult industrial task. The Haber process, developed during World War I, carries out this conversion as follows:



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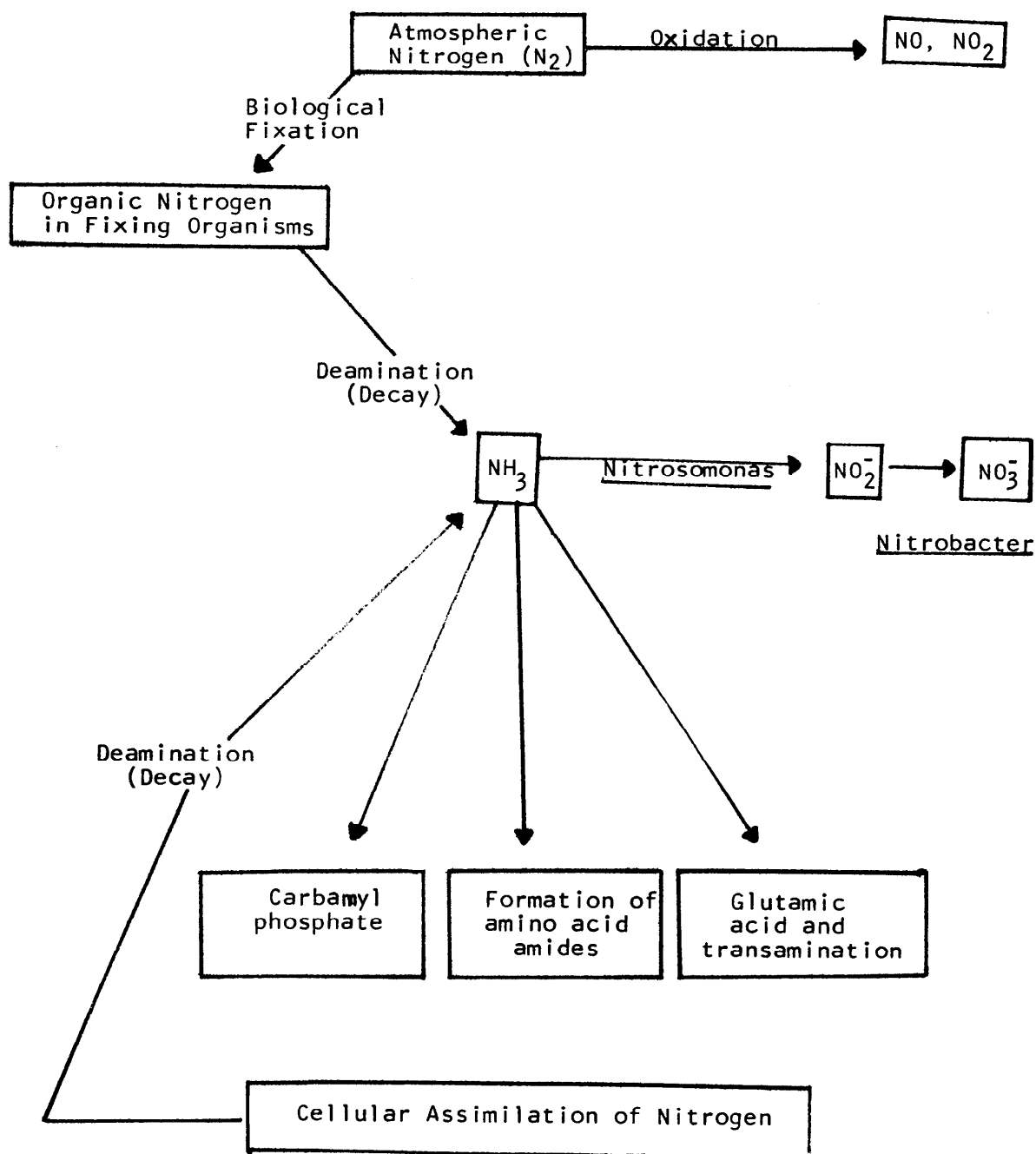


Figure 1. The nitrogen cycle.

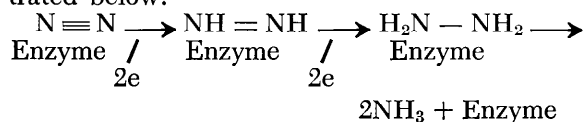
Very high pressure and temperature are required to effect the transformation that single-celled organisms, which lack cellular refinement and definition found in eucaryotic cells, carry out independently at isothermal temperature.

It has been estimated² that some 225KCal are required to break the $N \equiv N$ bond, approximately three times the energy required to break

the C - C bond. This process illustrates the wondrous adaptability of life and accounts for the respiratory rate of vegetative *Azotobacter* cells which is the highest of any living organism!³

The enzymatic processes which result in the reduction of N_2 to NH_3 are still not understood. However, it appears that the enzyme nitrogenase, an enzyme requiring a metallic cofactor of mo-

lybdenum (Mo) or vanadium (V) for activity, is essential for the process to proceed. It also now appears that the N_2 to NH_3 conversion is progressively carried out enzymatically as illustrated below:⁴



The energy for this reduction is, of course, supplied by adenosine triphosphate; however, the source of reducing hydrogens is not clear in *Azotobacter* nitrogen fixation. It appears that ferredoxin is involved in this reduction. Ammonia in the cell is transformed into organic nitrogen by conversion of α -ketoglutaric to glutamic acid. Subsequent transaminations among other amino acids occur and they are then incorporated into protein.

Excess NH_3 appears to be liberated extracellularly, with some liberation of peptides occurring, which serves to enrich the soil.⁵ This nitrogen, in the form of liberated NH_3 or amino acids, is now available for another facet of nitrogen fixation, nitrification, or conversion to nitrate (NO_3). Nitrogen fixation in *Azotobacter* may be a relatively efficient process with a conversion of 0.1 moles of $N_2 \rightarrow NH_3$ for each mole of O_2 consumed.⁶ The cyclic relationships of nitrogen are illustrated in Figure 1.

Cyst Formation and Morphology

As if nitrogen fixation were not a sufficiently unique characteristic, members of the genus *Azotobacter* also possess the ability to form resting cells called cysts. Cysts differ from endospores, the most widely known biologically resistant structure, in that they are not as refractile to heat nor desiccation as the spore. However, cysts can withstand long periods (years) of desiccation without considerable loss of viability.

The *Azotobacter* cyst and the *Bacillus* endospore are contrasting structures, apart from their resistant properties, in that the cyst encompasses the entire cell and a portion of the capsule; while the endospore is formed from essential internal cellular components. The process whereby the vegetative cell is converted to a cyst is a phenomenon which has only recently been elucidated.

The morphology of these bacteria is interesting in that they are large, pleomorphic, and motile Gram negative rods. The size of the individual cell is large by bacterial standards, ranging from approximately 0.5 to 3.0 microns (μ)* in width by about 2 to 6 μ in length.⁷ When grown on media containing an organic nitrogen source the organism ceases to fix atmospheric nitrogen, although not all fixed-nitrogen forms

are readily assimilable. Additionally, supplemental nitrogen also causes the morphology of the cell to be drastically affected, with the appearance of several types of bizarre forms in cultures.⁸

A large volume of research has appeared concerning this pleomorphism, probably more than for any other bacterial genus. At one time a complex life cycle including some thirteen different morphological forms had been proposed for *Azotobacter*. Many of these have been attributed to latent contaminants in the cultures of early workers; nevertheless the morphology of this genus remains complex.

When *Azotobacter* is grown in a closed system, a number of sequential morphogenetic stages are observed as the culture ages. In Figure 2 these forms are depicted. These include the vegetative cell, the precyst, and the cyst. *Azotobacter* is a chemoorganoautotroph, which requires only a fixed carbon source in addition to a balanced buffered salts solution for growth. The cellular form observed initially in this type of culture is the large coccobacillary vegetative cell.

In Figure 3, an electron micrograph of vegetative forms, this typically coccobacillary, or peanut-shaped morphology, is depicted. The electron dense areas represent polyphosphate (PP) inclusions, the cell wall-cell membrane complex (CW-CM) of the cells, is apparent, and a fibrous, continuous polysaccharide capsular areas (P) is observed to surround all of the cells.

The vegetative cell is motile by means of flagella located over the entire surface of the cell, termed peritrichous flagellation. When these same type of cells, vegetative forms, are observed by techniques of freeze-etching,⁹ a highly ordered cell wall structure (S) is observed as shown in Figure 4. The surface of the vegetative cell appears composed of interwoven strands which form a mesh, or woven appearance, on the cell. Several flagella (F) are also depicted on the outer wrapping of the cell.

It is difficult to grasp the complexity of the earth, this solar system, or our galaxy, and the precise physical laws which keep each unit as a functioning part of the whole. On the other hand, one finds equal wonderment in the complexity of the minute, such as the order found in a microscopic bacterial wall, for the particles which give the wall the characteristic woven structure are only 6 to 8 nm* apart! However, in either direction, from the infinitesimal to the immense, it is apparent that an ordered, precisely functioning system exists.

The interesting process of encystment is initiated as nutrients are depleted in glucose-containing culture, or in cultures supplemented with

*A micron (μ) is 1×10^{-6} meters.

*A nanometer (nm) is 1×10^{-9} meters.

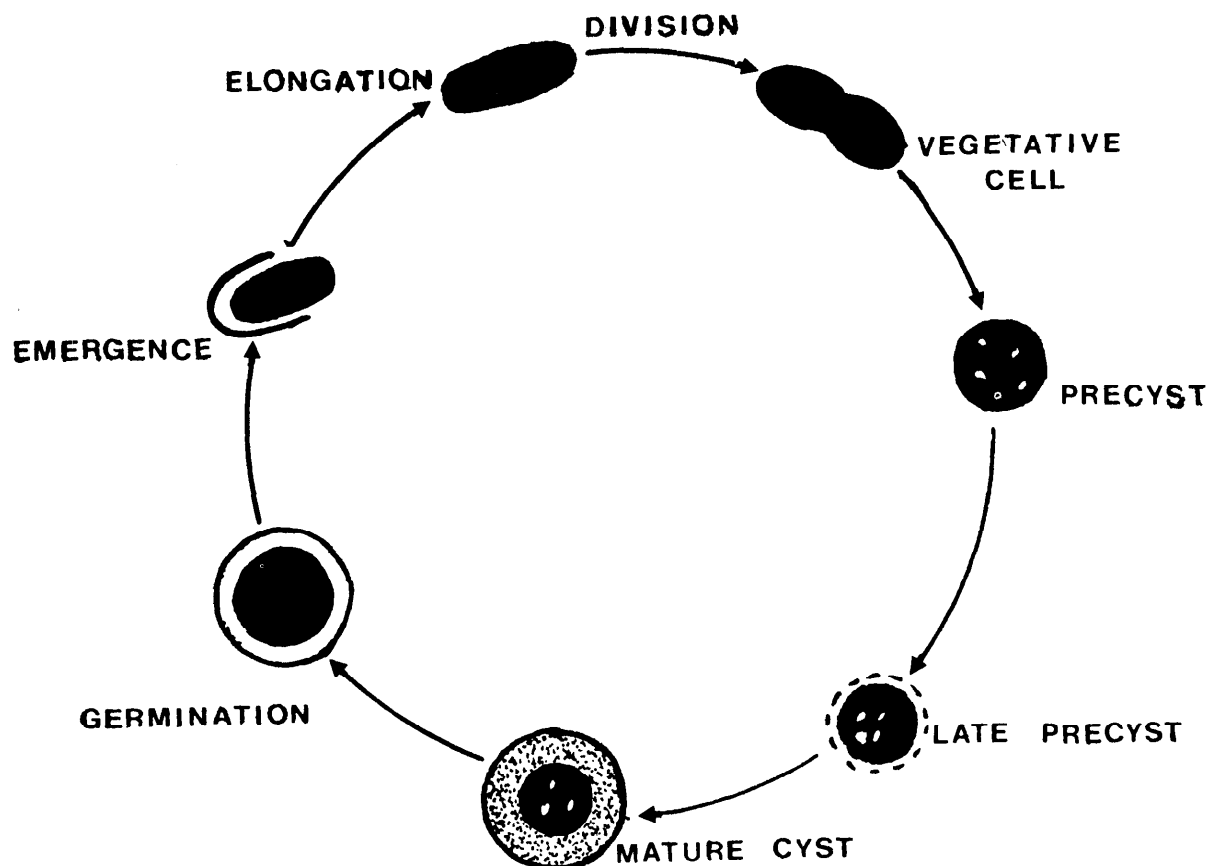


Figure 2. Schematic representation of the typical morphological forms encountered in *Azotobacter* culture. The vegetative cell, the precystic forms, and the mature cyst comprise the cellular forms through which the bacterium normally cycles. Arrows indicate the direction of normal progression of each form in nitrogen-free culture.

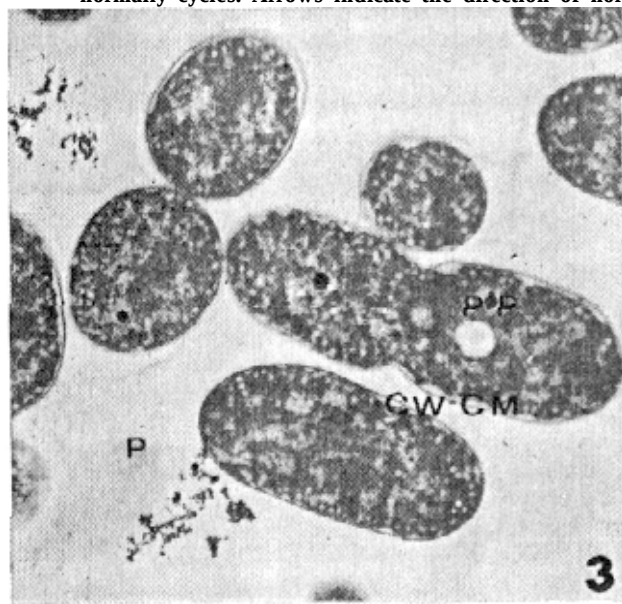


Figure 3. Electron micrograph of a thin section of vegetative cells of *Azotobacter*. A large amount of poly-saccharide (P) surrounds the cells which contains polyphosphate (PP) inclusions. The cell wall-cell membrane (CW-CM) of each cell is also apparent. (x 17,000)

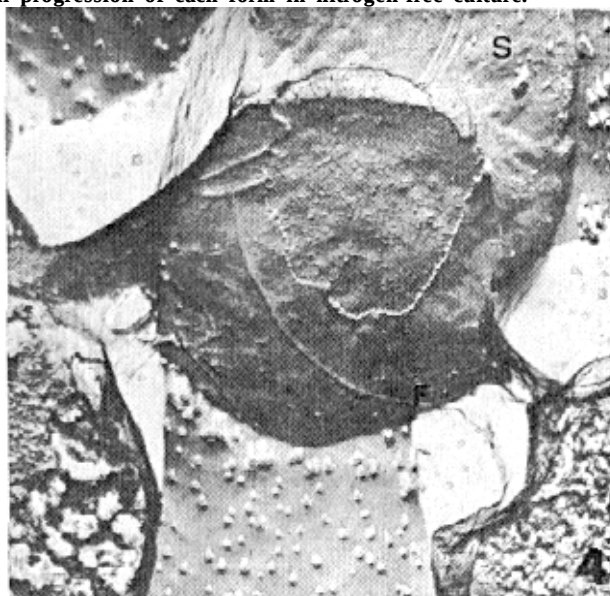


Figure 4. Frozen-etched vegetative cell. A sculptured (S) cell wall is apparent, beneath it the plasma membrane of the cell. Several flagella (F) are seen on the outer cell surface. (x 29,000)

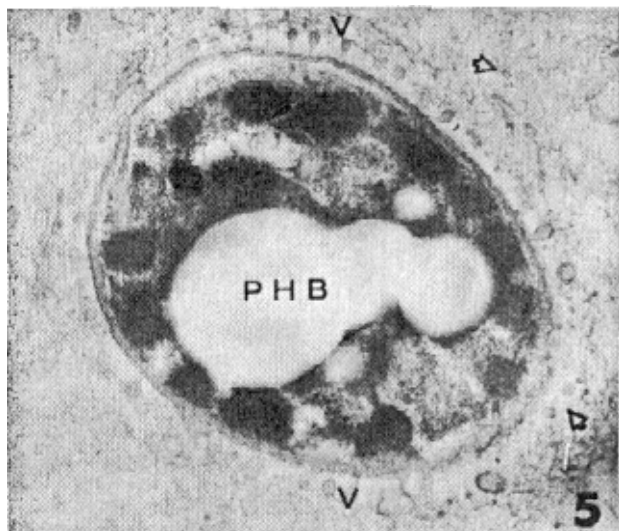


Figure 5. Thin sectional electron micrograph of an early precyst of *Azotobacter*. Numerous vesicles (V) and intracellular deposits of poly-β-hydroxybutyric acid (PHB) are observed. Extracellular polysaccharide (P) is also apparent. Some vesicles (arrows) are seen trapped in this extracellular polymer. (x 26,000)

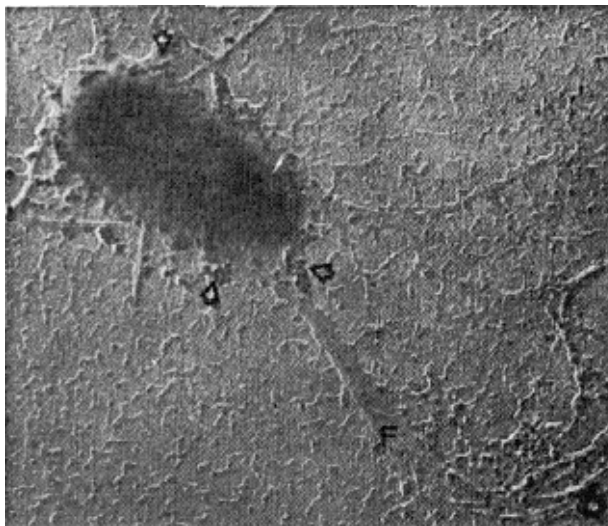


Figure 6. Electron micrograph of a shadow-cast preparation of encysting *Azotobacter* cells. The distribution of the vesicles (arrows) about the cell, the presence of flagella (F), and the rounding of the cell all indicate the occurrence of encystment. (x 11,500)

various short-chained organic compounds, as n-butanol, instead of glucose. The process of encystment¹⁰ is marked by a change in morphology of the bacteria from bacillary to coccoid form (Figure 2). At the same time particles of membrane (arrows) are extruded from the shrinking cell as shown in Figure 5. The ejection of particles has been observed in a number of other Gram negative bacteria, each time in response to some unfavorable cultural condition.

The process of vesicle formation serves the cell at least two purposes: 1) to reduce cell volume, and 2) to provide membranous material for coat formation. The metabolism of the cell also joins in the integrated evolvement from cell to cyst. An endogenous metabolism source, poly-β-hydroxybutyric acid (PHB), is formed as the precyst stage occurs in *Azotobacter* cultures. In encysting cultures cells are observed to extrude large numbers of these vesicular elements which is shown in Figure 6. This shadow-cast electron micrograph depicts many of the vesicles produced during encystment, as well as the peritrichous flagellation of the cell.

The mature cyst is formed as these vesicles migrate away from the cell which extruded them. *Azotobacter* cells are surrounded by a large capsule of polysaccharide, and as the vesicles diffuse away from the precyst their progress is hindered by the fibrous polysaccharide (Figure 7). The shingling of particles continues until the vegetative cell, approximately $2\mu \times 6\mu$, is reduced to a coccoid cell about 2μ in diameter. The particles, which appear to be doughnut-shaped, then

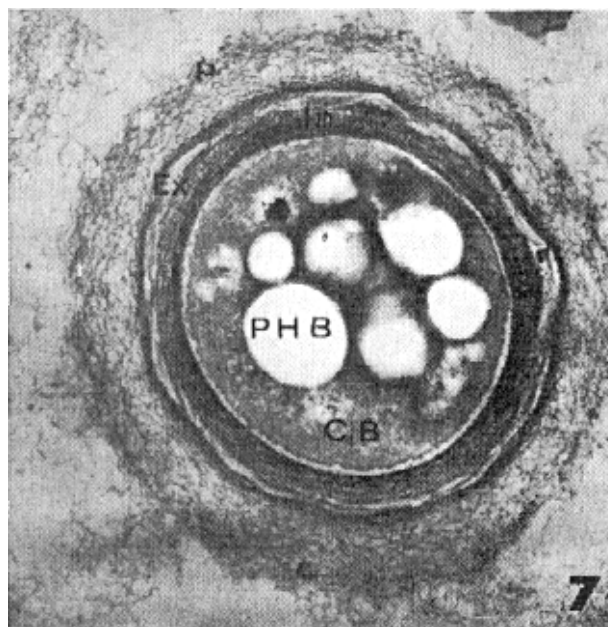


Figure 7. Electron micrograph of a thin section of a mature *Azotobacter* cyst depicting the general structure of the exine (Ex), with extracellular polysaccharide (P) extending beyond it; the intine (In); the central body (CB), with inclusions of poly-β-hydroxybutyric acid (PHB). (x 27,000)

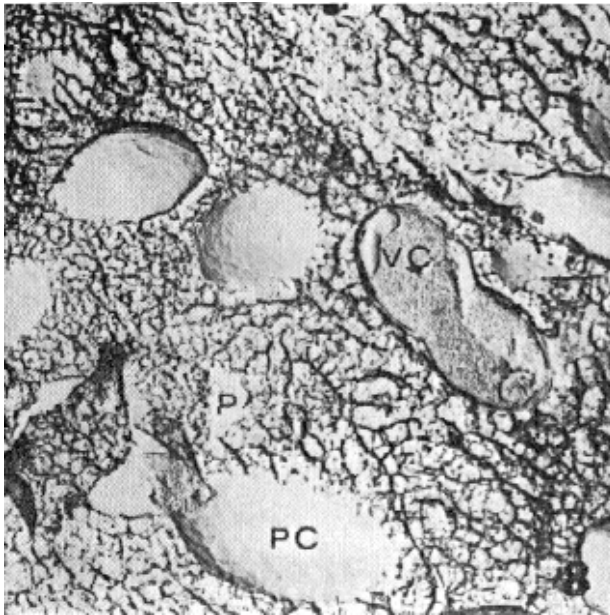


Figure 8. Electron micrograph of a frozen-etched preparation of vegetative cells (VC) and precysts (PC) embedded in a mass of polysaccharide (P). Note the slightly ordered surface structure of the precysts. (x 16,000)

open to form leaf-like units. From these units intact cyst coats appear to be formed, although the mechanism for opening of the vesicles is still unclear. Morphological features of the mature cyst (Figure 7) include: the cell or central body (CB), with large quantities of poly- β -hydroxybutyric acid (PHB); an area analogous to the capsule of the cell, termed the intine (In), an area which is amorphous and appears to buoy the central body and protect it; the cyst coat, or exine (Ex), the tough outer barrier to which the resistant properties of the cyst are attributed, and remnants of extraexinic polysaccharide (P).

Examination of the cell to cyst transition by freeze-etching reveals an equally precise process of morphogenesis.¹¹ The surface of the frozen-etched vegetative cell is smooth (Figure 4). As precysts are formed these cellular forms assume a surface with a slightly patterned surface which is almost geometric in nature (Figure 8). Each of the precysts illustrated have essentially the same surface appearance, although synchronous culture of these bacteria has never been achieved.

The mature cyst, as revealed by freeze-etching appears as a resistant biological structure (Figure 9). On first observation, the cyst seems more like a roughly hewn stone than a living, not inactive, metabolic organism. While cross sections of cysts (Figure 7) indicate only that the coat is multilayered, frozen-etched cells cleaved tangent to the exine indicate an architectural soundness of the structure. A ridged surface con-



Figure 9. Frozen-etched mature cyst observed with the electron microscope. The cyst is composed of subunits which unite to form the intact coat. (x 32,500)

figuration, not unlike a geodesic dome, is observed. Each subunit of the exine is a hexagon and it is again interesting to observe that other resistant biological structures, including viruses and spores, possess the same basic structure.

