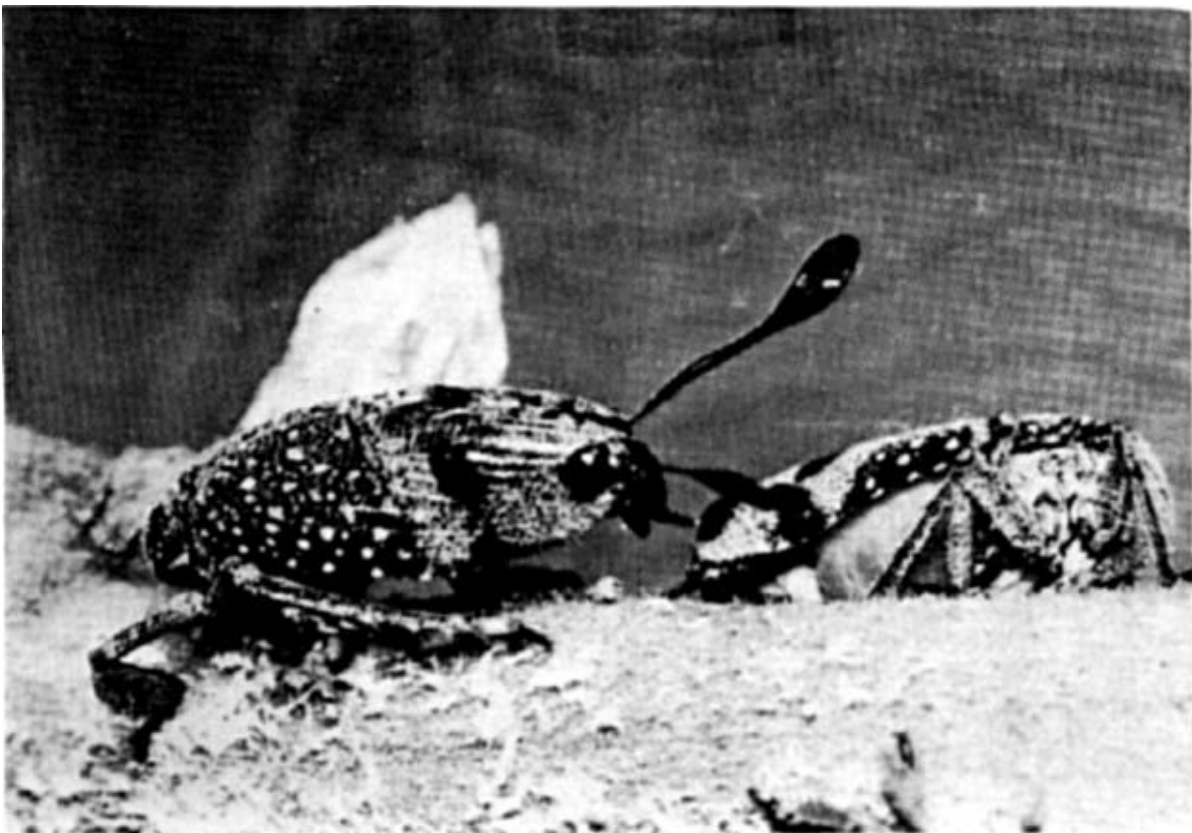


CREATION RESEARCH SOCIETY QUARTERLY



1971 ANNUAL ISSUE

Haec credimus:

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

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tion should be sent to Wilbert H. Rusch, Sr., 2717 Cranbrook
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COVERILLUSTRATION

The Siamese lantern fly (*Ancyra annamensis*) shown on the front cover is a most striking example of insect camouflage. Actually, the apparent antennae and eye spot (on the right) are at the posterior end of the insect. Thus, this "backward posturing" insect escapes predators by moving in the opposite direction to that expected when compared to "normal" insects. This illustration was made available through the special courtesy of Mr. Edward S. Ross, photographer for the Academy of Science in Golden Gate Park, San Francisco, California.

Is it reasonable to suppose that insects of this type could have evolved? The "antennae" and "eye spot" had to be perfect before the backward posturing behavior could have survival value for the insect. How, then, could these features have resulted from slow accumulation of minute mutational changes of genes?

Wolfgang Wickler attempts to explain such adaptations by natural selection in *Mimicry in plants and animals* (McGraw-Hill Book Company, 1968), which is reviewed in this issue by Dr. Walter E. Lammerts, Research Editor (page 79).