One is even more amazed upon consideration that a structure such as this provides the greatest number of stable bonds and the lowest amount of free energy! And, these are found in the most primitive organisms, the bacteria, and in structures (viruses) whose viability has not been resolved. How much more complex then is the life observed in metazoan animals?

Consideration of Advantages of Cyst Formation

The above paragraphs represent basically the process involved in encystment. Once the cyst is formed it may remain unchanged for relatively long periods of time (in excess of ten years). That these microscopic cells contain all of the necessary genetic information to carry out two involved processes, nitrogen fixation and cyst formation, points out that God's plan in nature is a perfect one. The dependence of life on nitrogen-fixation has been mentioned.

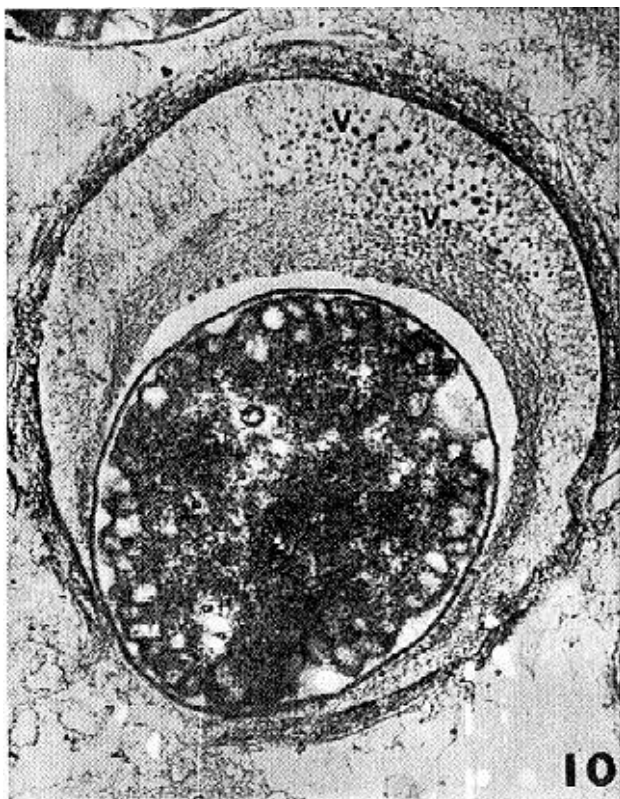


Figure 10. Electron micrograph of a thin section of a germinating cyst of *Azotobacter*. The cyst has been incubated in fresh media approximately four hours. The cyst coat is observed to be much thinner, and vesicles (V) are observed to reappear as the coat is digested. (x 30,500)

Both of the important non-symbiotic bacterial nitrogen-fixers have the capacity to form desiccation-resistant resting cells. It does not seem likely that this occurred simply by a random selective process, for too few cells form resistant forms, and too few are capable of converting N_2 to NH_3 . Instead, it seems more likely that the trait of nitrogen-fixation is an important one and is intricately necessary for the cycling of nitrogen from the atmosphere to the biosphere.

Cyst and spore formation represent created advantages for other vastly different organisms, including the fungi, for example. Although very slow to grow, spores allow an inactive existence; and, when opportunity for growth is provided, the fungi are present.

The process by which encystment occurs has been studied broadly, and it has been noted that many other bacteria produce vesicular elements as cells start to die. However, no member of these genera is capable of taking this basic units of encystment and converting them into an intact resting cell, complete with cyst coat. This inability on the part of other Gram negative bacteria may be explained as due to lack of necessary enzyme complement, which unites the vesi-

cular subunits into an intact coat, along with sufficient extracellular polymer to hold the elements in proximity to the cell while the coat is being formed. Some bacteria may possess one of these characteristics, as a sufficiently large capsule, but not both.

Reversion to Activity

As depicted in Figure 2, the life of these bacteria, or more specifically, of a single bacterium is a cyclic process. The first portion of the life cycle deals with the transition from cell to cyst. When cysts return to a favorable growth medium, the second portion of the bacterial life cycle is set into motion. The nutrients in the fresh growth medium diffuse across the external coat and initiate the metabolic activity of the vegetative cell.¹² In Figure 10 germination of an encysted central body of *Azotobacter* is illustrated.

This process is enzyme-mediated, as are nitrogen-fixation, cyst coat formation, and the myriad of other biological reactions which occur. As the transition occurs from cyst back to cell there is an accompanying increase in cell size and the thick, laminated coat begins to be enzymatically separated and dissolved, until finally the bacterium is liberated. The cycle is then repeated.

Conclusion

In conclusion, the presence of either of these systems, nitrogen fixation or encystment, in a single organism, much less the possession of both by single organisms, is more than can be explained by evolutionary concepts alone. This is true not only for the organism considered here, *Azotobacter*, but for the genus *Clostridium* as well. The Bible records the perfection of the works of God and states that in His works "there is no confusion." (I Cor. 14:33). Likewise reference is made to the cyclic nature of life—in the often quoted verse, "In the sweat of thy face shalt thou eat bread, till thou return unto the ground; for out of it wast thou taken: for dust thou art and unto dust shalt thou return." (Gen. 3:19). This constitutes only a small part of the perfect plan in nature.

References

- ¹Azo, K., and R. Yoshida. 1928. The application of the serum reaction in the classification of *Azotobacter*, *Proceedings of the First International Congress Soil Society*, 1:150-151.
- ²Conn, E. E., and P. K. Stumpf. 1966. *Outlines of biochemistry*. John Wiley and Sons, Inc., New York, p. 371.
- ³Jensen, H. L. 1954. The *Azotobacteriaceae*, *Bacteriological Reviews*, 18:195-214.
- ⁴Conn, E. E., and P. K. Stumpf. *Op. cit.* p. 373.
- ⁵Fruton, J. S., and S. Simmons. 1963. *General biochemistry*. John Wiley and Sons, Inc., New York, p. 675.
- ⁶Wilson, P. W., and R. H. Burris. 1947. The mechanisms of biological nitrogen fixation, *Bacteriological Reviews*, 11:41-73.

⁷Breed, R. S., E. G. D. Murray, and N. S. Smith, Editors. 1957. *Bergey's manual of determinative bacteriology*. Seventh Edition. The Williams and Wilkins Co., Baltimore.

⁸Von Schreven, D. A. 1966. Effects of penicillin on the morphology and reproduction of *Azotobacter chroococcum*, *Antonie van Leeuwenhoek Journal of Microbiology and Serology*, 32:67-93.

⁹Cagle, G. D., G. R. Vela, and R. M. Pfister. 1972. Freeze-etching of *Azotobacter vinelandii*: examination

of wall, exine, and vesicles, *Journal of Bacteriology*, 109:1191-1197.

¹⁰Hitchins, V. M. and H. L. Sadoff. 1970. Morphogenesis of cysts in *Azotobacter vinelandii*, *Journal of Bacteriology*, 104:492-498.

¹¹Cagle, G. D., G. R. Vela, and R. M. Pfister. *Journal of Bacteriology*, 109:1191-1197.

¹²Cagle, G. D., and G. R. Vela. 1971. Giant cysts and cysts with multiple central bodies in *Azotobacter vinelandii*, *Journal of Bacteriology*, 107:315-319.

REPORT ON THE VELIKOVSKY SYMPOSIUM

IAN MACIVER*

The first major interdisciplinary symposium on the works and theories of Immanuel Velikovsky was held at Lewis and Clark College, Portland, Oregon from August 16 to 18th, 1972. It was attended by over three hundred people who heard papers by ten invited speakers, and heard discussions of the papers led by twenty-six other invited scholars. Dr. Velikovsky himself contributed three keynote addresses.

There were six sessions spread over the three days, two on each day. On day one the main focus was on the physical sciences. On day two history and archaeology were emphasized. And on day three some of the relationships between Velikovsky's work and religion, psychology and sociology were explored. An open session on the final night was set aside for integration of the contributions from the three days of papers and discussion.

The idea for the conference emerged from publicity and response that resulted from publication of the May 1972 issue of *Pensée* magazine which was devoted to a review and assessment of Velikovsky's theories in the physical sciences.¹ This magazine has since been changed from a monthly to a quarterly publication and now constitutes a forum for critical comment, both favorable and unfavorable, on Velikovsky's work. Most of the papers presented at the Portland conference have been published in the issues of *Pensée* from the Fall 1972 through the 1973 numbers. No complete outline or description of the papers will be made here since they may be obtained from the *Pensée* office.

Velikovsky's Work and Theories

Velikovsky's theories have interested creationists ever since the publication² of his book, *Worlds in Collision*, in 1950. Velikovsky can be categorized as a catastrophist, overtly a secular non-theistic catastrophist,³ who proclaims that the earth has interacted with other planets in a

series of near collisions in the past. In *Worlds in Collision* he deals with two of these periods of near collision; (1) in approximately 1500 B.C. with two main phases of planetary proximity and attendant destruction around the Exodus from Egypt and around the "long day" of Joshua; and (2) from the mid-eighth to mid-seventh centuries B.C. associated with the earthquake in the days of King Uzziah,⁴ the destruction of Sennacherib's army,⁵ and the sundial of Ahaz episode in Isaiah 38:8. The earlier of these two cosmic events he contends was caused by the near approach of Venus to Earth and the latter by the approach of Mars.

Two earlier catastrophic periods, on which Velikovsky has books in preparation are linked with Saturn (*Saturn and the Flood*), and Jupiter (*Jupiter and the Thunderbolts*). The catastrophe of the Flood he considers to have been the most devastating of all in its effects on earth, and at the present not precisely datable, but to lie somewhere between five and eleven thousand B.C. The Jupiter influence on the earth received no further mention at the symposium. These books will be awaited with considerable interest and anticipation by creationists, but it would appear that considerable time may pass before they are published.

Velikovsky's theories also include a reworking of ancient Near Eastern chronology on the basis of his identification of the ten plagues and the Exodus at a period some six hundred years earlier in Egyptian history than according to conventional chronologies. When these events (and in fact all of ancient Egyptian history) are brought forward by several centuries to conform with the Biblical dating of the Exodus, an entire restructuring of ancient chronology is required since much of it hinges on synchronisms with events in Egypt. This was the theme of another work, *Ages in Chaos*,⁶ Volume 1, which is to be followed in the relatively near future by at least three more volumes on the same topic. These books, and another volume on collective amnesia and the human race (his theorized explanation

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for the blotting out of these catastrophes from memory) will all be published before the Saturn and Jupiter books.

In addition to his books on the historical evidences for cosmic catastrophism, and the chronological reorganizations that they require, he has also published *Earth in Upheaval* (Doubleday 1955) which deals with the geological evidences for catastrophic events. Incidentally in the acknowledgments he makes reference to review assistance received in early draft form of the manuscript from George McCready Price.

On the whole Velikovsky's views have received little acceptance from scholars, neither from those in the historical nor in the natural sciences. This has been true whether the viewpoint taken by critics was evolutionist or creationist. Yet throughout the years since the early 1950's a number of discoveries have been made which have fitted in with his theories very well—some of which in fact were necessary deductions from his theories, if the theories were to be considered tenable.

For instance, Velikovsky constantly insisted on the presence of electromagnetic forces associated with the sun and with the planets, forces which could interact at times of near collision. Such forces were thought impossible or highly unlikely when he wrote about them, but their existence has now been established. The high temperature of Venus, again unsuspected in 1950, Velikovsky insists is indicative of its youth (having been ejected from Jupiter during historical times). Craters on the Moon, craters on Mars, magnetic remanence in lunar rocks, radio noises from Jupiter, the period of the asteroid Toro,⁷ the anomalous (according to conventional chronologies) dating by carbon 14 of remains from Tutankhamen's tomb are all points that fit well with his theories, but are not easily conformable to conventional celestial and human history.⁸

Two prominent creationist-oriented researchers who have used Velikovsky as their starting point are Donald Patten and Donovan Courville. Courville has produced many new synchronisms which appear when Velikovsky's historical theories are tested backwards and forwards through time.⁹ Patten has taken the Deluge as an earlier catastrophe and, using Mercury as the "intruder," has built up a flood story of electromagnetic and gravitational interference producing great earth-engulfing tides, periods of mountain-building, strata deposition, and life extinction.¹⁰

Symposium Papers and Discussions

The symposium began with Velikovsky's first keynote address where he elaborated on his theories of collective amnesia of the whole human race as being responsible for the mental burying of these catastrophes. People like to

believe, he asserted, that the earth and the solar system as a whole have existed in peace, in harmony, and in their present order for the total period of human history and prehistory.

Planetary texts (the Ammizaduga tablets, for instance¹¹) from before 700 B.C. are considered distorted or inaccurate when they do not agree with astronomical retrojections from present conditions. The approach is almost always taken that *these texts* are wrong, not modern ideas. Velikovsky feels that texts and evidences of other types (such as old sundials) show signs of past conditions being different from the present order of things.

Velikovsky then dealt with claims he has made since 1950, particularly with his assertion that the Venusian atmosphere should contain hydrocarbons in substantial quantities.¹² This was completely unsuspected when he wrote *Worlds in Collision*, but was suggested at the time of the Mariner II probe.¹³

Later this conclusion was questioned and considered unlikely,¹⁴ but Velikovsky insists that the present evidence leaves the question still an open one. He is confident that further research will vindicate the conclusion that he has arrived at on this issue from historical literature alone—that gaseous hydrocarbons exist in substantial quantities in the atmosphere of Venus.¹⁵

Velikovsky has always drawn very heavily on ancient records to back up many of his hypotheses. He has gathered much material referring to "a downpour of bitumen," "fire water," "rain of fire," "stream of hot naphtha," etc., and he correlates these references with his theorized approach of Venus to Earth. If his case is not substantiated at this point then virtually all of his other postulates from the historical record must be held in question.

Discussion of the First Day

The paper by Ralph E. Juergens entitled, "Plasma in Interplanetary Space: Reconciling Celestial Mechanics and Velikovskian Catastrophism," was the next item on the program. Juergens tried to show that in modern time, i.e. in post International Geophysical Year, celestial mechanics, planetary bodies do not move around in an electromagnetic vacuum, but in electromagnetically charged "sheaths" with polarities different from that of the plasma through which they travel and with decreasing field intensities from the planetary surfaces.

The type of catastrophic event described by Velikovsky is more likely to be characterized by contact of electromagnetic sheaths rather than by contact of atmospheres or even the bodies themselves. Sheaths would then clash, forces much more powerful than gravity would be released, and thunderbolts of immense size and

power would result as electrical fields tried to neutralize themselves. In this way many of the phenomena described in *Worlds in Collision* would be given a physical basis.

Juergens also suggested that the sun's heat is fueled by strong electrical fields rather than by an internal nuclear engine, citing Melvin Cook as an originator of this type of approach.¹⁶ In a later comment Cook, as an invited scholar, proposed that possibly gravity itself could be explained by this model of electrically charged bodies, but he differed with Juergens on the important point as to whether the earth had a positive or a negative charge.

Another invited scholar, J. Dwayne Hamilton, was unconvinced that the violence of any competing forces would be anywhere near the order of magnitude required to produce the catastrophic electrical effects suggested by Juergens and Velikovsky. Velikovsky was quick to rise to the defense of Juergens. However, he was very careful to suggest that Juergens could be right or wrong, but the basic tenets of his own theories could accommodate any of Juergens' possible correct suggestions and also survive any of Juergens' possible errors.

At the afternoon session of the first day Dr. C. J. Ransom presented two papers. In the first entitled, "Old Arguments against the Velikovsky Theory," he made one point which many creationists will recognize as having been frequently directed against their ideas. This is the argument that any view presented by a non-specialist in that field loses impact since it is almost always based on derived data. All the information is gathered second-hand from other sources rather than constituting original field or laboratory research.

Ransom, and creationists, would be quick to make the counter-assertion that, if all theories that involved derived or second-hand data were to be cast aside, then much of science as we know it today could not exist. Also if only specialists were to be listened to most of the advances in seventeenth, eighteenth and nineteenth century science would be lost to us. This is not meant to deny, of course, the tremendous advances that have resulted from increased specialization, but to emphasize that on occasion a non-specialist, or a generalist, with a different view or with a greater breadth of view can also make important contributions to knowledge.

In Ransom's second paper, "Geological Mechanisms and Catastrophism," he gave numerous but rather scattered examples of recent changes of sea level and other phenomena not readily accommodatable in purely uniformitarian theory, but provided no framework or timing or type of catastrophe into which they might fit. In commenting at the conclusion of the paper, Velikov-

sky felt strongly that coal formations in many cases show features suggesting catastrophic formation, such as:

(1) a large number of the trees, etc., found in coal do not grow in swamps;

(2) fifty feet of coal, which can be found on occasion, require up to six thousand feet of vegetative growth which are unlikely to have had the chance to accumulate all in the one swamp situation;

(3) undivided coal seams in one area may split into two or more layers elsewhere;

(4) many kinds of marine life are found in coal; deep sea strata are sometimes found between seams;

(5) and erratic (presumably rafted) boulders are found in coal.¹⁷

For all of these reasons Velikovsky would favor the accumulation of coal in a marine, tidal wave, strong current, frequent submergence and emergence, catastrophic situation. Creationists such as Harold Coffin and N. A. Rupke, who have investigated coal formation and deposition as a Flood associated phenomenon, would be quick, I think, to agree.¹⁸

Wilfrid Francis, a major authority on coal, was mentioned by Velikovsky as commenting sympathetically on the idea of catastrophic formation.¹⁹

Albert W. Burgstahler then spoke on "The Nature of the Atmosphere and Clouds of Venus." In his analysis he concluded that some case could already be made for the presence of hydrocarbons in the atmosphere of Venus on the basis of the infrared spectra so far published, but that this case could be described only as very tentative. He insisted, however, that it is not possible yet to say that the atmosphere of Venus contains *no* hydrocarbons. Velikovsky in comment was very firm on the point that the case for hydrocarbons is still quite strong.

Discussions of the Second Day

The second day opened, like the first, with a keynote address by Velikovsky. Being the day set aside for history, it was devoted almost entirely to his historical/chronological work and to describing the contents of the volumes to succeed *Ages in Chaos*. Much of this is already available in an extremely abbreviated form in "Theses for the Reconstruction of Ancient History."²⁰

In the next paper, "Testing the Catastrophic Theory with Evidence from the Historical Sciences," E. W. MacKie tried to show how a variety of tests could be produced to evaluate Velikovsky's theories of catastrophism and concluded by giving some details of a test that he himself had attempted. In looking at radiocarbon dates of material derived from fossil

shorelines around the United Kingdom, there seemed to be some suspicion of clustering around similar time periods, thus suggesting eustatic (global) rather than isostatic (local) changes. There also appeared to be some evidence of vulcanicity in Iceland at the same time.

The same type of test for soil layers between lava flows, if dated for the whole world, should show clustering around several time periods—if catastrophic events on a world wide scale occurred. This could possibly be attempted at present with the material already published in *Radiocarbon*. The same type of test could be done on short-lived organic materials found in association with destruction levels on archaeological sites. If worldwide catastrophic occurrences were spread throughout history then a clustering of dates, rather than a random spread, should also be in evidence.

MacKie also looked in some detail at Thom's work on ancient stone monuments in Western Europe and at the conclusions that Thom made about their use for astronomical purposes.²¹ However, in trying to answer the questions, do these monuments fit retrojections of the present celestial arrangements, or does one need to postulate changes in the celestial order to explain their orientations, MacKie had to conclude that from his detailed investigations of sites in Western Scotland no definitive answer could be given.

Burgstahler, in his second paper entitled, "Radiocarbon Dates from Near East Archaeology," began by giving a list of the sources of error that can provide problems in radiocarbon dating. He was summarizing part of the contents of Harold Barker's paper in the *Journal of African History*.²² Readers of papers by Brown, Cook and Whitelaw in the *Creation Research Society Quarterly* will be familiar with most of this material. Then, in an aside comment, Burgstahler made an extremely interesting remark which was not considered at any later date, but which has a bearing on Velikovsky's and Courville's placing of the Exodus. He asked: "How did Moses, in Goshen, keep in almost daily contact with the Pharaoh since Middle Kingdom Pharaohs stayed in Thebes?" (The two areas are some three hundred miles apart).

In fact it would appear that most Twelfth and some Thirteenth Dynasty Pharaohs (which fits Courville's chronology in particular) had their capital at Ithtowe a few miles south of the Delta region.²³ This question *would* present problems to an Eighteenth Dynasty exodus (Thebes or Akhetaton as capital), but not necessarily to a Nineteenth Dynasty exodus under Rameses II, or Merneptah, who had their capital in the Delta.

Greenburg's paper, "The Lion Gate at Mycenae, a Study in Art-Historical Contradictions," favored the eighth century B.C. as an approximate dating for this edifice, rather than a thirteenth century B.C. date, the conventional one in presently accepted chronology. This alteration would fit in with Velikovsky's reconstructions.

Papers by Rose, Mullen, Willhelm, and Grinnell also concentrated mainly on Velikovsky's historical theories. Mullen, in dealing with the Pyramid Texts of Old Kingdom Egypt, felt that they suggested there was a time before the Deluge when little or no agriculture was practiced. The climate was sufficiently equable and food was sufficiently plentiful not to require it.

After the Flood, particularly in arid river basins, the most successful and stable human utilization would be through unification in order to have more control over the land, the river, and water collection, distribution and drainage systems. The unification of Egypt under Menes may have been simultaneous with widespread organization for cultivation after the Flood, and Mullen considers that this Flood may have been as late in time as 3400 to 3200 B.C.

Any attempt to date the Flood from the Biblical text has some numerical problems attached but a spread of from 2300 to 2500 B.C. would cover most calculations. This is later than all of the conventionally proposed dates for Menes, but under Courville's analysis of pre-Exodus Egypt (a subject on which Velikovsky has so far produced no major publication) Menes would be dated at circa 2200 B.C.²⁴

Reading into his data somewhat, Courville implies a Flood date of circa 2360 B.C.,²⁵ which makes this the only strictly academic analysis I have ever seen which uses both Biblical data and secular Egyptian data to derive a framework that places Menes *after* the commonly accepted dates for the Flood. This point alone means that continued work on Velikovsky's chronological ideas is worthy of some attention by creationists. It also illustrates the changes that have occurred since early researchers²⁶ attributed a date of 5867 B.C. to Menes.

Some Third Day Events

In an interlude before the final session, Dr. Ryan Drum from Bellingham, Washington, made an unofficial and unscheduled presentation of slides which he described as representing part of the collection of ornamented stones in the possession of Dr. Javier Cabrera (160 Bolivar, Ica, Peru). These stones, which supposedly were uncovered during land slippages at the time of the Huascan earthquake of recent years, were described to Dr. Drum by Dr. Cabrera as being 250,000 to one million years old.

Pictures on the stones show dinosaur-like creatures, amongst others, with human-like creatures also being depicted in association with them. The major difference between them and human beings today was that all drawings showed four fingers instead of five.²⁷ Drum was not sure whether these stones were ancient works of art and were true representations of some actual past condition, or whether they were ingenious forgeries perpetrated by some person unknown for some purpose unknown.

The final session of the symposium was thrown open for shorter presentations from invited scholars. Mr. Bruce Mainwaring in one short address urged caution in the use of carbon 14 dating. Both he and Velikovsky in later comment described attempts to get carbon 14 dates of twenty samples of Twentieth and Twenty-first Dynasty materials to test conventional versus revised chronologies. The Museum of the University of Pennsylvania managed to supply no samples for the Twentieth Dynasty and only six for the Twenty-first.

According to conventional chronology, the Twenty-first Dynasty would be placed around 1000 B.C., and according to Velikovsky around 480-280 B.C. Two of the six specimens were too old for *both* chronologies (1905 and 2343 B.C.), and two were too young (860 and 1010 A.D.). Hence this particular test failed. No information on possibility of sample contamination was given at the meeting, but presumably rather careful selection was done by the Museum to obtain a set of reasonably representative samples.

Mainwaring also referred to the Nineteenth Dynasty British Museum sample No. 658 which was dated at 1041 B.C., whereas the other half of the same sample of material was calculated at 1263 B.C. at the University of Pennsylvania. All radiocarbon sample dates are supplied with a range of error based on standard deviation principles, but the values suggested above make one suspect that the statistical precision even of the ranges, never mind that of the central date, may still bear a somewhat tenuous relationship to the age in calendar years.

Velikovsky, however, still felt that carbon 14 could be used for dating purposes when applied judiciously. He suggested that from the catastrophes he has described in his works a lot of "dead" Carbon 12 from volcanoes, and possibly from the burning of oil (Venusian hydrocarbon precipitates) and forests, would give contamination at certain periods of time, just as industrialization does at present. The ratio of C_{12}/C_{14} would change in such a manner as to make material seem older.

On the other hand additional cosmic ray penetration through magnetosphere field strength reduction or neutralization would have the oppo-

site effect. More cosmic rays would penetrate, more C_{14} would be formed, making dates seem younger.

In looking at these two conflicting actions he tended to believe that during the most severe catastrophe (the Flood) the quantity of cosmic rays was overwhelming and, in later catastrophes, volcanoes, etc., would be the major forces in ratio change. Some fairly sophisticated recalibration would be required but Velikovsky felt that where dates were reasonably fixed, e.g. Solomon, then contemporaneous short-lived materials from Egypt (Queen Hatshepsut's time in his chronology) could be cross tested to give a fix on which to base Egyptian materials. With a number of such fixes, assuming one time framework has been established by some other method, a reliable C_{14} dating method could be constructed as far back as 1500 B.C.

A later comment by Dr. Kimball S. Erdman of Slippery Rock State College raised the point that although Velikovsky had produced works on physical catastrophism, its implications and effects on history, he had not really integrated these theories to any great extent into the framework of biology. The section in *Earth on Upheaval* (Chapter Fifteen, "Cataclysmic Evolution") on the evolutionary effects of massive radiation was only a beginning.

Dr. Erdman could see no method by which two mutually compatible mutations could be produced at the same time in the same region so that the breeding and continuation of new species could occur. There would be no long term process of natural selection and gradual change available in an evolutionary model of this type.

In reply Velikovsky conceded, as Erdman admitted at the beginning, that one man cannot have all the answers. He suggested that possibly here was an avenue which he had opened up that sympathetic biologists might follow.

One can see that sympathetic biologists might be rather hard to find as the statistical improbabilities of evolution would seem to increase somewhat under these conditions. On the other hand, as Velikovsky noted, these periods would also be characterized by mass extinction as many old-established species and most of his postulated mutations would not be able to adjust to the new and initially rather hazardous environments.

The barrenness of the evolutionary "hypothesis," whether manifested in a uniformitarian or catastrophist framework, was admirably illustrated and even admitted in this discussion. It will be interesting to see if a slow realization that creationists can give a perfectly adequate answer to these biological dilemmas (as to many another dilemma) will yet follow. The swing toward catastrophism which came through so

strongly at the conference already shows that much of the evidence for rapid deposition and extinction and transportation, to which creationists repeatedly point, is receiving thoughtful consideration.²⁸

The final session then closed with an address by Velikovsky returning to the topic of collective amnesia, broadly relating his theories in that area to Freudian psychology. His professional occupation, in fact, before devoting all his time to studies in catastrophism was as a psychoanalyst.

Some Implications for Creationists and Creationism

Velikovsky propounded a number of hypotheses in the 1940's and early 1950's which brought the wrath of influential segments of academia on his head. After more than a decade, with little additional publication on the topic, the number of seeming confirmations of his views are greater than they have ever been. With such a strong orientation toward catastrophism and with such a common use of the Bible as source material, it behooves creationists who believe that God has on a number of occasions intervened in human history to pay particular attention to the Velikovsky movement. This, however, when one thinks of the drastic scientific and historical reorganizations that would be necessary, is not a bandwagon to be jumped upon before a considerable amount of testing and personal weighing of evidence has been done.

Basically creationists would be interested in the physical catastrophes but, since most of Velikovsky's evidences are literary and historical, his historical theses are almost inextricably intertwined with his physical/celestial ones. The present writer feels that a very strong case has been made for the historical readjustments that Velikovsky proposes.

This is especially important because of the compression that results, which brings all of the recorded history of one of the world's earliest civilizations into a post Biblical flood period of later than 2500 B.C. This, of itself, does not make these reconstructions correct but it is a point that makes one take notice.

Courville, of course, could be accused of bias in this matter from the beginning since he accepts the Bible literally, but Velikovsky who dates the Flood tentatively at between five and eleven thousand years B.C. is under no compulsion to "strait-jacket" his history by a third millennium Flood dating.

If Velikovsky is right then the earth could have suffered a series of cosmic catastrophic events, some of which were more serious than others, and concomitant tidal and crustal dis-

ruptions with massive erosion, sedimentation, destruction, fossilization, and possibly even continental displacement could have taken place.

The presence of unconformities, possible deeply buried erosion surfaces, buried river valleys, theorized ice advances and recessions fit somewhat uncomfortably on occasion with a one catastrophic event Flood Geology model. The addition of other, albeit smaller, catastrophic periods would mean that virtually all of the world's erosional and depositional forms would not have to be accounted for in the one event.

It has sometimes been suggested that a marked discontinuity exists after the conventionally named Cretaceous,²⁹ with possibly these and earlier sediments being Flood sediments and later ones having been caused by more recent events. Velikovsky's suggested catastrophes could provide these events.³⁰ Cuvier, amongst others in the nineteenth century, in the end came to depart from a flood model to one of successive terrestrial catastrophic engulfments.

Caution should, however, also be exercised here before jumping to premature conclusions since in the Middle and Near East these catastrophes, according to Velikovsky and his supporters, wrecked cities, burned vegetation, and caused massive migrations of humans and animals. The wrecked cities were often rebuilt so this may not suggest sufficient force for widespread rock strata deposition from the later catastrophes, but merely widespread surface destruction.

Velikovsky's theories are aligned strongly against geological (and astronomical) uniformitarianism and against slow, gradual evolution. They emphasize physical catastrophism as being the most powerful moulding force in earth landform and lithologic stratification. Creationists therefore should not ignore this movement.

Careful evaluation is needed before strong commitments are made for or against these theories. Their implications are many and deep, and much harm has been done in the past by precipitous espousal or rejection of causes. The theories are naturalistically oriented despite their strong Biblical content. Velikovsky uses the Scriptures not as inspired documents but more as one of the numerous sources of legend from the past.³¹ Yet Patten and Courville have been able to give valuable additions to Christian oriented scientific and historical literature from this viewpoint.

References

- ¹*Pensée* Special Issue, "Immanuel Velikovsky Reconsidered," May 1972, 2:2. Published by Student Academic Freedom Forum, P.O. Box 414, Portland, Ore. 97207.
- ²Velikovsky, I. 1950. *Worlds in collision*. The Macmillan Company, New York. Citations in this paper refer to the Delta Books printing of 1965.
- ³But see occasional instances such as *Worlds in Colli-*

- tion, p. 94: "The celestial body that the great Architect of nature sent close to the earth, made contact with it in electrical discharges. . . ."
- ⁴Amos 1:1.
- ⁵Isaiah 37:36.
- ⁶Velikovsky, I. 1952. *Ages in chaos*, Vol. 1. Doubleday Publishers, Garden City, New York. 1952.
- ⁷See short report of Robert Treash, *Pensée*, Fall 1972, pp. 43-44, entitled, "Is Asteroid Toro a Remnant of Comet-Planet Collision?"
- ⁸See *Pensée*, May 1972 issue, "A Record of Success," pp. 11-15 and p. 23.
- ⁹Courville, D. A. 1971. *The Exodus problem and its ramifications*. Two volumes. Challenge Books, Loma Linda, California. Also his article in *Bible-Science Association Newsletter*, August-September, 1972, pp. 4-5.
- ¹⁰Patten, D. W. 1966. *The Biblical flood and the ice epoch*. Pacific Meridian Publishing Co., Seattle, Wash.
- ¹¹Velikovsky, I. 1950. *Op. cit.*, pp. 198-202. Also Velikovsky Symposium paper, "Babylonian Observations of Venus" by Lynn Rose.
- ¹²De Grazia, A. *et al.*, 1966. *The Velikovsky affair: scientism vs. science*. University Books, New Hyde Park, New York, p. 16.
- ¹³*Ibid.*, p. 18 citing Mariner II experimenter Lewis D. Kaplan's article in *Newsweek*, March 11, 1963.
- ¹⁴Plummer, W. T. 1969. Venus clouds: test for hydrocarbons, *Science*, 163:1191-92, March 14. Also as a matter of interest: Harold Armstrong. 1969. Comments on scientific news and views, *Creation Research Society Quarterly*, 6:107.
- ¹⁵See Velikovsky, I. 1950. *Op. cit.*, especially the section on Naphtha in Part 1, Chapter 2 (pp. 53-58) for his reasons for adopting this position.
- ¹⁶Cook, M. A. 1958. *The science of high explosives*. Reinhold Publishers, New York. See appendix section.
- ¹⁷Also see Velikovsky, I. 1955. *Earth in upheaval*. Delta Paperbacks edition, N.Y., pp. 215-220.
- ¹⁸Coffin, H. G. 1969. Research on the classical Joggins petrified trees, *Creation Research Society Quarterly*, 6:35-44; and N. A. Rupke. 1966. Prolegomena to a study of cataclysmal sedimentation, *Creation Research Society Quarterly*, 3(1):16-37.
- ¹⁹Francis, W. 1961. *Coal: its formation and composition*. Second edition. E. Arnold, Ltd., London. See particularly the preface to the second edition and all of Chapter 1 (pp. 1-47) on the origin of coal.
- ²⁰Velikovsky, I. 1945. Theses for the reconstruction of ancient history, *Scripta Academica Hierosolymitana*, New Series, Scientific Report III. (Limited distribution, but available on interlibrary loan from University of California at Berkeley and Columbia University).
- ²¹Thom, A. 1967. Megalithic sites in Britain. And in 1971. *Megalithic Lunar Observations*. Oxford University Press. An interesting review of Thom's work by D. C. C. Watson appears in *Creation Research Society Quarterly*, 1972, 9(1):76-77.
- ²²Barker, H. 1972. The accuracy of radiocarbon dates, *Journal of African History*, 13(2):177-187.
- ²³Courville, D. A. *Op. cit.*, Volume I, p. 224. Courville's source is J. H. Breasted. 1946 *A history of Egypt*. Charles Scribner's Sons, N.Y., p. 157.
- ²⁴*Ibid.*, Volume II, p. 33.
- ²⁵*Ibid.*, Volume II, p. 142.
- ²⁶*Ibid.*, Volume I, p. 15, footnote 1.
- ²⁷Compare with E. von Däniken. 1971. *Chariots of the gods?* Bantam Books, paperback edition, New York, p. 21 for similar human-like drawings at Tiahuanaco.
- ²⁸In a letter contained in the Fall 1972 issue of *Pensée* Dr. Erdman continues the discussion on catastrophism and evolution. The following paragraph is worth quoting:
- For many years I have been very disenchanted with the current theories of evolution as well as those dealing with fossilization, extinction, geological processes, etc. Other biologists have argued at length with me basing their position on the claim that there is no other possible alternative. They, of course, object to individual special creation, and catastrophic evolution hardly ever enters into the discussion as a real possibility. (p. 49)
- ²⁹One recent example is Harold Armstrong. 1972. Comments on scientific news and views, section entitled, "Discontinuities and the Flood," *Creation Research Society Quarterly*, 9(1):72.
- ³⁰The deep burial of such things as the Calaveras skull could be explained by this type of mechanism. For details on Calaveras and other "early" fossils of man see Frank W. Cousins. 1966. *Fossil man; a reappraisal*. Evolution Protest Movement Publications, Santhia, Stoke, Hayling Island, Hants, United Kingdom.
- ³¹See interview with Velikovsky by Robert Goldfarb reported in *Pensée*, May 1972, pp. 48-49.

TECHNICAL MONOGRAPH ANNOUNCEMENT

The Institute for Creation Research (2716 Madison Avenue, San Diego, CA 92116), a totally separate creationist organization from the Creation Research Society, has begun publication of an important Technical Monograph Series as part of a goal to re-establish sound Biblical creationism as a viable scientific position. Four monographs are now available:

SPECULATIONS AND EXPERIMENTS RELATED TO THE ORIGIN OF LIFE: A CRITIQUE by Duane T. Gish, Ph.D. ICR Technical Monograph No. 1. A technical monograph on the naturalistic theories of the origin of life, documenting the biochemical impossibility for non-living chemicals to evolve into living molecules. 1972. Paper \$2.50.

CRITIQUE OF RADIOMETRIC DATING by Harold S. Slusher, M.S. ICR Technical Monograph No. 2. A study of the principles, assumptions,

and methods of the most frequently used radioactive "clocks," including Carbon-14, uranium-lead, thorium-lead, potassium-argon, and rubidium-strontium. The fallacies, weaknesses and limitations of such methods are exposed. 1973. Paper \$2.50.

THE CENTER OF THE EARTH by Andrew J. Woods, M. S. Discussion by Henry M. Morris, Ph.D. ICR Monograph No. 3. A fascinating determination by computer of the earth's geographical center. 1973. Paper \$1.50.

ORIGIN AND DESTINY OF THE EARTH'S MAGNETIC FIELD by Thomas G. Barnes, M.S., Sc.D. ICR Technical Monograph No. 4. An analysis of the nature and rate of decay of the earth's magnetic field, yielding startling new evidence that the earth cannot be more than about 10,000 years old. 1973. Paper \$2.50.

A QUANTITATIVE ANALYSIS OF THE LIFE SPANS OF THE GENESIS PATRIARCHS

JAMES E. STRICKLING*

Data from two sources (the Septuagint and Masoretic Texts) are used to generate exponential functions for expressing the post-Deluge life spans of the Genesis Patriarchs. When the functions are extended into a period of time less questionable than that of the Patriarchs and used to calculate dates and time spans in that period, two of those based on the Septuagint show reasonable agreement with known values. These functions are then used to establish a correction factor for the Carbon 14 dating process.

Introduction

Exponential functions are used to describe many natural processes. Examples include radioactive decay, build-up and decay of electric charge on capacitors, and certain biological processes. The mathematical expression of an exponential function is usually based on the number e .**

As an example, consider the time function $f(t) = 1 - e^{-t/T}$, where t is expressed in an appropriate unit of time and T is the time constant peculiar to a given process. For an exponentially increasing function such as this, T is the time required for the function to increase to 63.2% of its maximum value. This function begins at $f(t) = 0$ when $t = 0$ and approaches 1 as t approaches "infinity."

An exponentially decreasing function based on the same time constant T would have the form $f(t) = e^{-t/T}$. T is the time required for the function to decrease to 36.8% of the initial value. At $t = 0$, $f(t) = 1$, and $f(t)$ approaches 0 as t approaches infinity.

When an exponential function is plotted on a logarithmic scale the function assumes the form of a straight line.

With this brief background, attention will now be turned to the post-Flood Patriarchs.

Genesis Patriarchs

Graphical plots of the decreasing life-spans of the Patriarchs delineated in the Book of Genesis seem to indicate an exponential decay function. This possibility has been investigated by Patten¹ and Armstrong.² Both works ascribe this decrease to changing environmental conditions following the Deluge.^{3, 4}

Whitcomb and Morris suggest that the collapse of a possible vapor canopy during the Deluge subsequently left the earth exposed to hazards previously unknown; e.g., cosmic rays. It is also noted that Carbon 14 is formed in the upper regions of the atmosphere. Carbon 14 is, of course, the basis of a much used radioactive dating

process. The vapor canopy could have prevented Carbon 14 from reaching the lower levels of the atmosphere (life zones) so that antediluvian organic remains would contain little or no Carbon 14.

Armstrong⁵ assumes, "... that the rate of change or increase of the concentration of radioactive carbon (C_{14})* is proportional to the rate of change or decrease of average lifetime. This seems plausible if both changes are due to the same cause." He attempts to establish a correction factor for the Carbon 14 dating process based on the Patriarchal genealogies.

However, Armstrong assumes that the Carbon 14 reached a steady state level around 1000 B.C. Melvin Cook⁶ claims that such a steady state has not been reached.

The author believes the lower age limit "pegged out" at 70 years** around 1000 B.C.; it followed an external exponential process just so far and was then inhibited by other factors. If this is true, a correction factor based on the genealogies alone cannot be determined; the beginning point (i.e., time of the Deluge) must be known.

It would be interesting to determine if there is an exponential function that closely approximates the data provided in Genesis 11.

Mathematical Analysis

Graphs showing the Patriarchal life spans as a function of time elapsed since the Deluge can be somewhat ambiguous. For instance: The Masoretic Text states that Arphaxad was born two years after the Deluge and lived 438 years. It is no problem plotting 438 on the vertical axis, but what value should be used on the horizontal axis to represent this state of longevity? He lived from two years after the Deluge until 440 years after the Deluge.

Should this longevity be affixed on the horizontal axis to the time of his birth (2), the midpoint of his life span (221), or the time of his

*That is, in organisms living after the Flood.

**This of course has varied, decreasing to around 36 years in ancient Greece and Rome and to around 49 years in Europe during the Middle Ages. However, 70 seems to be the expected value, given sound hygienic practices, freedom from pestilence, etc. This level has been attained again by modern advanced nations.

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** $e = \lim_{x \rightarrow 0} (1 + x)^{1/x}$

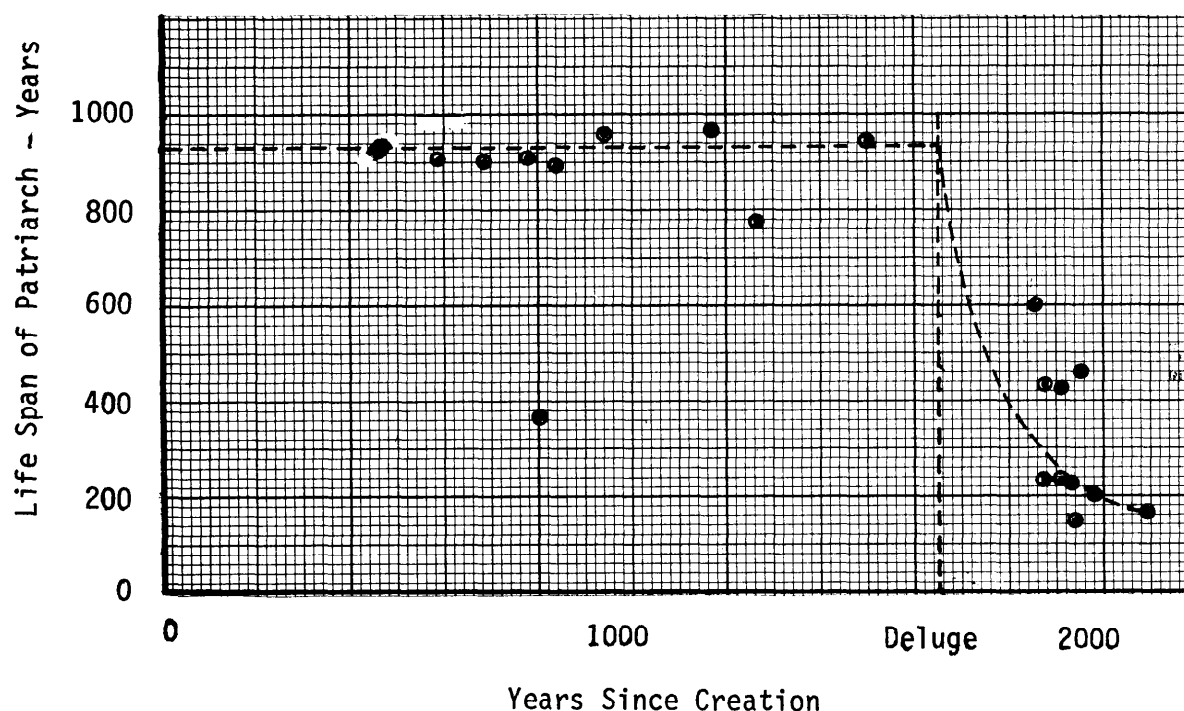


Figure 1. Plot of Patriarchal Life Spans from Masoretic Text.

expiration (440)? Armstrong plots the age of the Patriarch in question against the time of his maturity; or as he puts it, the time of his "first begetting."

There are two major divergent accounts of the Patriarchal genealogies: the Masoretic and the Septuagint. Tabulation of data from these texts is given in Tables I and II.⁷ The first column in each table gives the age at "the first begetting." The second column gives the age at death (life span), except for Enoch "who was translated and did not see death." The mid-points (half the age attained) of each life span are plotted in Figures 1 and 2 for these texts, respectively.

A regression analysis provides a "curve of best fit" for the given data. This has been done for the dates of maturity and the mid-points of the life spans for the Septuagint and the dates of maturity for the Masoretic Text. The life span mid-points for the Masoretic Text did not lend themselves to this analysis. The results are expressed as

$$A = ke^{-t/T}$$

where A = age (life span) of Patriarch; k = a constant determined from the analysis (This should be approximately equal to the pre-Deluge average life span.); t = time elapsed since the Deluge; and T = the time constant determined from the analysis.

The function determined from the Masoretic Text based on the dates of maturity is

$$A = 929e^{-t/244}$$

	Table I Masoretic Text		Table II Septuagint	
	Age at "Begetting"	Lifespan	Age at "Begetting"	Lifespan
Adam	130	930	230	930
Seth	105	912	205	912
Enos	90	905	190	905
Cainan	70	910	170	910
Mahalaleel	65	895	165	895
Jared	162	962	162	962
Enoch	65	365	165	365
Methuselah	187	969	187	969
Lamech	182	777	188	753
Noah	500	950	500	950
Shem	100	600	100	600
Arphaxad	35	438	135	535
Cainan	—	—	130	460
Salah	30	433	130	460
Eber	34	464	134	404
Peleg	30	239	130	339
Reu	32	239	132	339
Serug	30	230	130	330
Nahor	29	148	179	304
Terah	130	205	130	205
Abraham		175		175

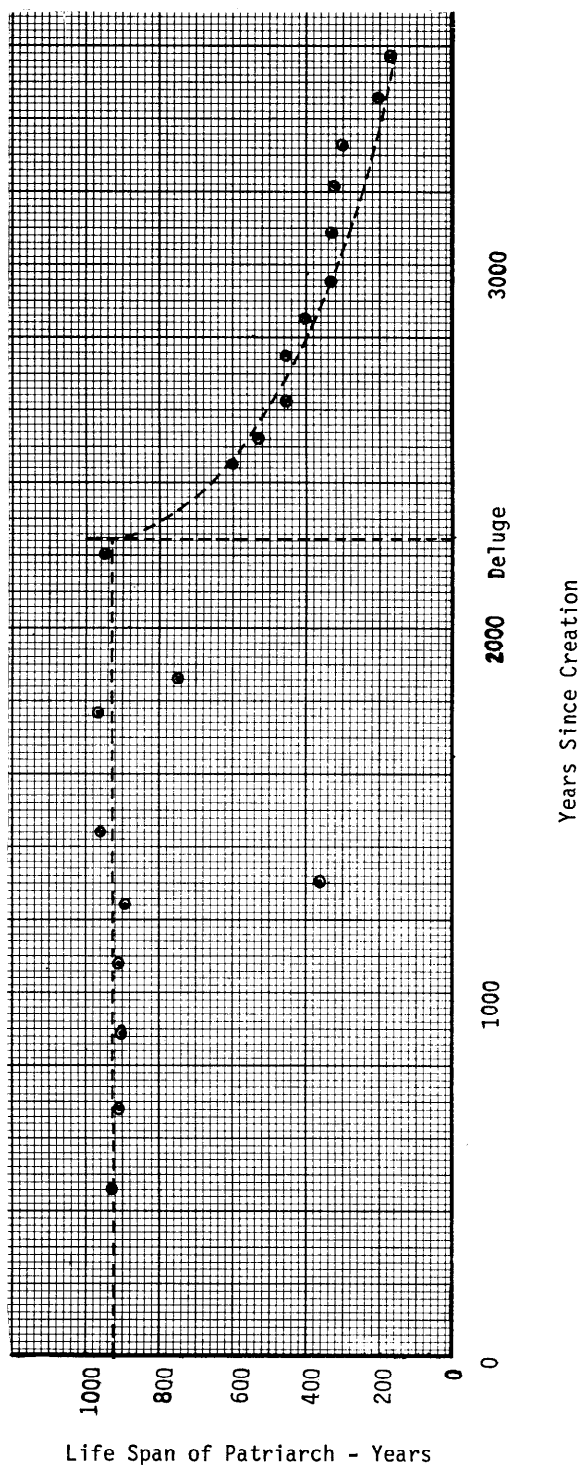


Figure 2. Plot of Patriarchal Life Spans from Septuagint.