It is through the work of Dr. Walter E. Lammerts, Research Editor, and Dr. John N. Moore, Managing Editor, that this color cover has come into being. The editorial staff thanks these men for what may become a new policy—a color cover for each Annual Issue in June, and black and white illustrations for the other quarterly issues. The editorial staff now invites photographers to consider this need in advance of next June. Correspondence can be initiated with any one of the three editors regarding a suitable color picture for the Annual Issue, or black and white cover illustrations for the other quarterlies. Then the editors will be able to select the most appropriate pictures.

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JOHN J. GREBE

It is fitting that we honor Dr. John J. Grebe with the dedication of this eighth Annual Issue of the *Creation Research Society Quarterly* to him. A founder, and charter member of C. R. S., Dr. Grebe gave generously of his time and money to help the fledgling organization get started. Many of us recall the organizational meeting which was held under his enthusiastic sponsorship in Midland, Michigan, June 22-23, 1963, at the Grebe home. Present at that meeting were Drs. Lammerts, Klotz, Marsh, Gish, Grebe, Moore, Warriner, Linsenmann, and Professor Rusch.

Dr. Grebe is a man of many talents, many facets; and, a man wearing many mantles. His interests range widely from marine biology to nuclear physics. His discussions also range from encouraging the free flow of thoughtful philosophy to a deeply abiding faith in his Lutheran church.

As a member of many years at St. John's Lutheran Church at Midland, Michigan, he was responsible for the development of its unusual and effective pipe organ system. As a modest man and humble Christian, he has always been a firm vocal advocate of the conservative Lutheran doctrine, openly fighting the teachings of evolutionists in word and print wherever the opportunity presented itself.

Dr. Grebe is a man whom this author has admired, trusted, and been privileged to call his friend for the past 46 years, dating back to arrival

of Dr. Grebe in Midland in 1924 when he began his illustrious scientific career at the Dow Chemical Company.

Dr. Grebe was born in Uerzig, Germany, 1900. He was sent to this country by a wise father who saw no future for his son in a Germany that was becoming continually more militarily belligerent. At the age of fourteen he arrived in Cleveland, Ohio, where he lived with his uncle, Henry Grebe. Characteristic of his response to difficult situations or challenges, he promptly won the friendship of his fellow students although an "alien," and he graduated with top honors from the East Technical High School in 1918.

Dr. Grebe earned his B.S. degree and MS. degree from Case Institute of Technology, now part of Western Reserve University. In 1935, Case Institute of Technology awarded him a D.Sc. degree.

From Director of the Physical Research Laboratories at the Dow Chemical Company, Midland, Michigan, he subsequently became Dow's Director of Nuclear and Basic Research. The years 1946-47 were spent at the Oak Ridge National Laboratory's Reactor School and Engineering Team on the application of nuclear energy to industry, submarines, and rocket propulsion.

In 1948-49 he served as Chief Scientist to the Army Chemical Corps at Edgewood Arsenal, near Baltimore. He was involved in chemical, biological, and radiological defense work there. He has served on many government agencies as

advisor, and is still consultant to many educational and scientific organizations. He was present at the first Bikini atomic testing at the invitation of the United States government.

In 1943 he became the youngest man ever to receive the Chemical Industry Medal as a reward for his research which led to the extracting of bromine and other chemicals from sea water—making it possible to produce synthetic rubber in time of national urgency. The enthusiasm and unshakeable faith that he gave to his teams on the Sea Water project are memorable. He would encourage us when it was sorely needed until the entire project succeeded. This research, by the way, also broke the Chilean monopoly on iodine which shortly became a most reasonably priced medicinal.

In 1942 he was given The Certificate of Merit by The Franklin Institute for his invention of Koolshade (to keep out insects and the heat of the sun). In 1946 he received the Hyatt Award for Plastics Development. In 1967 he received an Honorary Doctor of Laws Degree from Hillsdale College, Hillsdale, Michigan.

In matters of more personal interest, by 1925 his dream of having his entire family come here from Germany had come true. I can well remember the joy of that arrival as I drove my father's Model-T to help transfer some of the Grebe family from the railway station. In 1929, Dr. Grebe married Hazel Holmes, his wonderful companion throughout these years. They have been blessed with five children and 9 grandchildren.

After 41 years at the Dow Chemical Company, Dr. Grebe "retired" to a much more busy life—if that could be possible—pursuing his lifelong

interest in ecology. The term "ecology" may be an "in" word now, but Dr. Grebe's interest in the environment dates back many years—spanning his whole lifetime in science. Transportation, clean air, pure water, long-range plans for food harvests from the sea were all matters that held his interest in days when his voice of protest went unheeded. Sadly, one by one his prophesies of what might be expected through continued waste of our heritage have come true. His patents on well drilling techniques and processes are too numerous to mention as are his patents in the chemical industry generally.