The function determined from the Septuagint based on the dates of maturity is

$$A = 929e^{-t/1163}.$$

The mid-points of the life spans from the same data yield

$$A = 929e^{-t/1010}.$$

To eliminate the aforementioned ambiguity, a plot can be made showing the age at expiration on the vertical axis and the entire period of time the individual lived shown horizontally. On semi-log graph paper (logarithmic scale on one axis), the exponential function (straight line) to which the life spans are assumed to be related should cross each of the life spans. This is shown in Figure 3 based on data from the Masoretic Text.

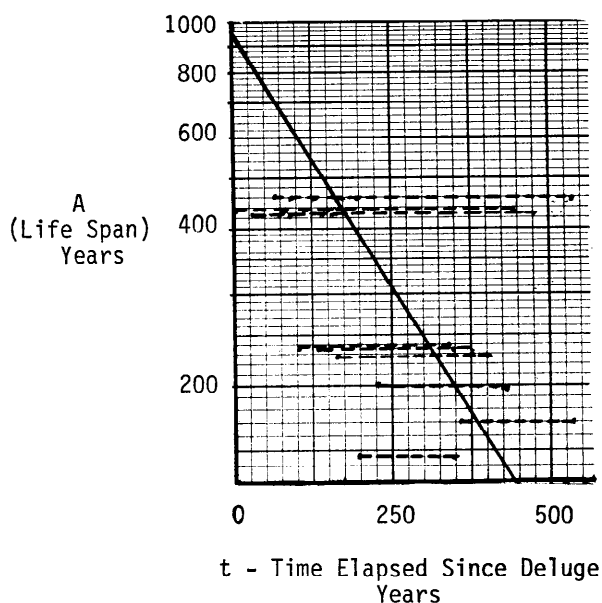


Figure 3. Visual Construction of Exponential Function Based on Masoretic Text. The solid line represents the exponential function. The dotted lines represent the life spans of the post-Flood Patriarchs. Nahor, whose life span is not crossed by the solid line, is represented by the bottom-most dotted line.

A straight line can be drawn across the life spans only if Nahor is excluded. If Nahor is excluded and a line is drawn from the 925 year point on the vertical axis, the resulting time constant is 225 years, so that

$$A = 925e^{-t/225}.$$

Consider now a similar plot based on the Septuagint. This is shown in Figure 4.

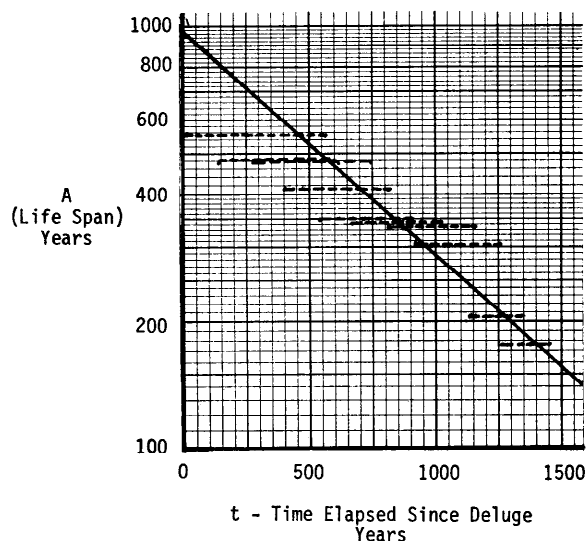


Figure 4. Visual Construction of Exponential Function based on Septuagint Text. The solid line represents the exponential function. The dotted lines represent the life spans of the post-Flood Patriarchs.

Again constructing a line from the 925 year point on the vertical axis, every life span is crossed. The time constant in this case is 850 years, so that

$$A = 925e^{-t/850}$$

The five relations are tabulated in Table III.

TABLE III
Exponential Functions Representing Patriarchal Life Spans after the Deluge

	Regression Analysis		Visual Construction
	Maturity	Mid-point	
Masoretic Text	$A = 929e^{-t/244}$ I*	Not Applicable	$A = 925e^{-t/225}$ II
Septuagint	$A = 929e^{-t/1163}$ III	$A = 929e^{-t/1010}$ IV	$A = 925e^{-t/850}$ V

Preference might be given to the function that is most compatible with data from a time period that is not so questionable as is that of the Patriarchs. However, the data must come from a period of time prior to that in which the lower level of the life span (70 years) was reached.

The ages (life spans) of Abraham and Joshua provide the data for one such compatibility test. (Other known life spans could also be used.) They are used to calculate the time interval separating Abraham and Joshua by means of the exponential time constant.

Two values, v_1 and v_2 , of an exponential function separated by an interval of time $\bar{t}$ are related as follows:

*Roman Numerals are provided merely to identify the functions.

$$\frac{v_2}{v_1} = e^{-\bar{t}/T}, \text{ where } v_2 \text{ is greater than } v_1.$$

The interval $\bar{t}$ is then determined, when v_1 = life span of Joshua = 110 years; and v_2 = life span of Abraham = 175 years, as follows:

$$e^{-\bar{t}/T} = 110/175 = .629$$

$$-\bar{t}/T = \ln(.629) = -.464$$

$$\bar{t} = .464T$$

The value of $\bar{t}$ calculated in this manner is somewhat ambiguous since the ages on which it is based are spans of time rather than points. Nevertheless, it will provide an indication of the validity of the function, since it is known that this period was some four or five hundred years.

The five values of $\bar{t}$ are shown in Table IV.

TABLE IV

Calculated Time Span between Abraham and Joshua					
Regression Analysis			Table III		
			T (years)	$\bar{t}$ (years)	Functions
Regression Analysis	Masoretic	Maturity	244	113	I
	Septuagint	Maturity	1163	540	III
		Mid-point	1010	469	IV
Visual Construction	Masoretic Text		225	104	II
	Septuagint		850	395	V

Another compatibility check can be made by determining when the lower limit of 70 years is reached by each of the functions, knowing this occurred prior to the time of David (who lived to 70 years of age): circa 1000 B.C. This can be done by setting the expression equal to 70 and solving for t . By Regression Analysis:

$$929e^{-t/T} = 70$$

$$e^{-t/T} = 70/929 = .0753$$

$$-t = T \ln(.0753)$$

$$t = 2.59T$$

By Visual Construction:

$$925e^{-t/T} = 70$$

$$e^{-t/T} = 70/925 = .0757$$

$$-t = T \ln(.0757)$$

$$t = 2.58T$$

The date of the Deluge derived from the Masoretic Text is approximately 2460 B.C. From Table II (Septuagint), it is approximately 3398 B.C. The "70 year date," computed from the Deluge dates, is tabulated in Table V for the five functions.

TABLE V
Initial Date of 70 Year Life Span

Regression Analysis			70 Year Date		Table III
			t (years)	(B.C.)	
Regression Analysis	Masoretic Text	Maturity	631	1829	I
	Septuagint	Maturity	3007	391	III
		Mid-point	2611	787	IV
Visual Construction	Masoretic Text		581	1879	II
	Septuagint		2194	1204	V

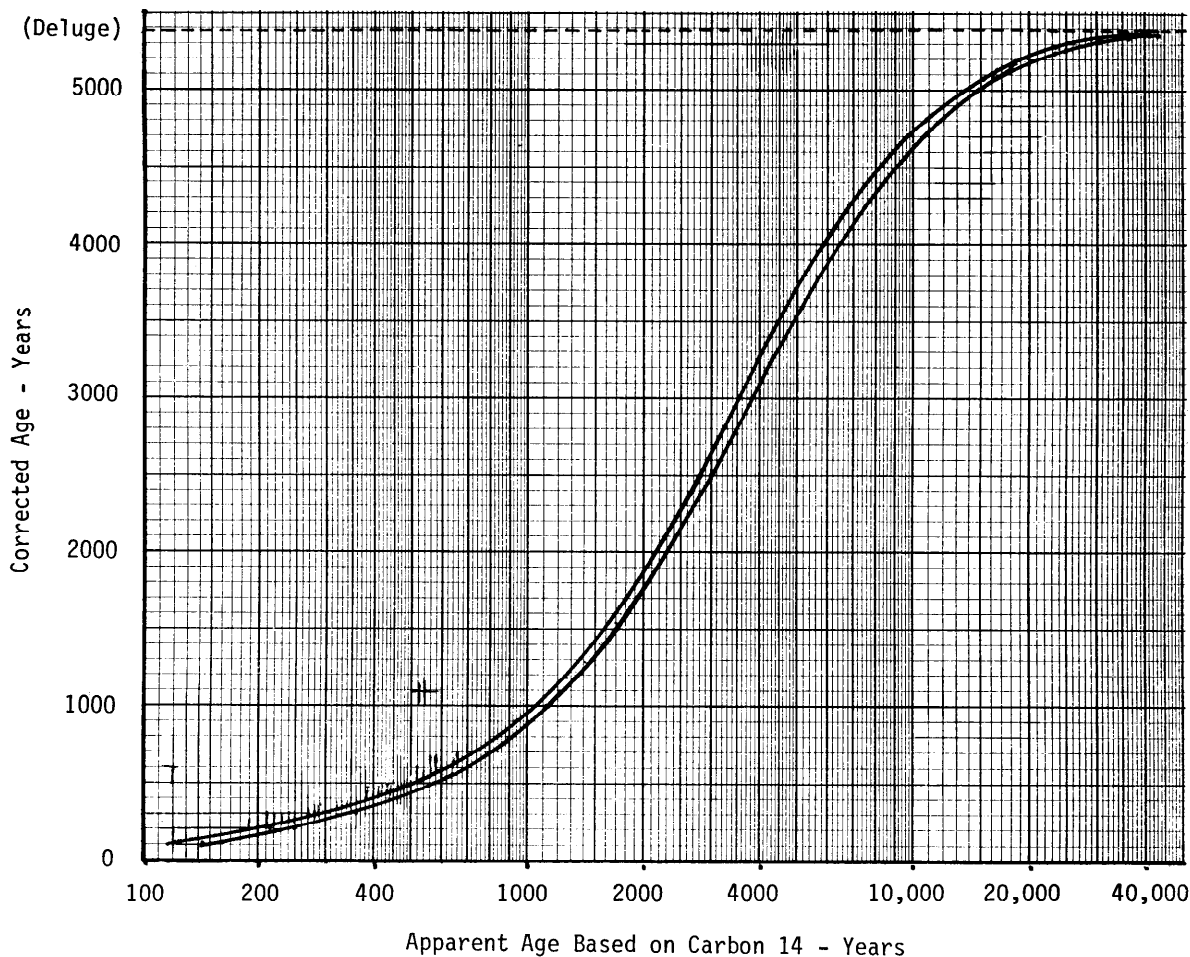


Figure 5. Correction Curves for the Carbon 14 Dating Process. The upper curve is derived from the exponential function with a time constant of 850 years. The lower curve is derived from the exponential function with a time constant of 1010 years.

The 3398 B.C. Deluge date and the 850 year and 1010 year time constants for functions IV and V as shown in Table IV have been used to determine alternative correction factors to the Carbon 14 dating process. This is shown in Figure 5.

The result of a Carbon 14 test on charcoal indicating a date of 2620-2630 B.C. for an ancient structure in Durrington Walls in England is reported in *The Genesis Flood*.⁸ It is pointed out that the date of the ancient structure according to compelling archaeological evidence should be at least 1000 years later. This means an apparent age of 4600 years for a 3600 year old object. The curve based on the 850 year time constant (V) in Figure 5 indicates a true age of 3550 years for an object dated by Carbon 14 at 4600 years. This is mentioned as a point of interest only; many such comparisons would be necessary to verify a potential correction curve.

Many Carbon 14 "adjustment factors" have been suggested. If the rate of Carbon 14 build-up has varied, no single correction factor can take that variation into account.⁹

Conclusion

None of the exponential functions presented precisely indicates the time span and date against which they are checked. However, two of them (IV and V) yield values close to those expected; these being the two based on the Septuagint (mid-point and visual construction). One might be tempted to conclude that the Septuagint is the preferred text.

However, no firm claim is made for the validity of these functions; they are presented as comparative mathematical models of the time-dependent decreasing Patriarch longevity and as a potential correction factor for Carbon 14 dating. It is hoped that further work will continue in this area.

References

- ¹Patten, D. W. 1970. A symposium on creation II. Baker Book House, Grand Rapids, Mich., p. 38.
²Armstrong, H. L. 1965. An attempt to correct for the effects of the flood in determining dates by radioactive carbon, *Creation Research Society Quarterly*, 2(4):28.
³Whitcomb, J. C. and H. M. Morris. 1961. The Genesis flood. The Presbyterian and Reformed Publishing Co., Philadelphia, Penn., pp. 23-25, 399-405.
⁴Patten, *Op. cit.*, pp. 33-35.
⁵Armstrong, *Op. cit.*
⁶Cook, M. A. 1966. Prehistory and earth models. Max Parrish, London, p. 6.
⁷Teachout, R. A. 1971. A new case for Biblical chronology, *Bible-Science Newsletter*, 9(1):1ff. January.
⁸Whitcomb and Morris, *Op. cit.*, p. 43.
⁹Hefferlin, Ray. 1972. A mathematical formulation of a creationist-flood interpretation of radiocarbon dating, *Creation Research Society Quarterly*, 9(1):68-71.

ENTROPY PRIOR TO THE FALL

ROBERT E. KOFAHL*

The assumption that the second law of thermodynamics was not in effect in the physical universe until after the Fall and imposition of the curse leads to many difficulties. Processes essential to life in the natural order, as well as thermodynamic order and predictability in all of nature are dependent upon the relationships involved in the second law. Scriptural data may be used to deduce that prior to the Fall the state of nature was one of natural, not supernatural order, though the living creatures and ecological systems were in a state of physical perfection.

It is therefore postulated that conditions described by the second law came into existence after Creation and prior to the Fall, that the disruptive and degenerative effects of random processes upon living systems were divinely constrained, and that the removal of this constraint constituted one aspect of the curse.

The assumption that conditions described by the second law of thermodynamics did not exist until after the Fall and the imposition of the curse upon all creation as recorded in Genesis 3 has apparently been widely accepted in creation-science circles without discussion. It would appear, however, upon careful examination of the place of the second law in the natural order that such an assumption leads to many serious problems. The purpose of the author is to consider foundations of the second law and its place in the natural order, and to suggest modifications to the above assumption which will eliminate the difficulties which inhere in it.

Foundations of Thermodynamics

Classical thermodynamics is concerned with energy transformations and equilibrium properties of macroscopic systems, systems sufficiently large for reproducible measurements of their properties to be made. The microscopic or atomic structure of the systems is not in view. The first law is the law of energy conservation.

The second law deals fundamentally with a property of physical systems called entropy, which has been found always to increase in irreversible processes in isolated systems. A thermodynamically reversible process is an ideal, hypothetical process in which all temperature, pressure, concentration and other gradients producing changes are infinitesimally small and all rates are infinitesimally slow. Obviously all real

processes are irreversible, since they involve finite gradients and rates, and they therefore produce increased entropy.

The entropy, S , is related to the Gibbs free energy, G , by the equation:

$$G = E + pV - TS,$$

where E = internal energy, V = volume, p = pressure, and T = absolute temperature. For a process occurring at constant temperature and pressure, the change in free energy is $\Delta G = \Delta E + p\Delta V - T\Delta S$. Thus free energy involves the entropy and is therefore related to the second law. But the equilibrium constant for a chemical reaction is related to the free energy by the equation:

$$\log_{10} K = - \frac{\Delta G^0}{2.303 RT}$$

where R is the gas constant, 1.987 cal/mole-deg; T is the absolute temperature; and ΔG^0 is the increase in standard free energy of the products over the reactants. If ΔG^0 is large positively, the reactants essentially will not react. If ΔG^0 is large negatively, the reaction will go far to completion at equilibrium.¹

Therefore, the direction of a chemical reaction and the equilibrium point are determined by application of the second law of thermodynamics through the relationship of the equilibrium constant to free energy and thus to entropy. Recall, also, that the second law may be used to describe the direction of the flow of heat and the flow of substances under pressure and concentration gradients, etc. These observations apply to the present natural order in the universe.

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Conditions before Genesis 3

What was the order of nature prior to the curse recorded in Genesis 3? Our first parents, though in an estate of holiness and intellectual and physical perfection, were nevertheless living in a natural, not a supernatural state. This may be deduced from the fact that they subsisted on food, and their bodies were flesh and blood, powered by natural chemical metabolism as ours are. There is every indication in Genesis 1-3 that once the supernatural work of creation was completed, the universe was in an orderly state in which cause and effect were normative.

Could such a state of nature exist independent of the second law? Consider, for instance, the chemical reactions involved in bodily metabolism of man and animals and in photosynthesis and other processes in the plants. Life depends upon these reactions proceeding in the proper direction and, in many instances, upon their attaining proper equilibria. In the human body the acid-base balance or pH of the blood and body fluids depends upon delicate chemical equilibria. Respiration depends upon movement of oxygen and carbon dioxide under the force of concentration gradients.

All of these processes absolutely necessary to physical life occur in accordance with the second law. In other words, the maintenance of orderly conditions and processes essential to living systems is not possible apart from the second law of thermodynamics.

Imagine, too, in the external realm of nature the improbable events, the unpredictability that could result from the absence or abrogation of relationships described by the second law. Adam might suffocate in fresh air or pick up a hot coal and get frost bite! A lake might separate into a solid block of ice at one end and boiling water at the other end. The air might separate into pockets of pure oxygen and pockets of pure, suffocating nitrogen. And these strange events could occur without violation of any physical law if relationships involved in the second law of thermodynamics were not in effect.

Statistical Mechanics Considered

At this point let us consider briefly what is called statistical mechanics or statistical thermodynamics.² Classical thermodynamics is not concerned with the atomic-molecular, microscopic structure of matter, but only with the properties and behavior of macroscopic systems consisting of trillions of atoms. On the other hand, statistical mechanics is concerned with the microscopic structure of matter and is used to relate the behavior of the microscopic elements of a system to its macroscopic thermodynamic properties.

Statistical mechanical analysis of a system starts with an assumed atomic-molecular model of the

system. It is also assumed that atoms move according to the ordinary laws of mechanics (Newton's laws of motion) plus the energy conservation law. Then, in view of the fact that literally trillions of atoms are involved in the model so that it would be impossible to follow each atom individually, a reasonable assumption is made about the relative probabilities of different microscopic states of the system. Then a mathematical-statistical analysis is made of the behavior of the collection of atoms or molecules in the system.

The result of this analysis is the fact that the equilibrium thermodynamic properties of the system—such as the temperature, pressure, energy, entropy and free energy—can be related to the average behavior of the large numbers of microscopic elements contained in the system. In particular it can be shown that the equilibrium state toward which the system spontaneously moves is the state of maximum probability, maximum entropy, maximum disorder or uncertainty on the atomic scale or level.

This leads us to the statement of a seeming paradox: The thermodynamic orderliness and predictability of the natural order depends upon the second law of thermodynamics, which is used to describe the fact that the natural order is tending spontaneously toward the state of greatest disorder on the microscopic level. Without these conditions the thermodynamics of the natural order would be characterized by disorder and lack of predictability. Also observe that the second law is of a character apparently different from such laws as the law of conservation of energy, the laws of mechanics, or the laws of gravitational and electrical forces. The second law appears to arise from the action of these other physical laws which exist independently of the second law.

Summary and Proposal

In summary, if relationships involved in the second law of thermodynamics were not in effect prior to the Fall, the thermodynamic order essential to the existence of physical life would be absent, and there would be no thermodynamic order or predictability in nature apart from special divine supervision or control, which would accomplish everything which the second law involves in the way of time-irreversible direction for the natural order.

The replacement by such total special divine controls of that which is the natural composite effect described by the other fundamental laws ordained by the Creator seems to be an unreasonable procedure. The Scriptures do not imply that the divine purpose was to block or reverse all of the effects of the second law, but rather to maintain the original physical perfection of His creatures corresponding with the total moral perfection of the creation.

I would propose, therefore, a three-part formulation:

(1) The second law of thermodynamics, as far as its general implications for physical and chemical processes are concerned, was in effect as soon as the supernatural work of creation was completed.

(2) In the original state of the world prior to the Fall, all disruptive effects of random processes upon the perfect physical design and order of living things and upon the balanced natural order of ecological systems were prevented by special divine constraints.

(3) The removal of these constraints constituted one aspect of the curse.

This formulation avoids the difficulties inherent in the concept of post-Fall imposition of the second law, for it correlates with:

(1) The data of Genesis 1-3 from which an orderly, natural physical-chemical order after

the completion of creation can be deduced.

(2) The biblical data relative to the perfect natural order prior to the Fall.

(3) The biblical data relative to the corruption and degeneration of the natural order following the imposition of the curse.

It is hoped that this proposal may lead to further and more careful analysis of this and other questions and to increased discussion and interaction between creationists, to the end that a creation model may be continually improved and thus brought into closer conformity with the data of the Scriptures and with the realities of our heavenly Father's creative handiwork.

References

¹The fundamental principles of classical thermodynamics may be found in any standard text on Thermodynamics or Physical Chemistry.

²The fundamentals of statistical mechanics may be found in any standard text on Statistical Mechanics, Statistical Thermodynamics or Thermal Physics.

RESPONSE TO ROBERT KOFAHL

EMMETT L. WILLIAMS*

Dr. Kofahl makes the assumption that the present is the key to the past in his article on the second law and the Fall. He is extrapolating present processes into the past where no observational information on metabolism, chemical reactions, etc., exists. If natural processes were different before the Fall, we have no justification for extrapolating into that period.

Drastic natural changes have occurred in the earth according to the Bible. For instance, animals initially ate vegetation (Genesis 1:30). However today there are many flesh-eating animals. What changes occurred to their metabolism and digestive processes because of this? The confusion of tongues at the Tower of Babel is another example. Something natural may have occurred to accomplish this, but we have no known means of study "at this point in time."

Considering the above unusual changes in living organisms, we cannot extrapolate particular present processes into the past any further than to the remarkable event. Frankly I am not willing to speculate about what existed before the Fall. The Bible is not that detailed in its description of natural processes.

However, there is nothing wrong with honest speculation into the past as long as it does not violate the clear teaching of Scripture. But any such speculation will always remain tentative and doubtful because of the lack of empirical evidence.

I see no compelling reason that conditions described by the second law had to exist before the Fall. If such conditions were absent, then all processes that occurred would have been 100% efficient. Heat could have moved from a hot object to a cold object, and there would have been 100% efficient transfer. Human beings could have eaten food and their bodies would have utilized 100% of the energy value of the food. There would have been waste products, but all metabolism within the body would have been 100% efficient.

It must be remembered that the flow of heat from hot to cold objects is an observable fact and the second law was structured to fit this observation. The second law was also structured to fit the phenomenon of the mixability of gases. In the beginning was **not** the second law; it is a *mental construct* of men developed as a result of observations of the direction taken by natural processes.

Also, if conditions described by the second law did not exist before the Fall, then no entropy potential would have existed. This does not mean that heat did not flow from hot to cold objects, or that chemical reactions did not proceed in the same direction as now. It simply means that certain thermodynamic potentials such as free energy would have different meanings and interpretations.

I offer some unknowables that possibly could affect "science" before the Fall. The answer to these would change considerably any thermodynamic interpretations. Before the Fall:

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- (1) Were there hot and cold-blooded animals as we know them today?
- (2) Or did all animals including man, have the same body temperature and this temperature varied with the environment temperature?
- (3) Were there large temperature differences on the surface of the earth?
- (4) Was absolute zero at the same tempera-

ture as it is today?

- (5) Could absolute zero have been a lot higher than it is today?

- (6) Was animal body metabolism much slower then?

I, also, would like to see the creation model improved. But any discussion of "science" before the Fall is at best risky.

ANOTHER REPLY TO ROBERT KOFAHL

HENRY M. MORRIS*

Creationists need to guard against the temptation to apply uniformitarian reasoning to the creation period and the period between creation and the curse. This is the approach taken by theistic evolutionists, who assume that all the present laws of nature were operational during these periods, but that they were somehow "divinely constrained" to direct the evolutionary process upward to man. Such people attempt to apply naturalistic reasoning to origins, but their approach fails to satisfy naturalistic philosophers since a supernatural dice-thrower directing the random processes must be postulated.

Dr. Kofahl's reasoning likewise is expedient, rather than Scriptural or scientific. In order to retain naturalism as far as possible, he attempts to extend application of the laws of thermodynamics into the Edenic period. This compromise is likewise inconsistent, since he also (like the theistic evolutionists) must postulate "special divine constraints" to prevent the "disruptive and degenerative effects of random processes" during this period.

Now the second law of thermodynamics without the disruptive and degenerative effects of random processes is simply *not* the second law of thermodynamics. It is some other law, about which we know nothing and the nature of which cannot be discovered by scientific experiment.

Kofahl proposes we adopt this concept in lieu of what he considers the "unreasonable procedure" of postulating "special divine controls." In order to avoid postulating special divine controls, he prefers to postulate special divine constraints. What is gained in this semantic maneuver is not clear.

Some creationists are opening a "can of worms" when they yield to pressures from uniformitarianists to try to make the creation period

commensurate with the present period. We need to heed the Apostle's warning that those who insist that "all things continue as they were from the beginning of the creation" are "willingly ignorant" that it was by the "word of God" that the original heavens and earth were standing (II Peter 3:4, 5).

Physical laws today, even when expressed in mathematical symbols, are strictly empirical, based entirely on scientific measurements taken in the present order. This fact is true even of the two laws of thermodynamics. There is no way, except revelation, by which we could determine how processes functioned in the Edenic period. The curse affected the "whole creation," bringing it under the "bondage of decay" (Romans 8:21, 22), with all its present processes.

In the primeval economy, perhaps *both* energy and entropy were conserved in all processes, with every decay process balanced elsewhere by a corresponding growth process. Perhaps the "good" effects of friction and thermodynamic equilibria were accomplished by now-vanished "converters" and "governors" about which we know nothing. One speculation is as good as another, for none may be submitted to scientific test.

The creation model, with which creationists in the Creation Research Society are attempting to compare and contrast the evolution model, contains a postulate that a primeval period existed during which all the basic laws, as well as the basic categories of the created world, were brought into existence and order by means of special divine processes which no longer operate. The primeval period has been superseded by the present period, in which all processes operate within the framework of the laws of thermodynamics.

Any blurring of the discontinuity between these two periods is merely a concession to naturalistic uniformitarianism and is, therefore, futile scientifically and dangerous theologically.

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NATURAL THEOLOGY IS A SCIENTIFIC SUBJECT

HOWARD BYINGTON HOLROYD*

In recapitulation of the argument, natural theology should now be called "scientific theology," and recognized as a branch of science through the great authority of Sir Isaac Newton. This science was started by Anaxagoras, who was the first physicist, and it has been developed almost entirely by scientists, for those who are not scientists cannot work effectively on the subject. In scientific theology factual evidence is used in a way which is neglected in the other branches of science, and thus important conclusions are reached which cannot be reached by other methods. Scientific theology is based upon the philosophy of dualism, that the universe is mind and matter, and this is accepted by both physical scientists and Christians. Scientific theology is not religion, but the strong bedrock upon which the structure of religion is erected. If scientific theology is taught effectively in our schools and institutions of higher education, atheism will disappear.

For the invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and godhead; so that they are without excuse.

—Romans 1:20

Introduction

Is natural theology a part, or branch, of science? This question is important, for if natural theology is indeed a scientific subject, there is no reason why it cannot be taught legally in our public schools and state universities. The final decision concerning this matter must be made by the Supreme Court of the United States of America, and it is not likely that the decision of this court will be arbitrary.

In this article, conclusive evidence will be given to show that natural theology is now and has always been a branch of science. Do not lightly pass over the term, *is now*, in the above sentence, for it means that there is no reason at present why teachers should not be teaching natural theology in our public schools. No change in current laws is needed, for this subject is not a part of religion, the teaching of which is not legal in public schools. Teaching the subject can become illegal only by further decision by the Supreme Court. If any one is arrested for teaching the subject, he can claim false arrest, and take legal action based upon this claim.

First, some attention to the word, *natural*, in Natural Theology. This was the term used in Latin by Sir Isaac Newton in his great Mathematical Principles of Natural Philosophy, one of the most important books ever written in physical science. A hundred years ago and earlier, what we now call physics, chemistry, and astronomy were all called natural philosophy. I have in my possession a book on simple physics, used by my uncle, which was written by Le Roy C. Cooley, Ph.D., Professor of Natural Science in Vassar College, and published in 1871 by Charles Scribner's Sons with the title, *Natural Philosophy*

for Common and High Schools. Due to changes in the meanings of words, the term, *natural theology*, should now be changed to *scientific theology*, and the subject matter should be considered one of the branches of science.

The greatest authority, and a great one indeed, for the idea that there can be a scientific theology is Sir Isaac Newton, one of the most intelligent people who ever lived. A revision of an early translation from the Latin of Newton's *Principia* by Florian Cajori was published in 1934 by the University of California Press, Berkeley, California. The "General Scholium" of this book was written by Newton when he was seventy-one years of age, and twenty-six years after the first publication of his *Principia*. This has been well called "the Famous Scholium."

In this critical discussion, Newton stated, "This most beautiful system of the sun, planets, and comets could only proceed from the counsel and dominion of an intelligent and powerful Being." People of this generation should read all of Newton's profound discussion of God which is completed by the statement, "And thus much concerning God: to discourse of whom from the appearances of things, does certainly belong to Natural Philosophy." This is a perfectly clear statement: the greatest of all authorities in physical science recognized that scientific theology is possible and properly a scientific subject.

The basic idea of scientific theology, the term which we should now use instead of natural theology, is that it is possible to learn from the appearances of things something about their Creator, just as we can learn from a design of an engineer something about his thinking, learning, and purposes. We have an old saying, "Actions speak louder than words." Designs also "speak" to those who are willing to listen.

Early Beginnings of Scientific Theology

Scientific theology started many centuries ago. Anaxagoras, an ancient Greek, who was born

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about 500 B.C. and died in 428 B.C., may be considered the first physicist. He taught that reason is the cause of all things. After many centuries, this idea is still accepted by many physical scientists, although they express it differently: they now believe that the universe is rational, and they search for rational explanations of things.

Only a few decades ago, the great British mathematician and philosopher, Alfred North Whitehead wrote a little book, *The Function of Reason*, in which he definitely supported the idea of Anaxagoras, and does not support Darwinism and Materialism. In a recent book, *Fundamental Laws of Physics*, F. Woodbridge Constant stated on page two:

Clerical authorities generally look upon the laws of nature as God's laws for the physical world, and the fact that scientists find these laws to be comprehensive, yet simple and few in number, furnishes a strong argument for belief in the omniscience and wisdom of God.

Let us compare this modern statement with some ideas expressed by Sir Isaac Newton's friend, Roger Cotes, Fellow of Trinity College, who wrote in a preface for the second edition of Newton's *Principia*: "Newton's distinguished work will be the safest protection against the attacks of atheists, and nowhere more surely than from this quiver can one draw forth missels against the band of godless men." This comparison shows that after three centuries scientists still believe that there can be a scientific theology because physical science "furnishes a strong argument for belief in the omniscience and wisdom of God."

Aristotle, the ancient Greek philosopher, who lived from 384 B.C. to 322 B.C., was one of the most learned and influential men who ever lived, and the first great biologist. G. F. W. Hegel, the German philosopher, who lived from 1770 to 1831, stated the following in his *Philosophical History*:

A thought of this kind—that Nature is an embodiment of Reason; that it is unchangeably subordinate to universal laws, appears nowise striking or strange to us. We are accustomed to such conceptions, and find nothing extraordinary in them. And I have mentioned this extraordinary occurrence, partly to show how history teaches that ideas of this kind, which may seem trivial to us, have not always been in the world; that on the contrary, such a thought makes an epoch in the annals of human intelligence. Aristotle says of Anaxagoras, as the originator of the thought in question, that he appeared as a sober man among the drunken. Socrates

adopted the doctrine from Anaxagoras, and it forthwith became a ruling idea in Philosophy, except in the school of Epicurus, who ascribe all events to chance.

It is, of course, only a short step in reasoning to go from the idea that Reason is the cause of all things to the basic thought of scientific theology, that we can learn something about a Designer from His design. Therefore we should consider that Anaxagoras, the first physicist, is the originator of scientific theology. Its origin is in the Greek traditions, rather than in the Hebrew, and Christians can make no special claims for it, although they may make reference to it.

Francis Bacon, Baron Verulam and Viscount St. Albens, was an English statesman, philosopher, and essayist who lived from 1561 A.D. to 1626 A.D., about a century before the time of Sir Isaac Newton, who lived from 1642 A.D. to 1727 A.D. Bacon was an important advocate for science, but he had much less direct influence on science than Newton.

Bacon was a man of great learning and force of mind. In his essay, "Of Atheism," he stated,

I had rather believe all the fables of the Legend, and the Talmud, and the Alcoran, than that this universal frame is without a mind. And therefore God never wrought miracle to convince atheism, because his ordinary works convince it. It is true, that a little philosophy inclineth men's mind to atheism; but depth in philosophy bringeth men's minds about to religion. For while the mind of man looketh upon second causes scattered, it may sometimes rest in them, and go no further; but when it beholdeth the chain of them, confederate and linked together, it must needs fly to Providence and Deity.

From this we must conclude that Bacon was aware of the basic thought of scientific theology, and that he accepted it as completely valid.

William Paley and Natural Theology

William Paley, Doctor of Divinity, who lived from 1743 to 1805 A.D., was an English theologian, philosopher, clergyman, and author, as well as the Archdeacon of Carlisle. His book on *Natural Theology* is well known for his famous illustration of the watch. The dedication of this great book was written in 1802. A. Cressy Morrison in his book, *Man Does Not Stand Alone*, stated in regard to Paley's book of some 125,000 words the following:

So far reaching and so convincing was this process of reasoning that the sum of \$48,000 was left to the Royal Society of Great Britain for an investigation in the various fields of

science which would conclusively demonstrate the existence of God. The result was some twelve volumes written by members of the Royal Society and others. These studies brought forward with apparent conclusiveness the evidence of design, and demonstrated to the philosophers of that period the existence of a Supreme Being.

This book by Paley, and other books mentioned, should be recognized as a part of science because the methods used are those which have long been recognized as scientific. Let us remember that the Royal Society of Great Britain is an organization of scientists. In his book, Paley stated forcefully,

There cannot be a design without a designer; contrivance without a contriver; order without choice; arrangement, without any thing capable of arranging; subserviency and relation to a purpose, without that which could intend a purpose; means suitable to an end, and executing their office in accomplishing that end, without the end ever having been contemplated, or the means accommodated to it. Arrangement, disposition of parts, subserviency of means to an end, relation of instruments to a use, imply the presence of intelligence and mind.

In order to obtain the factual basis for his conclusion that designs in nature are caused by an Intelligent Being, Paley studied the scientific subjects of physiology, natural history, and astronomy. He recognized the need to use his own powers of observation, and his book clearly indicates that he could see for himself. In this there is the strong hint that clergymen who wish to make the most effective use of Paley's studies must follow his example of studying science and of seeing for themselves. If they do this, they will be able to help others to understand how very powerful Paley's evidence and argument really are.

While Paley's subject matter is different from that of physicists, his method is the same as that followed by them to obtain, for example, evidence for the existence of the electron. He certainly reasoned "from the appearances of things" to his conclusions about God. This, according to Newton's statement, makes his book a part of "natural philosophy," the subject which is now called *science*.

The fact that a physician studies physics and chemistry in order to find better methods for the control of disease does not make physical sciences a branch of medicine. Paley was a theologian but it does not follow from this that he could not make scientific investigations. It does not appear to be generally known that Charles Darwin was educated to be a clergyman. Physics

and chemistry are related to medicine. Scientific theology is not religion, but a part of the solid bedrock upon which the structure of religion is erected.

To Newton, God revealed aspects of Himself in the mathematical laws which describe the motions of the solar system; to Paley, God revealed additional aspects of Himself in the designs and actions of organisms; and to the religionists, God has revealed other aspects of Himself through persons and the histories of peoples.

On Designs and Mechanics

The work of Paley and his followers clearly established the truth of the idea that in some of their aspects, organisms are similar to machines. Decades ago, biologists reduced this similarity to the metaphors, "organisms are machines," and "man is a machine." So the question is no longer whether or not this similarity exists, for this is accepted by all. Of course, it is going too far when biologists ignore differences and misuse their metaphors. The important question is, what does this similarity between machines and organisms really mean?

Paley recognized that the minds of designers and mechanics are involved in the construction of watches and other man-made devices, and therefore he generalized to draw the conclusion that a Mind must be involved in bringing organisms into existence. Paley's generalization is made strictly according to the important rule of scientific philosophy that we are not to introduce into our theories any more elements than necessary.

Darwin claimed that the generalization of the scientific theologians is false, and that the origin of species can be explained by variations and natural selection, both of which are conceived as mechanical processes not involving mind in any way. It is not surprising that Darwin should search for mechanical causes, for at that time physicists were seeking mechanical explanations for physical phenomena, mostly because Newton's mechanics had been found successful for many things. Since Darwin's time, mutations were discovered, and these changes have been correlated in theory with Darwin's small variations. The idea of natural selection has been kept by Darwinians.

If one argument refutes another, it is evident that both arguments belong to the same subject. It is not possible to refute a legal argument by one based upon the principles of musical composition. An argument in support of a move in chess cannot be refuted by one based upon the science of thermodynamics.

Since both arguments must belong to the same subject in order for the one to refute the other, it is a mistake to consider that Darwin's theory

of organic evolution is scientific, and that Paley's alternative explanation is religious. Both theories belong to the same subject, and this is scientific theology, a scientific subject.

If we are to classify Paley's theory as religious, we must also classify Darwin's theory as religious, although from the point of view of Christians, it is heresy. Newton is the greatest authority, and he considered scientific theology a part of science. In order to classify a theory correctly, it is not necessary to pass judgment concerning its truth; a great blunder in science, must still be considered science.

Requirements of Scientific Theology

In order to work effectively in the field of scientific theology, a person must have an excellent education in science, for he must be able to understand what scientists have discovered, and this means that he must be educated at least through the level of differential equations, the level that is ordinarily required for engineers. It is not possible for the non-mathematician to fully understand physical laws as they are understood by physical scientists.

Since the designs of organisms are similar in some aspects to machines, the scientific theologian should study engineering and its history, and then design some fairly complex device. To know so much is difficult, but if we recognize the importance of the subject, and place great emphasis upon it in our institutions, it is reasonable to hope that sooner or later a person with the mind of an Aristotle will be found to "climb to heights." The point here is that scientific theology actually is a scientific subject which can be effectively developed and taught only by people educated in science.

Many people seem to have drawn the false conclusion that since physical scientists have explained many things, they will eventually be able to explain everything. This expectation appears to have been reached through reckless generalization, a cause of many extremely bad errors.

To the contrary, there are excellent reasons for thinking that the methods and concepts of physical science will never be used to explain everything. For example, there is nothing in physical science which can be used to explain the distance of the earth from the sun, a distance which is very important to living things which must not be too hot or too cold.

Further, given the design of a watch, physical scientists can explain satisfactorily how it keeps time, but not how the design happens to be what it is; they can give no explanation for the sizes, shapes, materials, and arrangement of parts. Essentially the same thing is true for the other things made by man. Scientific theology

makes use, or different use, of factual information which is neglected in science otherwise, and this also shows that it is indeed a scientific subject.

Not only is scientific theology a branch of science; it is also an important part to which much thought should be given, and it should be taught in our schools and colleges. Alfred Russell Wallace became cognizant of the idea of natural selection independently of Darwin, but unlike the latter, he did not become an agnostic. Wallace made a profound statement which belongs to the subject of scientific theology:

This earth with its infinitude of life and beauty and mystery, and the universe in the midst of which we are placed, with its overwhelming immensities of suns and nebulae, of light and motion, are as they are, firstly, for the development of life, culminating in man; secondly, as a vast schoolhouse for the higher education of the human race in preparation for the enduring life to which it is destined.

Something should be said about the philosophical basis of scientific theology. It is one of the basic axioms of common sense that all pertinent evidence must be used in drawing conclusions. When we fail to use all of the evidence, and try to understand a whole in terms of a few of its parts, we fall into the fallacy of the expansion of abstractions.

This fallacy forms the basis of materialism: physics and chemistry are based upon only a part of our total experience, and when people conclude that the whole universe is nothing more than a vast physical system, they do so for a false reason.

It is not possible to cram into physical science all that we know. An extreme example is mathematics, which certainly is a part of the totality of everything, that is, a part of the universe; yet, we cannot use mathematics to explain physics and chemistry, then use these to explain physiology, including that of the brain, and finally the brain to explain the mathematics, with which we start, to form a closed circuit of explanation. Such reasoning is not valid.

The most generally accepted philosophy is that the universe is mind and matter, and scientific theology is based upon this dualism. We can be certain that teaching scientific theology will never produce atheism.

Conclusion

In recapitulation of the argument, natural theology should now be called scientific theology, and recognized as a branch of science through the great authority of Sir Isaac Newton. This science was started by Anaxagoras, who was

the first physicist, and it has been developed almost entirely by scientists, for those who are not scientists cannot work effectively on the subject. In scientific theology factual evidence is used in a way which is neglected in the other branches of science, and thus important conclusions are reached which cannot be reached by other methods.

Scientific theology is based upon the philosophy of dualism, that the universe is mind and matter, and this is accepted by both physical scientists and Christians. Scientific theology is not religion, but the strong bedrock upon which the structure of religion is erected. If scientific theology is taught effectively in our schools and institutions of higher education, atheism will disappear.

COMMENTS ON SCIENTIFIC NEWS AND VIEWS

HAROLD ARMSTRONG*

Kangaroo Rat Origins—Divine Intervention?

As is well known there are many creatures which have special ways of life (diets, for instance), which suit them but which would be useless to any other organism. One of these is the kangaroo rat, *Dipodomys microps* of the south-western deserts.

Unlike most other creatures, the kangaroo rat can live on leaves of the saltbush, *Atriplex*.¹ The outer layer of these leaves is very salty in contrast to the inside of the leaf. The kangaroo rat is equipped with special teeth, with which it is able to shave off the salty outside of these leaves before eating the inside.

Of course, the author of the report says that this ability evolved. But there is no evidence for any such thing. Nobody has ever found a fossilized rat peeling the fossilized outer layer off a fossilized saltbush leaf.

Indeed, the usual objection to supposing that such a thing could have evolved is apropos again. For the ability to eat saltbush leaves would have had to be about perfect before it would have been of any use at all; moreover the teeth to do the job, and the instinct (or whatever it is), to use them would have had to evolve simultaneously.

There is a question, though, of interest to creationists, which might be raised. Was the diet of saltbush leaves necessary in the beginning; or were there, perhaps, no deserts until after the Flood? At the present, we have no information to answer such a question. Even if there were no deserts before the Flood, there may have been the types of vegetation now found in the deserts. Cacti, e.g., can live with much more water than they get in the desert. Maybe, after the Flood, when the deserts formed, such plants were the only plants that became established, or re-established, there.

On the other hand, it might be that God intervened directly, at some time after Creation, to give such creatures as these a new way of life,

suited to new conditions. We know that He did intervene after the Creation in one case; viz.: that of the serpent. Since he intervened then to cause punishment, it seems quite possible that He might in other cases, as an act of assistance to the creatures concerned.

Nor has any evolutionist any right to complain if creationists propose that, in some cases, God has intervened directly. For anyone who believes at all in God, in any meaningful way, would not doubt at all that He could intervene. But evolutionists, beyond repeating meaningless catchwords, have really nothing at all to say as to why creatures have their peculiarities; or, if they do say something, usually their ideas, on close analysis, involve something that could not have happened.

Sherlock Holmes, in one of the stories, remarked that when what is impossible has been eliminated, whatever remains, no matter how improbable, must be the truth. Evolution, as we have shown many times in many ways, is impossible. The only alternative is Creation. So even one who considers Creation improbable (we see nothing improbable about it, but the argument can continue in this way), should admit that it must be the truth.

Scheme for Skater Evolution

From the time when we were children most of us have been fascinated by the "skaters," the insects which walk, or, rather, run, on water. Apparently the means whereby they are able to do this have not been investigated very much. Now electron microscopy, which has been of so much use in investigating the structures of so many tiny things, has been applied to them.²

Some of the halobates, in particular, were studied. Many small pits are found on their surfaces, and also a growth of hairs.

It is not clear how the pits function. But the hairs, it is believed, help to trap a layer of air, which, in turn, helps these insects in their special way of life.

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Some fine pictures are published with the letter in which this study is reported. They could be useful to anyone discussing the wonders of nature (or, rather, of Creation).

And in addition, we may again apply the argument which can be used about so many things. How could this way of life, involving walking on the water, have evolved? If any ordinary insect comes down on the water, it becomes wet and is overwhelmed by surface tension. So they would never live long enough to adapt to walking on the water. The "skaters" must have been created with the ability to live on the water, along with whatever peculiar facilities they needed.

Incidentally, is it known what, if anything, these insects do out of the ordinary when they begin to walk on the water? Presumably they begin at the beginning of their life as adults. Maybe something having to do with this would be a worthwhile area to investigate in one of the Christian schools.

Diffraction Grating and Butterflies

It has been known for quite a while that some of the colors in insects are due to interference, as light reflected from both front and back of thin films or scales interferes to accentuate some colors and to attenuate others. Now another kind of interference has been found—that due to periodic structures.³ Such a method is, of course, common in the laboratory where diffraction gratings are often used.

Certain butterflies, e.g., *Eurema lisa*, have elaborations, which can best be described as corrugated ridges, on the scales on their wings. Apparently this feature is found on the males only. Dimensions of the corrugations are such that they act as diffraction gratings, but for ultra-violet light, and reflect different wavelengths—presumably different colors for anything that can see the ultra-violet—in different directions.

Apparently some such arrangement is found in several different kinds of butterfly. Of course, this is called "convergence." But it is not shown how such a characteristic could "evolve" even once, let alone how it could occur several times, and then converge. For there is no need of such a feature; some kinds of butterfly get along well enough without anything of the sort.

On the other hand, some rudimentary form of the feature would be of no use at all for survival or for anything else; it would have to be about perfect before it would function at all. Again, anyone who wishes to read, in a book on optics, about the complications involved in making diffraction gratings, will find it impossible to believe that such a condition could come about by chance.

It may be worth while to remark that students at some Christian schools might find an idea here for a project or an investigation.

Eyes of Stone in Trilobites

I seem to recall reading once some poem which mentioned "... trilobites, with eyes of stone. . . ." Of course, that referred to fossils; but it now appears that the poet may have been right in more ways than he supposed.

It appears that fossil trilobites have eyes with lenses of calcite—transparent calcium carbonate.⁴ Of course, the whole fossil is stone, but it is argued that the trilobites had lenses of calcium carbonate while they were alive. If so, this is different from what is found in most living creatures supposed to be something like the trilobites.

Now calcite is doubly refracting; a lense made of it would cause a double image, except if the axis of the lens coincides with the optical axis of the calcite. In the trilobite eyes these axes do, in fact, coincide. This would be very strange if the calcite were formed during fossilization; it is proposed that the lenses of the trilobites were made of clear calcite, optically oriented.

Is this not an extraordinary thing, if, as should be true by evolution, the trilobites be a primitive creature? There are a few living arthropods or crustaceans whose lenses contain calcite, but it is poorly placed, and certainly not optically oriented. The relation of these living creatures to the trilobites is surely more like "devolution" than evolution.

And how, by the usual theories of "selection," would a creature "evolve" an eye of a material that must be oriented optically (for that matter, how is the orientation managed), when others succeeded with an arrangement not needing any such special treatment. Is it not clear that what we have here is another example of a very ingenious design by the Great Designer?