Through the years Dr. Grebe's stature as scientist has grown nationally and internationally. Yet he may be thought of as a "soldier of God," unafraid to speak in defense of his Faith even in non-receptive or antagonistic situations. Seemingly he has always been guided by the thought, "How can I serve God and mankind better?", and he has thus directed his thought, giant intellect, and boundless energy.

His prophesies in the world of science have become realities. Yet Dr. John Joseph Grebe remains a humble man of God, unaffected and unaffected—searching and striving that he might leave this world a better place for those who are to follow.

Karl W. Linsenmann, M.D.

(AUTHOR'S NOTE: The photographs of Dr. Grebe and much valuable background information for this dedication came from an article by Robert E. Mickelson entitled "Gifted Lutheran Scientist Serves God and Country," which was published in the Winter, 1965 issue of *Correspondent*, official publication of the Aid Association for Lutherans, Vol. 63, No. 448, pp. 2-7, Appleton, Wisconsin 54910).

NEW BOOK ANNOUNCEMENT

Ecology Crisis (God's Creation and Man's Pollution). 1971. Dr. John W. Klotz. Concordia Publishing House, St. Louis, Missouri. (\$2.75) 176 pages. Paperback.

Dr. Klotz has prepared an instructive book. He presents the background for discussion of the problem under these chapter headings: "Our Deteriorating Environment" and "Upsetting the Balance of Nature."

Then Klotz addresses himself to major pollution problems of the air, water, and other types of pollution in three closely worded chapters. In Chapter 7 the author discusses extinction of species, and reminds the reader of the passenger pigeon, Carolina parakeet, Townsend bunting, Grosse macaw, black-capped petrel, Michigan grayling, and the heath hen. Extinction of mammals, too, has led many to discuss natural area

preservation, the need for zoning, and "living museums."

After two chapters on "Radiation Damage" and "Pesticides and Herbicides," Dr. Klotz asks in his last chapter, "What Is Needed?" He considers possible legislation, research, and of great importance, the need for an ethic. He reviews the position taken by some that Christianity is to blame, and shows the reader the misrepresentations involved in such a position. Reminding that Christians are stewards of what is God's own, Klotz sees the import of Old Testament property laws. Responsible stewardship and balanced economic interests are discussed. He ends the book by noting, "We need the Christian environmental ethic outlined in the Bible, and we need Christians to practice it."

EDITORIAL COMMENTS

At about 6:00 o'clock, February 9, 1971, the morning calm was shattered in Newhall, California, and surrounding areas by a terrific earthquake which scored 6.5 on the logarithmic Richter scale. As I was walking between our kitchen and living room at that very moment, contemplating breakfast, the earth trembled and the house shook with indescribable power. Although our own house and college were virtually untouched, that was a period of about 60 seconds duration or less in which many lives were ended and others completely changed.

At the epicenter in the San Gabriel Mountains (some 10 miles south and east of Newhall) earth slippage was as great as five feet horizontally. Great reinforced concrete freeway overpasses were destroyed along with numerous buildings and damage in the multi-million dollar range was sustained.

Careful contemplation of this great event brings several thoughts to mind for the creation catastrophist:

1. Man has precious little control over the earth for God is still the sovereign Creator, who sustains not alone the domain of life, but also the balance of forces in the crust of the globe and the integrity of the earth itself.

2. In a period of only 60 seconds time an earthquake can undo several years of human effort in construction of solid concrete projects.

Those who have experienced this event with the many heavy aftershocks, or those readers who have viewed the more intense activity in Alaska, or Yellowstone Park, will realize that whole landscapes can be modified within hours or even minutes. We are completely unable to appreciate the dynamics of crustal action after the great deluge.

What Richter rating would earthquakes have had that accompanied the up-thrusting of the Sierra Nevada and the Coast Ranges on our own continent?! Such a question ought to be more fully explored by geologically-minded members of Creation Research Society, who might make it a point to visit the scene of earthquakes as they occur, and then attempt to interpret the effects of historic movements in lofting present mountain ranges to their magnificent heights. Even a minor experience such as the recent Newhall quake ought to show the fallacious character of theories proposed by Hutton and Lyell in the ignorance of 18th and 19th century times.

This eighth Annual Issue of *Creation Research Society Quarterly* begins with a dedication to a truly great scientist and deep Christian man who has had a continuing interest in ecology. Also this issue contains several papers on the

theme of environmental fitness. There are other papers covering a wide variety of topics such that every reader ought to find material pertinent to his own needs and interests in the area of origins.

Each of the first four papers deals with some aspect of the environment. In the study of ecology there are marvelous manifestations of design attributable to the Creator. Lest we fail to recognize this in our consuming study of life itself, authors of these papers make it plain that the environment in a chemical, physical, and geologic sense was "fit" for life.

Dr. Oscar Brauer reflects on the infinite knowledge of God as it is clearly seen in his chosen field of chemistry. The limitless numbers of organic compounds possible are a mute tribute to the versatility of the One who established the system and assembled molecules into living forms.

Dr. John Klotz brings to C. R. S. readers a balanced presentation of creationism in relation to the ecological crisis. He demonstrates that creationism is the only proper foundation for programs geared to preservation of life and improvement of the environment of life.

One of the greatest biological books of all times is Dr. J. L. Henderson's, *The Fitness of the Environment*. A timely review of this classic, plus an emphasis that Henderson could not have given, make Dr. Tinkle's paper a welcome addition to this Annual Issue.

Dr. Harold Clark is known to many as the author of the book, *Fossils, Flood, and Fire*. In his article, "Paleoecology and The Flood," Dr. Clark shows the role which life zones might have had in the distribution of fossils throughout the sedimentary deposits. By means of this ecological approach, a catastrophist is able to deal with the same data that uniformitarians take as evidence for long ages of evolutionary development.

Along a different line, Dr. Barnes shares with C. R. S. readers, for the first time, the fact that decay in the earth's magnetic field is striking evidence favoring a young earth. This evidence contravenes the million-year or billion-year figures which uniformitarians assign to earth age.

The next two papers relate to the historic evolution-creation question. Professor William Davis was of great assistance to me in preparing what we feel is a teaching paper in the area of population genetics. Some evolutionists frequently claim that, because natural selection is a fact, such selection leads quite naturally to a wholesale acceptance of neo-Darwinian evolution theories. It is our purpose in the paper, "Natural Selection Reexamined," to show teachers, stu-

dents, and all interested readers that natural selection does not lead to the origin of new 'kinds,' nor is it a valid basis for general evolution theories.

Mr. J. Arthur Jones combines perception of scientific topics with true mastery of philosophy in his article, "The Nature of Evolutionary Thought." He asserts that Darwinism is a conceptual framework geared to "paleo-science" and as such cannot be subjected to scientific test. Once again C. R. S. readers are reminded that each and every view of origins (evolution theory included) partakes of religious and philosophical presuppositions. We look forward to Mr. Jones producing more articles as his busy schedule will permit.

A set of articles which follow gives insight into the question of time. Dr. Walter E. Lammerts has a rare gift of seeing a valuable research aspect in nearly every phenomenon that he studies. His previous papers have provided data in such widely diverse areas as zoology (Darwin's finches), genetics (neutron bombardment of roses), and geology ("upside down" strata in Glacier National Park). On this occasion, Dr. Lammerts has discovered evidence in support of a recent origin for the deserts of the Pacific Southwest. Furthermore, he has demonstrated a connection of these data with the biblical flood.

Our second paper on the time question is by Professor Harold Slusher, co-editor of the creationist high school biology text, *BIOLOGY, A Search for Order in Complexity*. Mr. Slusher has undertaken to demonstrate that such astronomic data as meteoric dust and comets point to a recent creation. This paper is particularly "timely" as those, who examine lunar materials, make unfounded claims for great antiquity based on astronomic data.

Shorter papers by Dr. Henning, Dr. Grebe, Dr. Hoff, and Dr. Steinhauer deal with other facets of biology and astronomy. Drs. Henning and Grebe both marshal evidence in support of Divine special creation. Dr. Hoff raises a challenge to Mr. Donald Wesley Patten concerning the ice-dump hypothesis. Dr. Steinhauer has undertaken to answer questions raised by Dr. Hoff. Readers who have studied Mr. Patten's book, *The Biblical Flood and the Ice Epoch*, will enjoy this pair of papers in which two scientists debate the plausibility of an ice mass from space serving as basis for glacier formation.

Dr. Henry Morris and Dr. John N. Moore, as teaching scientists, have produced materials that will be of help to others in education. Dr. Morris discusses the historic "Day-Age Theory" of Genesis interpretation, whereas Dr. Moore sees a parallel between fraudulent activity in Hans Christian Anderson's tale, "The Emperor's New Clothes," and evolutionary pedagogy.

It has been said that creation scientists are devoid of a sense of humor. We trust that the wise (?) maxims collected by Professor Wilbert Rusch, Sr., and shared in his "Poor Bill's Almanac" will dispel such falsity of opinion and that they will cheer us as we note these all-to-evident tendencies!