The Enigma of Entropy

The second law of thermodynamics is of great interest to creationists, for they use it to deny the very events which evolutionists allege could have happened. So anything which has to do with this law is worth noticing. It has been discussed in a rather theoretical, but still fairly readable, article.⁵

The authors maintain that the irreversibility and increase of entropy, with which the second law is concerned, is to be looked upon as a loss of correlations. In other words, as time goes on correlations are lost. This, of course, is what is meant by the more usual statement that order decreases.

It must be remembered, of course, that here "order" does not necessarily mean "uniformity."

Rather, order is more like the arrangement according to some plan. This view is seen to tie in well with the correlations. In anything that is arranged according to a plan—a library, a workshop, an army—there are many correlations between the different parts. If nothing should be done to maintain such a state of affairs—if things are allowed “to go to the dogs”—the correlations would disappear.

It is suggested in the article that, in going from statistical mechanics to thermodynamics, we must look for something outside the usual Hamiltonian formulation of mechanics to bring in the irreversibility. For instance, friction might accomplish something of the sort; but usually friction is excluded from the Hamiltonian formulation of mechanics. In any event, it is maintained, entropy always increases, period. Which is what we have been saying. Then, of course, evolution, as commonly proposed, is impossible.

Continental Drift Opposed

The theory of continental drift seems to be in the position that theories sometimes reach: everyone talks as if it were true, and objections are ignored. Still, now and then an objection is heard, which should serve to remind people that, at least, the theory still has difficulties.

A review article, in opposition to the theory, will be of interest, both for its own sake and for the sake of the many references which it gives.⁶ The author concludes that: “Drift is found to be inadequate by itself to account for geophysical data, and may well be mechanically impossible. . . .” He remarks on the exaggerated view of the exactness of such data as are available; stating in fact: “. . . paleomagnetic results are often taken . . . to be much more exact than they actually are. . . .”

The author speaks of “. . . the youthfulness of the ocean floors. . . .” With that we should agree; in fact, many of them may go back only to the Flood.

I take it that creationists have no strong objection to granting that the continents may be moving a bit. But creationists should want to maintain that, if the motion has been no faster than what is observed (or not observed!), the continents could not have moved very far. So, even if there is some truth in continental drift, there is no great importance.

Urey on Cometary Catastrophism

It is remarkable to what an extent many scientific authors, forced by the facts, as it were, are using catastrophic notions. They proposed, for instance, that at some time in the past, or maybe more than once, a comet may have collided with the Earth.⁷ This is not the first time that such

notions have been entertained, but this discussion is of interest for the estimates given of the energy involved, and of the destruction that might have taken place.

Dr. Urey speaks of such things as “. . . scattering of ocean water over land areas. . . .” It is suggested that such a catastrophe might not only change the face of the Earth very much, but might also cause the extermination of certain kinds of animal, and moreover the preservation of fossils by their quick burial.

Clearly the inadequacies of the strictly uniformitarian viewpoint are being seen, and some sort of catastrophes appear much more likely to have brought about the very great changes between the past and the present.

Of course, this is just what creationists have been saying, that the uniformitarian theory is clearly inadequate, and that it must be admitted that things out of the ordinary have happened. Likely we have stressed Creation more than the catastrophes, preferring, perhaps, to “accentuate the positive”; But the two go together; God has acted in Creation and He has also acted in judgment. While what might be called secular catastrophism is no doubt an improvement on uniformitarianism, we may suspect that to stress the catastrophes and to ignore the Creation will not prove entirely satisfactory either.

If Meteorite Dates Fall, What Dates Will Stand?

Various attempts have been made to deduce the age of the Earth, the universe, and just about everything else by investigating the amounts of various radio-active elements present. These are too well known to need any long summary here.

It is also well known that the findings do not agree very well. In these pages, and elsewhere, reasons have been shown why the results would not be expected to agree, and why the ages deduced are often much too large.

It would still seem worth while to follow these efforts, and to notice new information which may come to light. Some studies of the amounts of isotopes of xenon in meteorites have again shown anomalous results.⁸ In the article discussing the matter, no reasons seem to be suggested to account for the results.

It may be worth remarking that, if something happens to meteorites, which presumably spent most of their time isolated in space, to affect the isotopes, it would seem even more likely that all kinds of things might happen to materials in contact with the Earth's surface. Thus it would seem that these isotopes, and their ratios, must be of very limited use in finding the age of anything.

References

- ¹Avoiding a salty diet, *Nature*, 241(5384):13. 1972.
- ²Cheng, L. 1973. Marine and freshwater skaters: differences in fine structure, *Nature*, 242(5393):132-133.
- ³Ghiradella, H., D. Aneshansley, T. Eisner, R. E. Silberglied, and H. E. Hinton. 1972. Ultraviolet reflection of a male butterfly, *Science*, 178(4066).
- ⁴Towe, K. M. 1973. Trilobite eyes: calcified lenses in vivo, *Science*, 179(4077):1007-1009.
- ⁵Mehra, J., and E. C. G. Sudarshan. 1972. Some reflections on the nature of entropy, irreversibility, and the second law of thermodynamics, *Il Nuovo Cimento* 11B, (2):215-256.
- ⁶Wesson, P. S. 1970. The position against continental drift, *Quarterly Journal of the Royal Astronomical Society*, 11(4):312-340.
- ⁷Urey, H. C. 1973. Cometary collision and geological periods, *Nature*, 242(5392):32-33.
- ⁸Manuel, O. K., E. W. Hennecke, and D. D. Sabu. 1972. Xenon in carbonaceous chondrites, *Nature Physical Science*, 240(101:99-101).

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 400 voting members (with graduate degrees in science) and over 1500 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and is now recognized as probably the outstanding publication in its 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 \$8.00 (Foreign, \$9.00 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 \$8.00 (Foreign, \$9.00 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: \$11.00 (Foreign, \$12.00 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. 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.

EVOLUTION AND MOLECULAR BIOLOGY

(A Review of Some Recent French Publications Concerning Transformism in Relation to Biological Discoveries)

JULIO GARRIDO*

In this article the author comments on some of the latest French publications concerning the evolution theory and interactions with molecular biology. Georges Salet's important work, *Hasard et Certitude* is stressed as a challenge to *Hasard et Nécessité* written by the Nobel Prize laureate Jacques Monod. Georges Salet analyzes the problem of transformism from a mathematical viewpoint in light of studies made by Borel. Salet proves that the formation of new organs and/or new functions by a mere game of chance in living beings is mathematically impossible. The evolution theory cannot be supported from a scientific point of view, but is based on an atheistic prejudice.

It should be obvious to everyone not influenced by artificial philosophies or atheistic prejudices, that the complex and wonderful structures of living beings could not have been the result of a game of chance. A watch or any machinery is built in view of a plan by an intelligent watchmaker or engineer who has prepared and made it. It is also evident that animals and plants are much more complicated and better adjusted than any machine ever built by man. It is paradoxical to think that plant and animal parts and functions, which are so exact and complicated, could be simple products of chance combination of some of the materials of the universe.

Denial of Common Sense Evidence

In the history of human thought, there have been and still are certain philosophers and scientists who deny the clearest common sense evidences to uphold artificial systems which they build in search of notoriety. There are philosophers who keep on thinking about life as a game of chance. But, this would be the same as asking that a blind Force without orientation produce everything existing in the Universe independently of any prepared and intelligent plan.

The most recent of these authors, Jacques Monod, is not a philosopher, but a scientist and a distinguished one at that, awarded a Nobel Prize. His main and perhaps only philosophy is a blind unfeeling faith in atheism. Jacques Monod of the Pasteur Institute of Paris, writes in his book, *Hasard et Nécessité*¹ about the relationship of the new molecular biology to a series of thoughts which essentially are only a repetition of the old ideals of Democritus and other materialistic philosophers. Monod says,

The elementary happenings which make up life and originate the evolution of living beings, are microscopical and accidental without any relation to the effects which could bring about its finalistic functioning. (Monod to change the vocabulary speaks of teleonomics.²)

But what professor Monod has forgotten in his book is that chance must be discussed according to certain laws, which are as exact and decisive as laws of chemistry and physics. The most modern chapters in physics can neither be conceived, nor studied without taking into account

the laws which govern fortuitous happenings. The analysis of the probabilities of events can be mathematically treated, especially those events in which there is a great number of unforeseen factors.

Probability and Biology

Such a mathematical study is made by the distinguished French scholar and mathematician Georges Salet in a recently published book.³

Salet admits, as a fact that there can be "mutation" processes which can bring forward changes, simplifications or the disappearance of organs and functions but which can never explain the appearance of new organs or bring about a "rising" evolution.

The Darwinist and Neo-Darwinist, Salet says, "explain that the observations we have made to date cover only a very short period of time, only some thousand years, which is a little thing if we compare them with the hundreds of millions of years of geological times."⁴ The problem is the calculation of the time needed for the biological evolution, and how we can study this question in a precise manner, because the mechanism of mutation is known by molecular scientists in a very exact fashion. Salet's conclusion in this matter is definitive; he says:

The length of geological time should be multiplied by 10 followed by some hundred or thousands of zeros to make possible the arising of a new organ, as small as it could be, by pure chance alone. The time lapse needs to be so great because, in just two words, if the number of elements in a functional structure enlarges in the form of an arithmetic progression then the time needed for this structure to arise by chance enlarges according to geometric progression.⁵

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In order to expound the thesis, Salet starts with some chapters in which he explains current developments in relation with the fundamental mechanism of cell life and reproduction. He analyzes the interactions between biological and molecular evolution, reaching the conclusion that even if recent advancements are taken into account there is still a mystery steadfastly surrounding life.

Next, the notion of chance and natural laws is analyzed in light of some recent mathematical studies, stressing Borel's law⁶ which mark the limits of impossibility for exceptional events, and is very useful in studying the problems of supposed evolution in probabilistic terms. The principal question is the study of the possibility of appearance by mutations of a **new organ** during embryogenesis. The results show a perfectly clear boundary of natural selection which acts only in a negative fashion and is unable to work in a more positive way, such as producing the more complicated organs from some simpler ones, which clearly indicates the independence of great taxonomic groups in the zoological classification.⁷

The Problem of the Beginning of Life

The question of the origin of life is studied by Salet making use of the same probabilistic system used in the discussion of evolution. He criticizes the different theories which try to explain the origin of the first organisms by a supposed "molecular evolution" which has been said to produce "naked genes" as ancestors of actual cells.

The explanation of the beginning of life cannot be found by any means through pure chance, as chance is recognized today by most scientists, even some who declare themselves as materialists and atheists. But, in this last group there are scientists who, as a matter of principle, do not want to admit any kind of Divine intervention.

They say that life appeared in a third way such that living beings are said to be the result of a *natural law*, which although highly improbable today, would have been much more probable in the past. But, here we find ourselves, says Salet, involved in a real play on words, "To say, against probabilistic laws which govern the physical world that life has begun in the past by means of these natural laws is the same as saying nothing; this postulate may explain anything as the famous 'Sleeping virtue of opium' and this is not science."⁸

In order to explain the beginning of life by way of a mysterious abiogenetic law, we would have to imagine for matter itself an extraordinary "set of powers" even beyond what is understood of matter by physical chemists today. Thus one either finds himself pushed into creationism or

into some spiritualistic transformism. It is impossible to solve the following dilemma:

Either the beginning of life and its evolution are a game of chance, or they are out of reach of the most certain physical and chemical laws. The third way leads nowhere.

Science and Philosophy—Spiritualistic Transformism

Salet says:

The scientist can have several attitudes toward the problem of the origin of the species. The first one is to say that science in the strict meaning of the word, has neither given light nor can it give any solution to this problem. The scientist should then, lose interest in the problem and give it to the philosopher. This is a prudent attitude and there cannot be any criticism of those who take it.

The second is a stubborn attitude which consists of saying that everything can be explained by matter and related laws. It is affirmed, then in a very definite way that the problem of the beginning of life will be solved someday in the same way that the problem of biological activity has been solved today. This attitude seems nearer to faith, but closer to a materialistic faith, than to the spirit of science because it seems from biology's own advancement that a physical-chemical explanation of the origin of the species would be against material laws.

This attitude does not yield any results. It is because of it that the problem of the origin of species has not advanced in the last 150 years. One hundred and fifty years have already passed during which it has been said that the evolution of the species is a fact but, without giving real proofs of it and without even a principle of explaining it. During the last one hundred and fifty years of research that has been carried out along this line, there has been no discovery of anything. It is simply a repetition in different ways of what Darwin said in 1859. This lack of results is unforgiveable in a day when molecular biology has really opened the veil covering the mystery of reproduction and heredity.

The third attitude (which is not necessarily the best) is one of the spiritualistic transformists. They recognize God's power but without changing natural laws, and this results in an attitude having the same deficiencies as the preceding one; or they imagine the action of a spirit or living soul in the phenomena of heredity, which happens to be a disguised return to Vitalism.

Finally, there is only one attitude which is possible as I have just shown: it consists in affirming that: Intelligence comes before life.

Many people will say, this is not science, it is philosophy. The only thing I am interested in is fact, and this conclusion comes out of an analysis and observation of the facts.⁹

Some of the important works of the famous French anti-evolutionist, Louis Vialleton, are reported. These detailed morphological and anatomical studies,¹⁰ though written before particularities of molecular biology were known, prove the improbability of biological evolution by means of morphological changes. These publications have never been challenged and should be better known.

While many biologists will not admit it, they recognize that animals are real physico-chemical machines intelligently constructed. Salet uses the term "machinicism" to express this tendency. This "machinicism" presupposes the existence of harmony among a set of laws—better, a family of coherent laws—that govern the structure and working of the organisms.

This concept has been explained by Pierre Loyer in a recent book¹¹ in which he studies some philosophical problems in biology. The conclusions of Loyer are like those of Salet: the need of the intervention of an intelligent Cause to organize the interaction of the laws for the production of precise biological mechanisms.

Biologists who are not obstinate in their prejudices are obliged to recognize that transformism is really not a scientific theory, but a philosophical one based on the principle that creation is impossible. Jean Rostand (a French evolutionist, sincere and logical in his prejudices) says,

The theory of evolution gives no answer to the important problem of the origin of life and presents only fallacious solutions to the problem of the nature of evolutive transformations. . . . We are *condemned* to believe in evolution, but we wait always for a suggestion concerning the motives of transformations . . . perhaps we are now in a worse position than in 1859 because we have searched for one century and we have the impression that the different hypotheses are now exhausted. Presently, nature appears to be more steady, more firm and more refractory to changes than we thought before we had made a clear distinction between hereditary variability and acquired characteristics. . . . The world supposed by transformation is a phantasmagoric, surrealistic world . . . and often we forget this when we speak upon the history of life and upon the changes in the horse feet or elephant molars.

Personally, I believe that this phantasmagoria has existed before the calm and stable reality that we now observe in the na-

ture. I believe firmly, because I have not found any other means by which mammals are derivated from lizards, lizards from fishes, but, when I affirm this, I know myself that it is an indigestible tremendous idea and I prefer to leave the origin of such scandalous transformations in vagueness and I do not intend to add a decisive interpretation to their improbability.¹²

Evolution, Science and Childhood Diseases?

Recent discoveries of molecular biology may be used to restate the biological problems in a more precise way than before. The discontinuities of the structures of the genotype are really in a position diametrically opposed to that desired by evolutionists and the transformists hypothesis becomes more and more indefensible.

This is so because evolutionism is a simplistic idea, almost an infantile idea. Evolutionists pretend to explain the complex and wonderful world of living beings by a nebulous universal principle of "blind progress." It is similar to the Proust hypothesis of the origin of the chemical elements which supposed that the different kinds of atoms are simply condensations of hydrogen.

Simple hypotheses are frequently harmful in science when they are not forsaken at the opportune moment; they can become real "infantile diseases." The evolutionary theory is one of these "diseases," because it is the corruption of philosophical prejudices regarding a pure scientific question.

Scientists refer to observation, experimentation, and verification of measurements, free discussion and finally hesitation on conclusions out of their reach. Science is not philosophy, metaphysics, or theology, all of which are removed from the domain of science.

Biological evolution, as a purely scientific hypothesis, should have been a purely objective problem, but, unhappily it has been turned into a problem charged with emotion. Evolution has been turned by many people into a way to remove God from creation, or at least to give Him a secondary and indefinite role in which God would have worked in the beginning only.

The evolutionistic myth has been used to derive man from animals, destroying the idea of original sin, the need for redemption and all Christian economy because the fundamental notions of good and bad are lost in a loose notion of animal atavism.

Finally, the Christian idea of soul salvation and eternal life is changed in hope of a "happy superman," who will not know either illness, or death as a result of mutations which will bring advancement to his nature.

Evolution, the key idea of neopaganism and deChristianization, should be studied in one domain only: science. That is the reason why creationists should happily receive these latest publications which reveal the inconsistency between logic and scientific data on the one hand and evolution theory on the other.

References

- ¹Monod, J. 1971. *Le Hasard et la nécessité*. Editions du Seuil. Paris.
- ²*Ibid.*, p. 135.
- ³Salet, G. 1973. *Hasard et certitude. Le Transformisme devant la biologie actuelle*. Editions scientifiques Saint-Edme. Paris.
- ⁴*Ibid.*, p. IX.
- ⁵*Ibid.*, p. X.
- ⁶Borel, E. 1943. *Les probabilités et la vie*. Presses Uni-

versitaires de France. Paris; and 1950. *Probabilités et Certitude*. Presses Universitaires de France. Paris.

- ⁷Holroyd, H. B. 1972. *Creation Research Society Quarterly*, 9(1):5-13. In this article, Dr. Holroyd gets to the same results using the same kind of mathematical reasoning. He concludes that Darwinism is absurd either from a physical or from a mathematical view. See also an article of Howe and Davis, 1971. *C. R. S. Quarterly*, 8(1):30-43.
- ⁸Salet, G. *Op. cit.*, p. 327.
- ⁹*Ibid.*, p. 331.
- ¹⁰Vialleton, L. 1911. *Morphologie des Vertébrés*. O. Doin. Paris; 1924. *Membres et ceintures des Vertébrés supérieures—Critique du transformisme*. O. Doin. Paris. 710 pp.; and 1929. *L'origine des êtres vivants—L'illusion transformiste*. Paris. 395 pp.
- ¹¹Loyer, P. 1971. *Du Cosmos à Dieu*. Nouvelles éditions latines. Paris.
- ¹²Rostand, 1972. Cited by G. Salet (*Loc cit.*, p. 419) *Figaro Littéraire* no. 574.

"THE KING IS NAKED"

(Reflections on H. B. Holroyd's criticism of Darwin's theory of evolution)

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When some definitely biased and one-sided outlook is being hurled upon a young mind, there are three possible ways of reaction to it: (a) become indoctrinated, (b) revolt against it, or (c) withdraw into a protective shell of total indifference. This third attitude was the one that I had most frequently adopted to protect my mind against the official "ex-cathedra" preached ideology.

There are however instances when even the most neutral and placid minds revolt. For me such a moment came when I was being taught Darwin's theory of evolution. Yes, I thought that survival of the fittest might be correct, but then amoebas are not worse equipped to live and survive on this earth than man and higher mammals. Why would there not be just a great variety of amoebas, bacterias, viruses, etc.?

This very reasonable question might cast some serious doubts upon the usefulness of Darwin's theory to explain *all* about the origin of man. However, the major thesis that the development of life could result in an interplay of two blind factors: chance variations and natural selection, is not refuted.

Nevertheless the article¹ in question, written by a physicist, seems to contain such a refutation, to have Darwin's theory of evolution—at least in its original version—completely destroyed. I use the word "seems" purposely. For the argument that Dr. Holroyd uses against Darwin is incredibly simple. So simple that in spite of its logical coherence one is tempted to become

suspicious about it and keep asking; if it is so obvious, why could not the scientists have said it earlier?

Well, there are some very good reasons explaining this fact. Darwin's theory was published when the statistical methods of reasoning had not yet been firmly introduced even into physics. In the period that followed, biologists, generally speaking, had very little knowledge of physics or mathematics. One can perhaps also say that physicists and mathematicians tend to be rather narrow minded and few take interest in general matters, outside their specialty.

All this being true however one cannot forget the major psychological factor: courage. To oppose deeply ingrained superstitions and beliefs, to be alone against all the scientific community, to risk one's career and prestige, requires either total innocence and unawareness or a great intellectual and moral courage. A child could say, "the king is naked," out of inborn simplicity and straightforwardness, but when a scientist does it, we cannot hesitate in attributing him with full merit for the act.

Dr. Holroyd's direct argument against Darwin's mechanistic theory of development of life is based on the impossibility of realizing the full trial-and-error (in Darwin's language: chance variation and natural selection) processes of which man—or other complex forms of life—would be an outcome. The interval of time that has elapsed since the formation of the earth is too short for trying even a small fraction of the total number of configurations and structures which could be made up of groups of all molecules contained in more complex living organisms.

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I am accepting Dr. Holroyd's argument not only because it appears logical and well-grounded; but, also, because I know that there exist other scientific ways to prove that no mechanistic theory of life can be true. I shall mention here two patterns of such reasoning.

The first one² could be called the cybernetic proof. It is based on Gödl's theorem applied to computers. According to that theorem, for any machine which is functioning according to some built-in program, there exists an infinity of problems which it **cannot** solve.

It follows that for any machine there exists a limited class of tasks which it may perform or of modes of behaviour which it may simulate. (It does not follow, that for any task that we may think of, we cannot build *the* machine to perform it).

It follows, further, that although any specific goal pursued by man's brain or his muscles can be accomplished by a suitable machine, no mechanistic system can exist that would substitute for man as a whole.

The second pattern of reasoning is based on the concept of negentropy and on the Second Law of Thermodynamics. Both living systems and machines are subject to the Second Law. The living system, however, can locally increase negentropy, regardless of the conditions which are actually reigning in the immediate environment. Man can do so individually, other organisms do it as the total mass of all species living presently and in the past.

There are, however, some limits to which the environment can change without impairing man's ability to "produce" negentropy. As shown by our history, these limits are incessantly expanding.

Considering only the physical limitations, we may notice how they have been unceasingly transgressed in recent years; environmental temperatures from 0°K up to 400°K and more, pressures from 0 to 20 or more atmospheres, velocities greatly exceeding that of sound now have become standard external conditions for many categories of men (for instance Apollo astronauts, men working on off-shore drillings, deep-sea divers, etc.).

Setting aside considerations regarding the questions of limits and environmental conditions, it must be emphasized that no system ruled only by deterministic laws can "produce" negentropy. It follows that man and his development (man as a whole, not his particular functions and modes of behaviour) cannot be understood by any theory based on a mechanistic model. As shown by Dr. Holroyd the model based on chance must also be discarded.

If neither chance nor determinism, where then can one turn?

References

- ¹Holroyd, H. B. 1972. Darwinism is physical and mathematical nonsense, *Creation Research Society Quarterly*, June.
- ²Hubert, J. Z. 1968. Gödl, Ruyer and Assembling, *Znak* 16, Krakow.

REVIEW OF CREATIONIST ASTRONOMY

GEORGE MULFINGER, JR.*

Introduction

As can be seen from the brevity of the list of offerings presented here, much work remains to be done in the area of creationist astronomy. Christians who have sufficient background in the field and who have strong enough convictions to take a good stand on the issues involved should be encouraged to write.

Frankly, I have been appalled at the number of professing Christians who have taken the easy way out and have compromised with atheistic theories. Yet, whether realized by readers or not, creationists are in the midst of a spiritual warfare. Satanic forces and doctrines, which creationists oppose, exist at all levels, even in the basic sciences of physics and astronomy. Perhaps the heresy in those areas is more subtle than in, say, the doctrine of human evolution, but it is present nonetheless.

And, as has been brought out in Bible-science seminars in various parts of the country, a compromising tendency is taking a tremendous toll among our young people today. How can they be helped to withstand the wiles of the devil in this respect?

It is instructive to note from Ephesians 6:14 that *truth* is listed first among the defenses that comprise the "whole armor of God." But how can they know the truth in some of these subject matter areas unless capable Christians are willing to exercise some of their God-given talent to "dig it out" and make it available to them?

The writings reviewed in this article are, to the best of my knowledge, strictly creationist in their approach. Admittedly some decisions had to be made in determining what was to be included. Several books and articles that exhibit some measure of compromise with an evolutionary cosmology or time-scale have been excluded from the listing.