The editor appreciates correspondence relative to previous C. R. S. articles. This proves that the journals are being read and carefully evaluated. This month a letter to the editor is accompanied by the author's answer. We shall continue this "letters" feature whenever valuable correspondence arrives.

Creation Research Society Quarterly exists because of an attitude that captures the best in true science and true religion. Each author prepares his paper for publication with no direct thought of personal gain because C. R. S. does not purchase manuscripts. This places the journal along with the better scientific magazines. They exist as organs of primary publication because talented workers submit the fruits of their studies for publication with no thought of payment in return.

C. R. S. authors sense, in addition, that this is a key area of Christian witness and an avenue through which they can express their gratitude to the God of scriptures, their Savior, the Lord Jesus Christ. I am certain that all members of the editorial staff join me in conveying heart-felt thanks to each contributing author who by his selfless effort has made this issue and previous issues possible.

Let us keep on freely and generously producing papers—research papers, library review papers, short articles, and book reviews—so that Creation Research Society publications can continue to maintain an amalgamation of the best in science with an overflow of love and gratitude to the Creator who has made possible our very life and breath.

GEORGE F. HOWE
Publications Editor

COMMENTS FROM PRESIDENT MORRIS

The *Creation Research Society Quarterly* begins its eighth year of publication with this issue and there are so many interesting and significant papers included in it that it may seem presumptuous to single out only a few of them for specific comment. I can only urge each member to read every one of them carefully and thoughtfully, with the assurance that his mind will be stimulated and his faith in God's Word strengthened.

Several of the papers are worthy of acceptance as definitive treatments of their subjects, deserving wide distribution and use for years to come. The paper, "Natural Selection Reexamined" by George Howe and William Davis, is certainly outstanding in this respect, both thorough and devastating in its reevaluation of this key concept of evolution theory. John Klotz' article on "Creationism and Our Ecological Crisis" could well be considered as a standard position paper on the relation of the Christian to problems of conservation and utilization of natural resources.

A much-needed discussion of evolution in terms of its basic assumptions and methodologies, from the standpoint of a careful philosophy of science, is given by Arthur Jones in his outstanding analysis of "The Nature of Evolutionary Thought." Incisive and highly useful insights abound in this study.

Tom Barnes has added a sharp weapon to our growing arsenal of evidence for a young earth in his consideration of the "Decay of the Earth's Magnetic Moment." Papers by Walter Lammerts, Harold Clark and Harold Slusher are also very helpful in this connection.

Every issue of the *Quarterly* seems to include one or more articles by new contributors. This is certainly an encouraging indication of a growing awareness and scientific interest in creationism. Editor George Howe reports that more than 60 different authors have had papers published in the *Quarterly* since it began.

On the other hand, this statistic also reveals that we have about 300 scientist voting members who have not yet contributed in this way. If you are among this latter number, this might be a good time for you to think through your own research and see if there isn't some material there that you could recast into form suitable for C.R.S. publication. Our next Annual Issue will be centered around the theme of order and design in nature, as an evidence of creation, and every field of science yields this sort of testimony.

It should be stressed again that the sole purpose of the Creation Research Society is to promote and publish research studies in the field of scientific Biblical creationism and catastrophism. As a pioneering effort, the development and pub-

lication of our textbook, *Biology: A Search for Order in Complexity* could be considered as a special sort of research project. Now that this has been successfully accomplished, it is hoped that it may serve as a pilot project for creation-oriented textbooks in many fields.

There is an urgent need, both in private schools and public schools, for books of this sort to be produced as soon as possible, at all levels and in all disciplines. Hopefully, other organizations and writers will take up this challenge. The Creation Research Society as such, however, at its recent annual board meeting, decided not to engage in further textbook projects, but to continue to concentrate solely on research and publication of the *Quarterly*.

One interesting development in recent years has been the emergence of a number of other creationist organizations and publications, all essentially with the same Biblical and scientific orientation as the Creation Research Society. I know of at least a dozen such organizations, and there are probably more than this. Some of our members have been concerned lest such proliferation result in a dilution of effectiveness. Personally, however, I think this is a very healthy development, because the need is great to reach as many people with the truth about creation as soon as we possibly can.

The Creation Research Society will concentrate on the fundamental research which is absolutely essential if our efforts are to be respected and accepted. The Bible Science Association, along with others, is reaching an increasing number of both laymen and scientists with its Newsletter, field tours, book distribution, seminars and other services. Another organization, Concerned American Citizens, and similar groups in various states are attempting to promote the teaching of creation in the schools.

The Creation Science Research Center in San Diego is engaged in textbook-writing, as well as research studies, radio ministry, creation seminars, etc.

None of these and other similar groups have any formal connection with each other. Each operates independently and is solely responsible for its own activities. In particular, the Creation Research Society, although in a sense partly responsible for the stimulus that caused these various organizations to develop, has repeatedly emphasized, through formal action of its Board, that it has no connection or responsibility with respect to any of these. Many individual members of the Society, including most of the Board members, do participate in one way or another in the functions of other creationist societies (as they do in other professional and scientific socie-

ties) but they do so as individuals and not as representatives of the Society.

This clarification needs to be made from time to time, as new people become concerned with the creationist revival and need orientation. However, I hope that, along with this necessary divergency of operations and activities, there will continue to be a basic unity of purpose and belief among all Biblical creationists. There is ample room and need for cooperation and encouragement of each other, and perhaps even friendly competition, but I trust all will seek prayerfully to eschew factionalism and personality-based (which, being interpreted, means "based on human pride") divisions.

Perhaps the scientist, more than others, needs to be cautioned against such weaknesses of human nature.

For ye see your calling, brethren, how that not many wise man after the flesh, not many mighty, not many noble, are called: But God hath chosen the foolish things of the world to confound the wise: and God hath chosen the weak things of the world to confound the things which are mighty. And base things of the world, and things which are despised, hath God chosen, yea and things which are not, to bring to nought things that are: That no flesh should glory in his presence. (I Corinthians 1:26-29)

THE SECOND LAW OF THERMODYNAMICS AND EVOLUTION

G. C. LOCKWOOD*

All living organisms are made up of chemical elements. Even the replication systems of cells, called DNA, are made up of chemical elements. Therefore, living organisms are subject to the second law of thermodynamics. The system of life includes the sun since it is the energy source. This system of energy and chemicals is subject to degradation, loss of order and death.

Life forms are like an engine, in that energy fuel is used. A thermal efficiency test can be run on all. All wear out and die. Engines are produced in factories while living organisms have their own self-contained reproduction factories. It takes energy to produce engines and it takes energy to run reproduction systems. But all wear out, decay, lose order, or die.

An open system simply means that there is at least another element involved in the total closed system. The total closed system is subject to the second law of thermodynamics. For example, an engine uses external fuel. The fuel-engine system is subject to the second law. There are friction and heat losses, which result in the work output being less than the fuel energy used. However, the fuel alone can only burn, unless there is the engine. The engine is the result of intelligent design and purposeful building.

Chance and energy alone cannot produce such order. Chance and time are destructive. Purposeless energy is also destructive, unless there is intelligent planning and control. Energy alone can only degenerate. It would be more logical to believe that a motor built itself by chance than

it would be to believe that life and all life's mechanisms came by chance.

Engines are made in factories. The order found in an engine is due to the work done by the factory. The factory requires energy to accomplish the work of making an engine. So it is that the reproductive systems of life are like the factory, in producing offspring. The order found in an offspring is that which was programmed in the DNA system of the fertilized ovum. Energy is used which is provided for by food.

Both systems have their energy inefficiencies and both systems wear out. The order found in the factory came from the intelligent planning of engineers, and the work of machine builders, tool makers and electricians. So it is that the order found in the DNA system of cell replication and reproductive systems demands an intelligent Creator.

Mechanisms and ordered systems do not build themselves by chance. Chance and Time cause disorder and loss of design. This is the experience of engineers. But evolutionists make idols out of Chance, Time and Nature.

Survival of the fittest does not account for the origin of species but rather shows extinction of species, which is not evolution but degeneration. Darwin wrote in the *Journal* of his voyage on January 9, 1834:

It is impossible to reflect on the changed state of the American continent without the deepest astonishment. Formerly it must have swarmed with great monsters: now we find mere pigmies, compared with the antecedent, allied races.

(Continued on Page 23)

*G. C. Lockwood, B.S.M.E., M.A.E., M.A., is a professional engineer. Presently he is an evangelist in Iowa Campaigns for Christ, supported by the South National Church of Christ, Springfield, Missouri

ORGANIC CHEMISTRY REFLECTS GOD'S INFINITE KNOWLEDGE

OSCAR L. BRAUER*

The structure of organic chemical molecules is reviewed briefly from the alkanes through and including the steroids. For each class of compounds the number of different molecules that may be synthesized is truly immense. Such versatility of design and construction is seen as a tribute to the infinite wisdom of the Creator.

Introduction

All knowledge comes from God.

... for the Lord is a God of all knowledge.¹

Mighty is our Lord and great his power, and his wisdom beyond all telling.²

The particular part of knowledge that concerns us in this article is Organic Chemistry. Although it is hard to quantify, knowledge dealing with chemistry is now said to double every ten years.