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"The Origin of the Solar System" by John C. Whitcomb, Jr. Presbyterian and Reformed Publishing Company, Nutley, New Jersey, 1964, 34 pp.

In this well written, well documented little booklet, Whitcomb raises questions that the theorists will never be able to answer, so long as they insist on restricting themselves to blindly acting naturalistic mechanisms. Some of the areas covered include problems in the alleged condensation of the sun and planets, angular momentum, eccentric and inclined orbits, retrograde rotation of planets, retrograde revolution of satellites, and distribution of elements in the solar system. The booklet also includes an exposure of the fallacies of the double revelation theory.



"On the Origin of the Universe" by Donald O. Acrey in *Creation Research Society Quarterly*, July 1964, pp. 10, 11.

Acrey points out some of the observational hindrances to astronomy such as absorption of light by the atmosphere, absorption in the interstellar medium, back-scattered solar radiation, and cosmic radio noise. It is sobering to contemplate that theories in astronomy are not the only aspect that is suspect. The very observations are often questionable.

One thinks of the canals of Mars. At one time in the not-too-distant past many capable astronomers were seeing and sketching the "canals." But somehow they never seemed to be able to photograph them successfully. The Mariner space probes have now shown them to be non-existent. What were they? No fully satisfying explanation has yet been proposed.

The author stresses the futility of attempts to date the universe, most especially those methods involving the use of light. He suggests the logical creationist view that light waves were formed instantaneously, already in motion, at the beginning. How long ago this took place, however, cannot be determined because of lack of proper tools and techniques.



"God of the Universe Watching Over the Earth" by Oscar L. Brauer in *Creation Research Society Quarterly*, January 1967, pp. 4-11.

This paper is broader in scope than just astronomy since the author touches also on biology, geology, and theology. Brauer presents some compelling arguments for teleology, drawing from a wide assortment of illustrations and experiences. He makes some astute observations concerning those who would attempt to harmonize the Bible with some scientific theory by annihilating the portion of Scripture in question. He asks, "Why not change the theories to fit

God's Word?"

In his list of references the author gives the chapter and verse for each of the 71 portions of Scripture that say or imply that God created the heavens and the earth. Of these, 53 are found in the Old Testament, 18 in the New Testament.



"Examining the Cosmogonies—A Historical Review" by George L. Mulfinger, Jr. in *Creation Research Society Quarterly*, September 1967, pp. 57-69. (Also reprinted in *Why Not Creation?* Walter Lammerts, Editor. Presbyterian and Reformed Publishing Company, Nutley, New Jersey, 1970, pp. 39-66.)

This is a study of the fickleness and transitoriness of man's "best" thinking in the realm of cosmogony. The paper covers eleven theories of the solar system chronologically from 1644 to 1951, and four theories of the universe from 1927 to 1965. Viewed in historical perspective this naturalistic guesswork perpetrated in the name of science is seen to be a vast chain of changeableness, with no guarantee that the theorists are coming any closer to the truth today than when they first started speculating.

As a matter of fact it appears that, from a philosophical standpoint, at least, they are actually getting *farther* from the truth. In their attempt to force God to abdicate His creatorship they have turned to more and more bizarre schemes that increasingly involve violation of natural laws. The vast spans of time that are invoked to make the theories seem more plausible actually work against them.

In conclusion it is suggested that it is totally useless to speculate about what the universe used to be when we don't even understand what it is today! The challenge to those who reject the Word of God on the subject still stands:

Let him who scoffs at the Genesis record state specifically which hypothesis he would put in its place. Then let him attempt to resolve the insuperable difficulties inherent in that hypothesis and defend it against the onslaughts of future experimental findings.

If this can be done successfully it will be a "first" in the history of astronomy.



"The Creation of the Heavens and the Earth" by John C. Whitcomb, Jr., in *Creation Research Society Quarterly*, September 1967, pp. 69-74. (Also reprinted in *Scientific Studies in Special Creation*. Walter Lammerts, Editor. Presbyterian and Reformed Publishing Company, Nutley, New Jersey, 1971, pp. 22-31.

Whitcomb shows the Biblical basis for an *ex nihilo* creation and enumerates nine defects inherent in the various evolutionary theories of the origin of the solar system. He then adds, "In

the light of all these facts of astronomy, it seems to me that evangelical scientists have no right to lend their support to evolutionary cosmogonies."

As all these theories demand vast spans of time it is profitable to study from a textual standpoint whether such time can in fact be comprehended within a Scriptural framework. Thus the paper includes a discussion of the Gap Theory, showing its various difficulties. Whitcomb concluded the paper with consideration of the *purpose* of the stellar creation, stressing the uniqueness of the planet earth in the overall scheme of the physical universe.



"Modern Cosmology and the Origin of the Solar System" by John Read in *Bible-Science Newsletter*, October 15, 1967. (Also reprinted in *The Creation Alternative*. Walter Lang and Vernon Raaflaub, Editors. Bible-Science Association, Caldwell, Idaho, 1970, pp. 80-85.)

It is refreshing to see Read's strict interpretation of Genesis I with respect to astronomical creation. No gaps are postulated and it is stated emphatically that no harmonization can be effected between Genesis and modern cosmology.

The author presents two very excellent quotes from noted astronomers admitting quite candidly the failures of modern theories—one from Thornton Page and one from Jastrow and Cameron. The latter enumerates three serious problems in the origin of the solar system: angular momentum, mass distribution, and difficulties in the alleged condensation process.

After sketching a brief historical review of the unenviable record of failure of the various hypotheses that have been attempted, Read concludes, "There is zero chance the solar system could have evolved. In fact, the Genesis account recorded by Moses is the only explanation that is consistent with the scientific facts."



"Degeneration Processes in the Cosmos" by George L. Mulfinger, Jr. in *Bible-Science Newsletter*, September 15, 1968. (Also reprinted in *The Creation Alternative*. Walter Lang and Vernon Raaflaub, Editors. Bible-Science Association, Caldwell, Idaho, 1970, pp. 72-79.)

This is a brief survey of some of the specific examples of degenerative events in the universe that can be observed readily. The paper touches on normal stellar processes, novae, supernovae, shell stars, planetary nebulae, comets, meteors, cosmic rays, natural radioactivity, and the slowing of the earth's rotation. There is overwhelming evidence that natural events are "running downhill." Properly interpreted, this evidence can be used to completely deny all theories of cosmic evolution.

"Is There Life on Other Worlds" by Frank W. Cousins in *Creation Research Society Quarterly*, June 1970, pp. 29-37.

The author states that the question raised in the title is an open one. The alleged direct evidence (i.e., results from analyses of carbonaceous chondrites) is shown to be unsatisfactory at best. Lacking scientific evidence, then, the question is seen to be a philosophical one rather than a scientific one.

Cousins first shows the arbitrary nature of the guesswork concerning the existence of other planets suitable for life. The estimates of the possible number of such planets vary greatly. Shapley's guess of 10^8 differs from Hoyle's guess of 10^{14} by a factor of a million! The study of astrometric binaries is shown to be difficult and unrewarding, at least insofar as shedding light on the question at hand.

The author then attacks the hypotheses of spontaneous generation and biological evolution. Considering the case he presents it seems impossible to accept the occurrence of either one *once* here on earth where conditions are known to be "right," much less multiplied billions of times out in space where conditions can only be imagined.



"Origin and Development of the Universe" by Thomas G. Barnes in *Creation Research Society Quarterly*, June 1970, pp. 51-53.

The origin and development of the universe is a paradox in science. There is *no way* that the first and second laws of thermodynamics can be used to achieve a scientifically consistent explanation of the origin of the universe and its transition to the present state. This is a paradox in science *per se*.

Apart from divine intervention, the first law, consistently applied, would lead to a belief in the eternity of matter. Yet the universe would have *already* run down as a result of conditions described by the second law. "Obviously that is not the present state of the universe. Hence the paradox."

The difficulty is not resolved by the "big bang" idea or any other so-called hypothesis that is based upon strictly naturalistic processes.

Barnes mentions one highly amusing ruse that has been suggested in an attempt to salvage the situation—namely, that the universe is an open system with energy continually being pumped in from the outside! Objections to the idea should be rather obvious. But *no theory*, either serious or facetious, can be used successfully to answer the question that Barnes raises.

"Is the Universe a Thermodynamic System?" by Emmett L. Williams, Jr. in *Creation Research Society Quarterly*, June 1970, pp. 46-50.

This paper deserves to be studied. The author defines the frequently misused terms "open system," "closed system," and "isolated system." It is his studied conclusion that it is impossible to tell if the universe is in fact a thermodynamic system on the basis of the scientific method. We simply do not have enough information at our disposal to make a positive statement.

However, on the basis of Scripture it is *assumed* that the universe is a thermodynamic system, and, because it does not appear to exchange energy or matter with its surroundings, it is further assumed that it is an isolated system. Yet, "whether the universe is open, closed, or isolated, it is definitely degenerating. No matter what type of thermodynamic system is chosen, the entropy of the system always increases with the occurrence of an irreversible process."

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"Critique of Stellar Evolution" by George L. Mulfinger, Jr. in *Creation Research Society Quarterly*, June 1970, pp. 7-24.

This is a protest against the all-encompassing "hydrogen-to-man" concept of cosmic evolution popularized by Shapley, Gamow, and others. Such thinking, in spite of many scientific and philosophical absurdities, is widely adopted today.

Furthermore, many professing Christians are being "carried along with the tide." Surely they fail to realize the consequences. There is no logical stopping point. The theory is a broad philosophical "pathway" leading ultimately to atheism.

It is remarkable how evolutionists can turn the truth around. Degenerative processes in stars, predicted by both scientists and Scripture, are termed "stellar evolution," leading the unsuspecting to believe that some kind of upgrading or improvement is involved. The most incredible part of this system of belief is the concept that stars, planets, and other astronomical bodies do not need a Creator. Rather they supposedly have been structured spontaneously, which occurs continually. Such an alleged process is unscriptural (Gen. 2:1-3), would violate the known laws of nature, and has never been observed.

The paper includes an entropy calculation indicating that the star formation process would be in flagrant violation of the second law of thermodynamics. It has been interesting to observe responses of evolutionists to this dilemma. Amusingly, some have attempted to take refuge in "entropy sinks," which would appear to be about the only "loophole" available. But any knowledgeable thermodynamicist would be able

to point out that *there is no such thing as an entropy sink in the macroscopic world!* And there is little question that an interstellar cloud several light years across (which is supposed to be condensing into a star) is indeed macroscopic!

Similarly, a calculation of the forces acting in such a cloud demonstrates that it would tend to expand rather than contract. I am now working on a new improved force calculation that shows the expansive force of the cloud to be considerably stronger, even, than I had originally thought. This will hopefully be published in this *Quarterly* in the near future.

Astronomical dating methods are discussed and rejected as invalid. Such methods involve a two-step guessing procedure: (1) guessing at an evolutionary history for the object being dated; (2) guessing how long that history would take to complete itself. By this line of reasoning, for example, it has been concluded that the Pleiades are 900 million years old! Many age discrepancies existing in the astronomical literature are cited to show that such dating methods *must* be quite unreliable. In some cases discrepancies involve many hundreds or even thousands of percent error.

Other difficulties are discussed to illustrate the fact that the reader is beset today with a hodgepodge of mutually contradictory ideas in the literature, brought about by a desire to superimpose an evolutionary framework on a degenerating universe. But this view avails nothing. The evolutionary approach is utterly bankrupt when attempting to explain the ultimate origin of anything. To the evolutionist each stage of development requires a previous stage. Never can there be a true beginning. Yet scientific data and Scripture both demand such a beginning.

The most satisfactory explanation for the origin of stars, galaxies, and planets is a rapid and miraculous Creation which endowed the heavens initially with all the diversity of structure and function that we observe today.

☆ ☆ ☆

"A Scientist Explains" by Harold S. Slusher in *Science and Scripture*, March-April 1971, September-October 1971, November-December 1971, January-February 1972, July-August 1972.

In this series of very excellent articles Prof. Slusher discusses a number of evidences for a young solar system. The indicators he has selected include the decay of the earth's magnetic field, the mercury content in the oceans, juvenile water from volcanoes, comets, the Poynting-Robertson effect, and the behavior of light in Riemannian space. The last named is a most fascinating subject that warrants a great deal of further investigation.

Slusher's discussion of light in space is based on a paper that appeared in the *Journal of the Optical Society of America*, August 1953, entitled, "Binary Stars and the Velocity of Light." The two investigators (Moon and Spencer) concluded that if light travels in Riemannian space with an effective radius of 5 light-years (and there is some experimental evidence to indicate that such may well be the case), then light can arrive here on the earth from the farthest star in only 15.7 years. To the best of my knowledge this original paper has never been refuted.

Slusher's treatment of comets is also noteworthy. According to figures quoted from Lyttleton, long-period comets would be expelled from the solar system in relatively short time. In "only" 5 million years about 95% would have been lost. The short-period comets, by virtue of their closer approach to the sun, would suffer rapid breakup into meteoroids. The author cites calculations by Richardson which are truly amazing. According to Richardson's figures, out of an original family of 1000 short-period comets, at the end of 3000 years only 1 or 2 would be left! Slusher concludes, "The destruction and the loss of comets puts a definite upper limit on the age of the solar system. Instead of 4.5 billion years, it appears at the most to be only a few to several thousand years old."

Also in this series of articles Prof. Slusher discusses the question, "Does Life Exist on Other Planets?" His conclusion is as follows: "It seems highly improbable that there is life in our solar system outside of the earth. If other intelligent life does exist then it must be in another planetary system somewhere in space. We do not know for certain that any other planetary systems exist."

☆ ☆ ☆

"Some Astronomical Evidences for a Youthful Solar System" by Harold S. Slusher in *Creation Research Society Quarterly*, June 1971, pp. 55-57.

This is a discussion of several indicators of a youthful solar system—meteoritic dust accumulation on the earth and moon, the Poynting-Robertson effect, comets, the helium content of the earth's atmosphere, etc. The Poynting-Robertson effect is especially interesting. It can be shown that particles in solar orbit gradually spiral into the sun.

The question then arises: Why is there still so much particulate matter present in interplanetary space, such as that which gives rise to the zodiacal light? There appears to be far too much material for the alleged age of the solar system. The questions raised in this paper should be given serious consideration and study—not the condescending smile and cursory dismissal that is so often encountered.

"Comets and a Young Solar System" by Harold Armstrong in *Creation Research Society Quarterly*, December 1971, pp. 192, 193.

The fact that there are still comets in orbit around the sun can be used to argue strongly against a multibillion-year history for the solar system. It has been estimated that a typical comet can only survive 50 or 60 revolutions before disintegrating completely. Another possible fate that can befall a comet is perturbation by a large planet such as Jupiter, resulting in its ejection from the solar system. With depletion of comets possible by both of these processes, it is remarkable indeed that any survive today.

The "comet bank theory" of Opik and Oort is an *ad hoc* speculation that has been devised to provide a continuing source of comets "as needed" from regions beyond the orbit of Pluto. Armstrong states, "There is no evidence for any such thing, and some evidence against it." The question should be studied further. Unfortunately the alleged comet bank lies (conveniently for the theorists) beyond any possibility of observation, at least for the present. Therefore it cannot be studied scientifically. However, the reality of this defect is overlooked, in this case, because naturalistic scientists are so desperate for some idea.

☆ ☆ ☆

The Early Earth by John C. Whitcomb, Jr. Baker Book House Company, Winona Lake, Indiana, 1972, 144 pp.

This is a remarkably comprehensive new book covering such subjects as the nature of Creation, astronomical theories, the geologic timetable, the creation of plants and animals, theistic evolution, the antiquity of man, the day-age theory, the gap theory, and the double revelation theory. The reader is referred to a complete review in the March 1973 issue of *Creation Research Society Quarterly*.

☆ ☆ ☆

"Could There Be Life on Other Planets of the Solar System?" by Oscar M. Erpenstein in *Creation Research Society Quarterly*, June 1972, pp. 58-63.

The author concerns himself only with "life as we know it." This would appear to be a wise approach because, in his words, "life in any other form is no more than a metaphysical speculation, incapable of proof." The question posed in the title is answered decisively in the negative, the chief reason being the absence of liquid water.

This much is now certain, without necessarily going even further, that the earth is the only planet on which liquid water is to be found, and this is absolutely necessary for the sustenance of life as we are familiar with it.

Some interesting information not usually available from astronomy texts is included in the paper: the apparent diameter of the sun as seen from the various planets, the apparent stellar magnitude of the sun from each of the planets, and the relative amounts of heat and light received by each planet.

☆ ☆ ☆

"Our Degenerating Universe" by George L. Mulfinger, Jr. in *A Challenge to Education*. Walter Lang, Editor. Bible-Science Association, Caldwell, Idaho, 1972, pp. 53-58.

This paper was presented at the Milwaukee Creation Convention, October 1972. It touches on the following general areas: mass and radiation losses from stars, catastrophic events in stars, white dwarfs, neutron stars (pulsars), black holes, "normal" degeneration in galaxies, and exploding galaxies, including Seyfert galaxies and quasars. Everything from stars to galaxies is seen to be wearing out. Yet the cosmic evolutionist is unable to point to new objects that are forming to take their places.

☆ ☆ ☆

"Airy's Failure Reconsidered" by W. van der Kamp. Printed by the author (14813 Harris Road, RR #1, Pitt Meadows, B. C., Canada). Copyright, 1970.

This is a thought-provoking little booklet. The subject is a bit esoteric for the average Christian, touching on matters both scientific and philosophical, but it has definite merit for the serious-minded reader in that it forces one to think through some of the concepts and notions he has taken for granted without proof since childhood.

More specifically, van de Kamp's treatise points up the fact that much remains to be learned about the nature of light and the manner in which it is propagated. The title refers to an experiment performed by Sir George Airy, British Astronomer Royal, in the year 1871. Airy failed to observe any difference in the required angular setting between an ordinary telescope fixed on a given star, and a water-filled telescope fixed on the same star. There are a number of ways of interpreting this result.

This reviewer would disagree with van der Kamp's interpretation that the earth is in fact static while the rest of the universe turns around it. (The author embraces Tycho Brahe's cosmology rather than Ptolemy's.) Such a view calls into question the entire framework of celestial mechanics erected by Newton, Kepler, and others. This edifice has withstood the test of centuries, and is admirably useful in the space program today.

Some of the outcomes of Einstein's work are similarly challenged, but this is a different matter. Einstein's results have not yet "weathered" the test of centuries of observations, and while some recent research tends to confirm his Special Theory of Relativity, other findings are troublesome for supporters of the General Theory.

The author proposes an experiment to resolve the question that may or may not be definitive. He also sets forth a unique view of gravitation which sounds quite strange to those who have received orthodox instruction in physics, but then it must be admitted that *no one* really knows just how gravitation *does* work.

Christians might be willing to accept van der Kamp's geocentric view to a degree. Certainly we cannot deny that the earth is the center of God's interest. It is to this planet that God sent His Son to die on the cross, and it is to this planet that He will return to set up his Kingdom. Creationists might not even quibble too much about the idea that the earth is at the geometric center of the visible universe.

But the idea of a stationary earth will loom as a stumbling block to many. The author apparently has Biblical reasons for this belief, but does not spell out in detail (at least not in this treatise) which portions of Scripture he feels would compel one to the geocentric point of view.

The booklet is written in an attractive style and is well documented. It is recommended reading for anyone who enjoys exercising his mind, and who is willing to rethink some of his long-cherished beliefs about the universe in which he lives.

OTHER BOOK REVIEWS

There Is a God in Heaven by Otis Gatewood, B.A., M.A., L.L.D., 1970. CONTACT, Inc., 541 East North 16th Street, Abilene, Texas 79601. 317 pages. \$6.95 Hardcover.

Reviewed by T. Robert Ingram*

This is a solid contribution to the fast-growing literature on Creation. Although not lengthy, it is broad enough in scope to be classed as a kind of "summa" so popular with the school men of the Middle Ages. As such, it must share the weaknesses of that type of writing, especially in that rare indeed are the minds equipped to cover such vastness.

The author approaches the issue of creation vs. non-creation (or evolution) by considering first the nature and attributes of God. This is a good complement to another work reviewed in these columns recently in which the question was approached from traditional arguments for the existence of God. Dr. Gatewood simply assumes Existence, but expands very profitably on the Divine Nature. It is heartening to see this return to sound theology which undergirds all reasoning with a doctrine of God.

He is particularly strong in his recognition of evolution as a form of pantheism, and in his analysis of pantheism in general. He writes,

There is very little difference between the pantheist and the atheist for both declare that all things come from "within." The pantheist says he is not an atheist, but in reality he de-thrones his deity of all personality or entity, the same as the atheist, and declares that God and universe are one.

The author also sees that "continuous-creationism" and theories of evolution are basically built upon pantheism, and thus he deals a solid blow against theistic evolution; for he says, "A theistic evolutionist is one who believes in God but does not believe in fiat creation in seven days. He believes that God, by continuous creation through millions and billions of years, brought the present life forms into existence. . . ."

In that connection, he formulates a conclusion that must be sobering to every one who tries to hide his unbelief in creation under a cloak of continuous creation, namely, "We must be fully persuaded that God is supreme as Creator in order for us to trust him as Redeemer."

Karl Barth's neglect of the doctrine of Creation in his attempt to reconstruct a systematic theology on the single premise, "Jesus is Lord," has been shown to have failed precisely on this point.

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From the earliest times it has been understood that none other than the Creator could redeem.

It is regrettable that one with so irenic a spirit and such profound insights would be found wanting in topics which seem to cry out for some treatment of the doctrine of the Trinity and would go along with popular cultural evolutionary assumptions about the Dark Ages and belief in a flat earth. It is even more jarring to meet the pejorative use of "bourgeois" and the howler that Christ is a revolutionist of the first order.

I also felt uneasy, despite the Scriptural warrant from Philippians 2.6, with his attributing "form" to God, since form nearly always means limits and parts such as side, top and bottom.

His concept of darkness as having been created is most provocative.

On the whole, this is an excellent beginning in the much needed area of tying together all doctrine to the fountainhead of Creation. While it may well be true, as the ancients held, that Redemption is a greater work of God than Creation, nevertheless without Creation there could not have been Redemption.

☆ ☆ ☆

The Life of James Clerk-Maxwell by Campbell and Garnet. Johnson Reprint Co. \$26.50. And *Faraday* by L. Pearce Williams. Bias Books, N.Y.C. 1964. \$12.50.

Reviewed by Samuel T. Wolfe*

It is fortunate that in just the last few years biographies of unusual excellence have come out on Faraday and Maxwell—the first an original work and the second a reprint. A study of these works in conjunction reveals a most interesting situation.

For the utilization of electricity and with that the entire gamut of modern science we are indebted uniquely to the discovery of the basic relation between electricity and magnetism achieved in practice by Faraday, and later put into the most brilliant formulation by Maxwell. More important, each in his own way was an outstanding follower of the historical Christian faith.

The scientific situation has been described by A. E. E. McKenzie:

The most fundamental change in the outlook and basis of physics after the time of Newton originated from the work of (Faraday and Maxwell).

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Newton's picture of reality was in terms of the movement of particles by the action of forces across empty space. Faraday conceived of the space surrounding a particle as an extension of the particle, developing his ideas from his researches in electricity and magnetism. Such a space is known as a field. A space in which electromagnetic or gravitational forces can be detected is called an electromagnetic or gravitational field, respectively. Maxwell put Faraday's ideas into mathematical form and represented combined electrical and magnetic fields by a set of equations which describe the changes in the field in space and time.¹

Prof. Williams has written a skillfully rounded modern biography which succeeds admirably in bringing Faraday out from any shades of technical obscurity. Unusual talent is evident through in-depth portraits of Faraday and those he worked with as well as in excellent analyses of Faraday's actual experiments. The author of the book-jacket writes very well: "This definitive and lively biography illustrates for the first time the full extent of Michael Faraday's monumental contributions to modern physics."

Emphasis is put on the manner in which two ideas guided Faraday. Beside the non-Newtonian idea of the ever-present field of force, there is the idea of the integration of all forms of matter implied in the law of the conservation of energy. All of this was very much in question in Faraday's time. But with these two guidelines he entered the herculean labors which have won him the name of the greatest of all researchers, at the culmination of which he established the principle of the dynamo by which, in turn, demonstrated that electricity and magnetism are mutually inductive.