Organic Chemistry

Organic chemistry is the chemistry of carbon compounds. Although most any of the active elements may be incorporated in an organic compound, those most commonly associated with carbon are hydrogen, oxygen, nitrogen, sulfur, chlorine, bromine, iodine and fluorine.

It is very fortunate for us that God invented the carbon compounds because organic chemistry or carbon compounds include foods, fuels, and clothing. The simple foods—fats, proteins and carbohydrates—are all carbon compounds. For health, besides foods, we need vitamins and hormones, which are organic compounds too.

Other organic compounds that touch our daily lives are clothing such as cotton, wool, silk, and many synthetic fibers.

To these are added soaps, perfumes, dyestuffs, flavors, plastics, photographic films, explosives, synthetic rubbers, artificial flavors and many medicinals. Organic fuels are coal, natural gas, gasolines, fuel oils, and lubricating oils.

The organic compounds are infinite in number. In the Bible to represent very great numbers the author mentioned the "sands of the sea." The number of possible organic compounds far exceeds the "sands of the sea."

In the days of Columbus the exciting thing for a young man to do was to discover new lands. Now that has practically all been done. Around the end of the Nineteenth Century the exciting adventure was hunting gold. Now that type of search has practically been exhausted. One field will never be exhausted and that is organic chemistry. The organic chemist will never run out of things to do and much of his work is very exciting such as discovering new medicinals to cure other diseases.

*Oscar L. Brauer, Ph.D., former professor of chemistry and physics, San Jose State University, is presently retired.

The Simpler Organic Compounds,

In inorganic chemistry a pair of elements are known to make only a few compounds, usually one or two. For instance, hydrogen and oxygen form only two compounds—water (H_2O) and hydrogen peroxide (H_2O_2). Carbon and hydrogen, however, can form trillions of compounds.

The general name of the carbon and hydrogen compounds is *hydrocarbons*. There are many series of hydrocarbons.

The Alkanes³

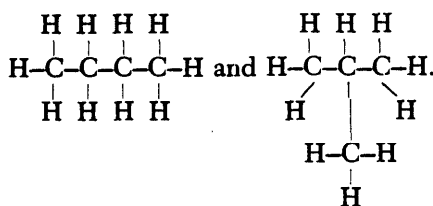
The simplest series of hydrocarbons is known as the "Alkanes." The alkanes start with one carbon, two carbons, three carbons, four carbons, on up to 94 carbons and probably many more. The molecule with 94 carbon atoms is the largest one synthesized by the chemists, but we have every reason to believe that this is not the end of the series.

A series of compounds of the same elements differing from the next by one carbon is called an *homologous series*. The series of alkanes is built up on the fact that carbon has four valences or bonds by which it can attach to other elements including carbon atoms. The smallest molecules in the alkane series are gases, then liquids of increasing density and finally solids.

The simpler alkanes are methane, $\begin{array}{c} \text{H} \\ | \\ \text{H}-\text{C}-\text{H} \\ | \\ \text{H} \end{array}$;

ethane, $\begin{array}{cc} \text{H} & \text{H} \\ | & | \\ \text{H}-\text{C}-\text{C}-\text{H} \\ | & | \\ \text{H} & \text{H} \end{array}$; and propane, $\begin{array}{ccc} \text{H} & \text{H} & \text{H} \\ | & | & | \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ | & | & | \\ \text{H} & \text{H} & \text{H} \end{array}$.

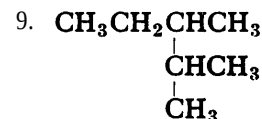
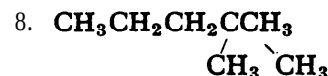
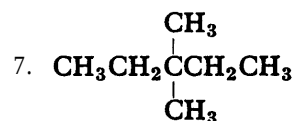
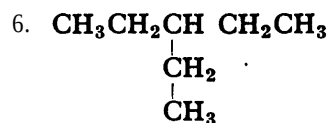
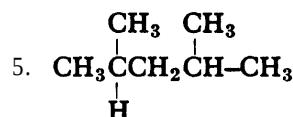
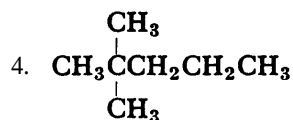
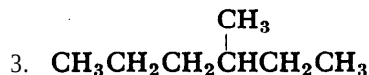
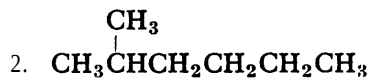
The next member in the alkane series is called butane. The surprising thing about butane is that there are two butanes. This is explained by the two structures:



The two or more forms of an alkane are called isomers. As the number of carbons in the molecule increase, the number of possible isomers increases. For instance, heptane with seven carbons exists in nine isomers.