It is fairly well known that Faraday, throughout his life, was an earnest member of the Sandemanians, a group analagous to the Plymouth Brethren. Williams touches briefly on this, noting Faraday's unusual personal reputation for saintliness and how his science was rooted in his faith. For Faraday the world was beautiful, intelligible, and adapted to the needs of mankind because God was rational and good.

Dr. Bence-Jones in the older standard biography further noted: "His standard of duty . . . was formed entirely on what he held to be the revelation of the will of God in the written word, and throughout his life his faith led him to act to the very letter of it."²

In other words, the man who harnessed electricity was a Biblical literalist. This, for creationists, should have considerable meaning.

However, Faraday was not perfect. It was because of his weakness at mathematics that Maxwell needed to put his insights into the form of equations. And difficulties didn't stop there. Faraday was highly sensitive as to his belonging to what many considered a minority sect. In giving science lectures he was a veritable nonpareil of God-exalting eloquence. However, when it came to discussing religion he tended to be disconcertingly terse and incommunicative.

All of this, though, is mentioned only so that the reader recognize how an ideal doubly unreached was wonderfully fulfilled through a marvelous successor.

Seldom since Elisha received the double blessing has a successor come through like Maxwell. As a Christian gentleman he had just that certain warm outgoingness previously lacking. Moreover, and so significantly, the set of four equations along with certain added scientific concepts whereby he gave full mathematical expression to Faraday's electrical achievements warrants him much consideration as the greatest theorist of all time.

All this, and so much more, is found in the "super-biography" by his closest friend—Rev. Lewis Campbell—with the addition of Maxwell's own poems and articles as well as a most fascinating summary of Maxwell's scientific works by a star pupil—Edward Garnett.

The original of this is out of circulation but the Johnson Reprint Co. provides a great service by putting out a new issue. The high price may discourage some private buyers, but it should at least be in the libraries of all Christian schools for copious reference.

Concerning the set of Maxwell's equations, which was formulated over a century ago, few people to this day know anything about it outside electrical engineers and a few other scientific specialists, yet one seldom hears such praise heaped on any human achievement. It was the application of Maxwell's principles that led Hertz to discover radio waves and led Einstein to write about relativity; while Boltzmann declared of this set of equations that a god must have written it.

Dr. Thomas Barnes, chairman of the committee that wrote the creationist biology textbook, can be called one of the leading contemporary disciples of Maxwell. He says: "Maxwell had not only predicted the existence of electromagnetic waves such as radio and radar waves, but he had also shown that light is the same type of a wave. He had in effect unified the fields of electricity, magnetism, and optics—the greatest single achievement in the history of physical science."³

Involved mathematical explanation of this set of equations is beyond the scope of this review,

but a common-sense explication is perfectly feasible. Concise and highly useful equations are laid down for each step of the following sequence:

- (1) An electric charge generates an electric field.
- (2) An electric current generates a magnetic field.
- (3) The lines of the magnetic field form a closed loop.
- (4) A magnetic field varying with time induces an electric field.

These laws have great utility. They were basic to the formula for the dynamo—already invented at that time. Heinrich Hertz followed their guidance to discover radio waves shortly afterward. They are, in fact, the cornerstone for modern electronic-oriented science.

Now, it should be evident this set of equations is not astronomically inaccessible to the average mind. Why, then, has it been as little known as it has over a century? An incongruity seems involved, recalling how the music of J. S. Bach lay almost literally untouched until revived a century later by Mendelssohn? We cannot but speculate whether something here is uncongenial to those of evolutionary mentality who have so largely controlled mass communication in the last century.

The integration of Faraday's massive faith with his awesome discoveries should not be brushed aside as a sort of useless Sphinx's riddle; nor the fact that the flowering of Christian personality in Maxwell was, if anything, more amazing than what he did in science. All this is to be carefully considered as part of a total pattern.

Maxwell was a man of many-sided talents. As a poet he had the touch of a Tennyson or Browning. He penned much devotional writing of unusual excellence.

I also find it interesting that Maxwell, in several places, quite clearly anticipates what Herman Dooyeweerd was later to articulate as the intermodal coherence of spheres of being with increasing complexity. This was evidently an idea destined to challenge many Christian men of science in the harvest years since 1860.

In all justice it must be pointed out that Faraday, as well as Maxwell, was noted for a warm glowing personality. It's only that Faraday in a few areas tended to be indrawn and cryptic.

But Maxwell's geniality poured out like sunlight. He visited the sick, was the driving force in the Church Building Program. Had Maxwell

been living today he would have undoubtedly been given a citation as Outstanding Christian Layman. And recognition of this charismatic vein in Maxwell must undoubtedly be the apex of this Faraday-Maxwell testimony brushed aside for a century. At Maxwell's premature and unfortunate passing at the age of 48 there was literally wave upon wave of testimony to the effect: how unparalleled as a scientist, yet how incomparably greater his testimony as a Christian.

It must be admitted neither man was a crusading anti-evolutionist. Maxwell described Faraday as well as himself in saying he had "no nose for heresies." However, Faraday as a Fundamentalists was *de facto* a creationist, whereas Maxwell's incessant "digs" at evolutionists left little doubt where he really stood.

Modern electronic-oriented science may be said to have received its start when Maxwell assumed the chair of Experimental Physics at Cambridge in 1871. Since then there has been little enough Christian climate therein.

The *Principia Mathematica* of Russell and Whitehead (both non-believers) is usually taken as the last word in the field of mathematical physics. Einstein was a Deist whose God was "above" human destiny. Yet, even Einstein was so appalled at the God-ignoring callousness in modern science as to have said that he did not believe God controls the universe by throwing dice. And atomic scientist Ralph Lapp, in a recent book,⁴ has compared the current march of science to a runaway train controlled by an unknown engineer.

The message by this time should be clear. Mathematical physicists aren't supermen in Olympus any more than any other scientists. Creationists today should pick up the baton where Maxwell left it and demonstrate anew that the Lord is present in foundational mathematical science as well as anywhere else.

References

- ¹McKenzie, A. E. E. Major achievements of science. Vol. 1, p. 174.
 - ²Bence-Jones. Life of Faraday. Vol. 2, p. 286.
 - ³Barnes, T. C. 1965. Foundations of electricity and magnetism. D. C. Heath, Boston, p. 284.
 - ⁴Lapp, Ralph. The new priesthood, p. 196.
- (Added note: I am very glad that the following is now available: "The Scientists: James Clerk Maxwell and Michael Faraday" by Dwight Watson. 1973. Bible-Science Association, Box 1016, Caldwell, Idaho 83605. Primarily, Mr. Watson provides a commentary on the Campbell-Garnett biography of Maxwell.)

Science at the Cross-Roads by Herbert Dingle. Martin Brian and O'Keefe, Ltd. London, 1972. 256 pp. About \$8.00. And *The Special Theory of Relativity, a Critical Analysis*, by L. Essen. 1971. Oxford University Press, London, New York, etc. 27 pp. About \$1.50.

Reviewed by Harold Armstrong*

Really, only the first of these books will be of much concern to most readers of these pages; but it seems worthwhile to mention the second as background information.

Creationists have probably suffered as much as any people from trouble in getting a hearing. Of course, others who are not much concerned about Creation have encountered the same kind of thing in dealing with the same kind of question; one immediately thinks of Velikovsky. But it may be a surprise to many to find that a man concerned with physics, has found the same kind of trouble, and, in fact, seems to have endured what is almost another Velikovsky affair.

The man concerned is H. Dingle, a well-known English physicist and philosopher of science. Over the past 50 years or so he has written many books and articles, some of them on the theory of relativity. However, about fifteen years ago he began to feel that the usual proofs and arguments given for that theory were unsound, or at least unsatisfactory.

Eventually he came to the conclusion that the theory, in its usual presentation at least, involves contradictions, and cannot be wholly true. He suggests that these defects were not noticed much previously, because people concentrated on one aspect of matters and ignored the contradictory one; also, if things should become too bad, it was always possible to call a contradiction a "paradox," and glory in it, instead of being embarrassed by it.

Dingle felt that not only was this a matter of defending his own opinion, but that also public safety could be involved. For if physical theory is not correctly understood, then unexpected things might happen in physical processes and experiments. He was not much more specific on the matter than pointing out, reasonably enough, that if it were known wherein any danger might lie, it would not then be such a possible danger.

I suppose that Dingle had nuclear experiments in mind, e.g., if the theory is not completely understood there is always the possibility of an explosion in conjunction with some process that was supposed to be safe. One might recall that the use of D.D.T. was supposed to be safe a few years ago. Also, early in this century, experiments on radioactivity without much protection

were supposed to be safe, and many people thereby received injuries.

Anyway, Dingle published one or two items on the matters which he had worked out; but, authors of published responses only evaded the matters which he had raised. Subsequently Dingle found he was unable to get anything more published in the usual journals, and eventually found it necessary to write this book.

Why is all this of interest to creationists? Admittedly, in one way the matter is not of as much concern to creationists as it is to evolutionists. For the matters with which relativity is concerned are hardly "saving" matters. (Except in so far as people may try to argue from relativity of motion, supposedly established, to relativity of belief, morals, ethics, etc. But any such argument is not valid anyway.)

On the other hand, creationists shall, I trust, wish to see justice done, and shall likely think that Dingle did not really get fair treatment. Creationists can also see his side of the matter better because they have had the same kind of experience. Many creationists have had difficulty in publishing criticisms of evolutionary ideas, and have seen how all too often important points are evaded, and trivial circumstances are supposed to prove whatever point is held by the majority.

For teachers there is another matter. Different topics in different sciences are taught with different degrees of proficiency; and of all possible topics surely evolution and relativity are commonly handled with the least accuracy. When these subjects are introduced in an elementary course not one pupil in a thousand, I am sure, hears with any understanding; rather they just accept what they hear on grounds of *ipse dixit*. Surely a prime requirement for a teacher is to be aware of many of the objections to the view which he is presenting, and, if he can, to be able to answer them; if not he should at least admit that objections exist, and that thus the "official" view may yet have to be replaced.

One of Dingle's interests, as already mentioned, is the philosophy of science. Thus his book contains quite a lot of comments on points related to that philosophy. His points are not highly technical, and anyone interested in such things would find the book worth reading for this area alone. Dingle also makes some apt remarks on ethical matters.

The points which I have been making would apply whether or not Dingle is right in his views. My own view is that many of the text-book proofs and arguments associated with the theory, e.g. those in which people wander around with flashlights and rubber yardsticks, are puerile, unnecessary, and almost certainly sophistical. On

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the other hand, some of the effects ordinarily considered along with the theory, e.g. that it is harder to accelerate electrons if they are already moving at a great speed, seem to be true.

The book by Essen is mentioned as corroboration. Essen is one of the world's greatest authorities on atomic clocks, and he maintains that the behaviour of the "clocks" proposed with regard to the special theory of relativity is not at all what happens in practice, and that besides there are contradictions. He believes that the older theory proposed by Lorentz is more likely to be true.

From time to time, other critical writings on this subject have appeared, including those by Ritz, O'Rahilly, Brown, and others. Incidentally, in both of the books reviewed here, Dingle's especially, there is information on the history of physics, through especially the earlier part of this century. It is worth looking at this, to help to counteract the distorted accounts which are all too common.

Now one more remark. The situation of Dingle is much like that which Berkeley encountered, more than two hundred years ago, when he pointed out certain illogical features in certain developments of mathematics. Then, too, his points were evaded, not answered. Then, too, people rushed to defend notions which (to judge from the defenses offered), they did not understand. Anyone interested would find it intriguing to read the *Analyst*, and the correspondence connected with it, in any edition of Berkeley's works. It certainly does show that the more things change the more they are the same.

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How Did the Earth Get Here? by George Mulfing. 1972. Bob Jones University Press.

Reviewed by Thomas G. Barnes*

Readers of the *Creation Research Society Quarterly* will recall the excellent review articles and critique by George Mulfing regarding the theories of origin of the universe and of stellar "evolution."^{1,2} In his new booklet: *How Did the Earth Get Here?*, he itemizes the weaknesses in the theories of the "evolution" of the earth. A concise historical review of the emergence of these theories is given. Then each theory is considered and basic defects of each are exposed.

A surprising development in the booklet is the manner in which the author shows that the basic defects can be identified in the very area of expertise of the originator of the theory or model. As a case in point, one would hardly expect Laplace, with his excellence in mathematics, to fail on that score. But after explaining Laplace's

model of a hot, slowly rotating cloud that was supposed to cool, contract, increase in rotational speed until it broke up and formed the planets and their satellites, Mulfing states:

This hypothesis was warmly received by many who were of an antireligious turn of mind. Not anxious to "stare a gift horse in the teeth," those who might have done so failed to scrutinize it closely, and the defects that later became apparent went undetected for several decades. Ironically, Laplace's hypothesis, a mathematical approach to the question of the earth's origin was torn down in the mid 1800's by the penetrating analysis of a Christian physicist, James Clerk Maxwell—using mathematics!

The futility of the various attempts to remedy defects or add physical plausibility to these theories is well handled. One of the most extensive refutations is given to Gerard Kuiper's "protoplanet hypothesis." The lunar explorations are considered and the folly of expecting moon rocks to reveal evolutionary origins is thoroughly exposed.

In his conclusion the author presents Biblical Creation as the only answer: "To look at the question of origins in terms of the laws governing the universe at present is to do violence to logic. How obvious this is to one who has a perceptive understanding of either science or Scripture—"

This is a refreshing little booklet with a timely subject and written so that all may profit from it.

References

¹Mulfing, George. 1967. Examining the Cosmogonies—A Historical Review, *Creation Research Society Quarterly*, 4(2):57.

²Mulfing, George. 1970. Critique of Stellar Evolution, *Creation Research Society Quarterly*, 7(1):7.

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The Origin of Species by Charles Darwin with "Introduction" by L. Harrison Matthews, F.R.S. 1971. J. M. Dent & Sons Ltd., London. Paperback, xiii plus 488 pp.

Reviewed by Vernon A. Raaffaub*

The Centennial edition of Darwin's *Origin*, which contained the splendid "Introduction" by Dr. W. R. Thompson, is well known to readers of the *Creation Research Society Quarterly*. Professor Thompson found the general theory of evolution to be quite inadequate as an explanation for the origin and development of life, and stated so. But Thompson's position is not popular among biologists generally, and so with the publishing of a new edition of Darwin's book, and a new "Introduction," comments favorable to evolutionary thinking were expected.

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While Professor Matthews seems to be an evolutionist, he does not seem to be dedicated strongly to the theory, and his candid comments are of great value to the creationist. This "Introduction" would be a valuable addition to any school library, and certainly to the creationist's bookshelf.

Matthews points out that most biologists now accept the "fact" of evolution, although some, such as Thompson do question it, and he goes on to make the following observation in regard to Thompson's criticism of Darwin's thesis:

Much of Professor Thompson's criticism of Darwin's text is unanswerable. In accepting evolution as a fact, how many biologists pause to reflect that science is built upon theories that have been proved by experiment to be correct, or remember that the theory of animal evolution has never been thus proved? Even "Darwin's bulldog," as Thomas Huxley once called himself, wrote in 1863:

"I adopt Mr. Darwin's hypothesis, therefore, subject to the production of proof that physiological species may be produced by selective breeding"—meaning species that are infertile if crossed. That proof has never been produced, though a few not entirely convincing examples are claimed to have been found. The fact of evolution is the backbone of biology, and biology is thus in the peculiar position of being a science founded on an unproved theory—is it then a science or a faith? Belief in the theory of evolution is thus exactly parallel to belief in special creation—both are concepts which believers know to be true but neither, up to the present, has been capable of proof. (pp. x, xi.)

If school texts presented the situation as candidly as does Dr. Matthews, creationists would have little objection! Creationist interpretation is given equal footing with evolutionary thinking.

Toward the end of his "Introduction," Matthews states his opinion that evolution is logical, and a satisfactory faith, but unproved. He writes:

... evolution by natural selection of random mutations, generally of small size, is a logical explanation of the origin of the immense array of organisms now and in the past living on earth. The theory is so plausible that most biologists accept it as though it were a proven fact, although their conviction rests upon circumstantial evidence; it forms a satisfactory faith on which to base our interpretation of nature. (p. xii)

Matthews discusses experimental studies of the Peppered Moth, often used as an example of evolution in action. He points out that such experiments "do not show evolution in progress," because "all the moths remain from beginning to

end *Biston betularia*." (p. xi) Even the terms "natural selection" and "selection pressure" are criticized. In reference to the *Origin*, Matthews says:

It is surprising how much of the book is given to arguments based on entirely supposititious premises; the conclusions are doubtless sound enough provided the wholly theoretical data are true. (xii)

Those familiar with Thompson may be surprised to find him referred to as a "Christian fundamentalist"! (p. x) There are other points where a creationist might not find himself in complete agreement with Matthews, but on the whole this reviewer finds his "Introduction" to be such a fine piece of work, that he has no hesitancy of recommending it.

☆ ☆ ☆

Scientific Information, and Uncertainty by Leon Brillouin. Academic Press, New York. 1964. 164 pages.

Reviewed by H. L. Armstrong*

Recently I came across this book; and, while it is not creationistic, it does contain several things of interest to creationists. These will be mentioned briefly.

There is some discussion of thermodynamics, the second law, and the connections between macroscopic thermodynamics, statistical mechanics, and information theory. This is useful, for going from thermodynamics as it is concerned with engines to the questions which concern creationists. The point, that it is impossible for order to come from chaos and nothing else, is not mentioned very directly, but there is some discussion about the "arrow of time"; and it seems to be concluded that the arrow is, or arises from, or is closely connected with, irreversibility.

A second point of interest is a discussion of determinism. The author argues that, in fact, determinism is not to be found even in classical mechanics, where it is often supposed to exist if anywhere. Granted, the mathematics may be determinate, and it is often to the mathematics that people pay the most attention.

But the actual physics, as expressed in such things as initial conditions, is inevitably subject to uncertainties. Indeed, when one comes to think of it, the situation is not so much different from that in wave mechanics; there the mathematics, such as a solution of Schrödinger's equation, is determinate enough, but the interpretation is not.

*Harold Armstrong, M.S., is a faculty member of the physics department of Queen's University, Kingston, Ontario, Canada.

Another point raised by Brillouin concerns the stability of mechanical systems; the Solar System, for instance. As is known, Newton considered that the perturbations of the planets' motions by their mutual attractions might, at some future time, bring about an unstable situation which might result in a catastrophe, unless God should intervene.

Later, Laplace, Poincaré, and others were considered to have shown that the effects of the perturbations would always remain limited. But the trouble seems to be that their solutions were by

developments in series, and for that method it had to be assumed that the perturbations were small. So it appears that the question was begged.

Thus, if a uniformitarian wants to maintain that, given enough time, anything which is not rigorously impossible will happen, creationists are entitled to ask him how it is, then, that there is still a Solar System, since catastrophic instabilities of the Solar System seem to be possible, and, according to his figures, have been possible for untold ages.

LETTERS TO THE EDITOR

Food Laws

Mr. Arthur Jones has done a fine job on "Boundaries of the Min . . ." in the June and September numbers. I wonder if I could ask him into which category he places ducks, geese and swans.

In Lev. 11:18 and Deut. 14:16, in the King James Version, and also in the Douai, Lamsa, Septuagint, R. V., and Am. R. V., and Young versions, the swan is included with the forbidden birds—ducks and geese are not mentioned, but in literature on the food laws, put out by the British-Israel and other organizations, there is a blanket prohibition of all web-footed birds.

The Hebrew word translated as swan in the above versions is translated in Young's Concordance as "mole," "chamelion," "owl," and Ferrar Fenton translates it as "crested owl," Moffatt as "waterhen," Smith and Goodspeed as "horned owl," Basic as "waterhen."

In my opinion the swan should not be included in the forbidden lists—it is neither a scavenger nor a predator bird, and is certainly no relation to either a mole or a chamelion. When I was in London, England, about 15 years ago I wrote to the Chief Rabbi of London and asked his opinion about these birds: ducks, geese and swans; and he replied that those birds that are not prohibited are considered to be clean.

In a Jewish Encyclopedia the only mention I can find is under a subheading regarding "eggs": "As a rule, however, since most eggs sold are those of chickens, ducks and geese, no questions need be asked."—the implication being that those birds are considered as clean. I can find no mention of a web-foot prohibition, and I do not believe it is correct.

I am sending a copy of this letter addressed to Mr. Jones in your care with the hope that you may have his address and be able to forward it to him.

Yours sincerely,
E. W. Abraham,
"Tiritea,"
1125 Fiathful St.
Victoria, B. C., Canada
27 October 1972

Reply to Mr. Abraham

I agree with you that the swan (and the duck family in general) were not counted as unclean. I do not know how the idea that webfooted birds are unclean came about, but it certainly has no foundation. The Hebrew *tinshemeth* (the word at issue in Lev. 11:18 and Deut. 14:16) almost certainly refers to the rails and coots ("waterhen" in some of the versions) and not to the swans or other ducks.

There does not seem to be any scientific reason why one animal is unclean and another clean to men (such as might be indicated by webbed feet!). It just seems to be, that under the Old Covenant, God declared unclean all those animals whose habits (killing other flesh for food, feeding on carrion, etc.), *if seen in man*, would render *him* unclean and unable to worship a holy God. Under the New Covenant all these old relationships are done away: "every creature of God is good, and nothing to be refused, being received with thanksgiving; for it is being sanctified by the Word of God and prayer." (1 Tim. 4:4-5).

I hope these few comments are helpful.

Yours sincerely,
Arthur Jones
31 Glenwood Ave.
Eastwood
Leigh-on-Sea
Essex, England
United Kingdom
13 November 1972

☆ ☆ ☆

Value in Reprinting Allen?

The September, 1972 issue of the C.R.S. *Quarterly* was above average in both quality and content with one major exception. I question the merits of reprinting the B. F. Allen paper, "The geologic age of the Mississippi River" (C.R.S. *Quarterly*, 9(2):96-114). Since that arti-

cle was originally published 30 years ago, reprinting it without updating appears to be a mistake sure to bring criticism upon the Society for living in the past.

I agree with Dr. Clifford Burdick (Editor's Note, p. 96), that the paper did represent an outstanding piece of work, but I would add, "when it was originally published." At present the importance of the article lies in offering a review of the older literature and in stimulating some interested and competent person to review the subject in the current literature.

Isn't it about time that someone asked Allen's question (p. 97) again, viz. "Do the subsequent and latter views on the factors vital to the age of the delta . . . still fairly sustain the originally discovered facts?"

If "after about a century of diligent geological study of the Mississippi river and its delta . . . reasonable conclusions based on acceptable facts . . ." were justified, how much more should the additional facts collected during the last 30 years lend support to Allen's thesis?

If someone takes up the challenge to search out the most recent data on the delta's formation and the theory of deltaic subsidence, and reports his findings in this publication, maybe the reprinting will not have been a mistake after all.

Respectfully,
Lanny H. Fisk,
24676 Alamos Drive,
Loma Linda, CA 97354
11 December 1972

Christian vs Government Schools

I am distressed by the efforts of Christian educators to have the creation account taught in the government schools together with the evolutionary doctrine. These educators hold that tax-supported schools must not be monopolized by one view, that all views should be represented in the "public" schools.

However, they accept unchallenged the concept of tax-supported education, contrary to Biblical principles by which the parents, not the State, are given the responsibility and right for the education of their children. In accepting the premise and compromising on the content of biology courses (they do not wish to eliminate the teaching of evolution, but only to have it "balanced" by the doctrine of creation), they are declaring that truth does not exist, that one viewpoint is as good as another, that education should consist in presentning opinions and "letting the child choose."

Such a position is anti-Christian. Christians believe the Genesis account to be true, not relatively, but absolutely. Hence I am dismayed by the rejoicing in Christian circles that creation is now being taught in government schools. *It is not.* Creation is taught as an hypothesis, not as God's Word, that has been suggested to account for the existence of life. Teaching creation as an hypothesis is not Christian teaching.

Only when Christians jettison the "statist mentality" that leads them to support government schools will they begin teaching Christianity to the young.

Sincerely,
Dr. John W. Robbins
1221 Massachusetts Ave., N.W.,
Washington, D.C. 20005
7 December 1972

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