The Heptanes

1. $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$



Any particular alkane can be represented by the formula $\text{C}_n\text{H}_{2n+2}$. The number of isomers soon begin to increase rapidly with the number of carbons in the molecule as follows:

7	Carbons—9 isomers.
10	" -75 isomers.
20	" -366,319 isomers.
30	" -4,111,846,763 isomers.
40	" -6.25 X 10^{13} isomers.

No one has tried to estimate how many isomers there could be of the alkane with 94 carbons in the molecule. Now we are getting beyond man's limit of comprehension into a level conceivable only to God. Yet we have hardly begun to estimate the possible number of known organic compounds.

The Alkenes⁴

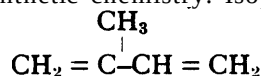
Another homologous series of hydrocarbons is the alkenes. The general formula for the alkenes with 1 double bond is C_nH_{2n} . This means that any alkene molecule has two fewer hydrogen atoms than the corresponding alkane. This is explained by assuming a double bond between two adjacent carbons. There is no alkene corresponding to methane. The series must start with ethene, $\text{H}-\text{C}=\text{C}-\text{H}$. Beginning with ethene, there is



one or more alkene for every alkane.

The alkanes are not very reactive at laboratory temperatures, but the alkenes take part in many reactions. They react readily by addition, where the double bond is broken and part of the adding molecule joins each of the carbons where the double bond was.

As soon as the molecule reaches a chain of four carbons there can be two double bonds to form a diene. For instance, butadiene, $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$, is a very useful compound in synthetic chemistry. Isoprene,



is the fundamental unit in natural rubber, and is also important in synthetic rubber.

Since a double bond can be put between any two adjacent carbons in an alkane molecule there can be many times as many alkenes as alkanes. As soon as a chain gets four carbons long there can be dienes, and as soon as it reaches six carbons long there can be trienes, then tetrenes, etc. If there can be trillions of alkanes there can be many times as many trillions of alkenes. Man cannot think in terms of such numbers; and, therefore, we shall have to turn the counting over to God.

The Alkyne⁵

Another hydrocarbon series is the alkynes. The alkynes are characterized by triple bonds between adjacent carbons. Their reactions are similar to those of the alkenes. The number of alkynes is comparable to that of the alkenes, so they add about another billion billion to the total number of hydrocarbons.

There are several other classes of hydrocarbons but let us hold them in abeyance until we have discussed the addition of some other atom to the hydrocarbon molecule.

The Alcohol⁶

Two generally known alcohols are methanol, commonly called wood alcohol (CH_3OH) and ethanol ($\text{C}_2\text{H}_5\text{OH}$) commonly known as grain alcohol. The numbers of alcohols are very large since there can be one OH on most of the carbons in the alkanes.

We noted previously that there can be over four billion alkanes with up to 30 carbons in the molecule. Since most of the hydrogens in the alkanes can be replaced by an OH, the number of alcohols becomes extremely large. Even now we have hardly begun to estimate the number of organic compounds.

The Aldehydes and Ketones⁷

If we try to put two OH's on the end of a carbon chain, water splits off and we get an aldehyde. The simplest one is formaldehyde (HCHO). If we try to put two oxygens on a carbon within a chain, again water splits off and

we get a ketone such as acetone ($\text{CH}_3-\overset{\text{O}}{\underset{\text{||}}{\text{C}}}-\text{CH}_3$).

In the complicated molecules wherever there is an end to a chain, the last carbon can become an aldehyde group. Any carbon within the chain having two hydrogens can become a ketone. It is almost impossible to estimate how many compounds the aldehydes and ketones represent.

But let us think of a ketone as being $\overset{\text{R}_1}{\underset{\text{R}_2}{\text{C}}} > \text{CO}$. Now either R_1 or R_2 can be any one of the four billion radicals in the alkanes with 30 carbons. The ketones can start with R_1 as CH_3 and go through the whole four billion R_2 radicals. Then R_1 can be changed to C_2H_5 and then repeat the four billion radicals for R_2 . This will add up to four billion squared or 16×10^{18} . The possible aldehydes will not be so many but the number will be large.

The Ethers⁸

If we took an alcohol and replaced the hydrogen of the OH by an alkyl radical, we would have an ether. Diethyl ether ($\text{C}_2\text{H}_5\text{O C}_2\text{H}_5$) is the ordinary anesthetic ether. We could consider the ethers in the same way we did the ketones, by looking at an ether as R_1OR_2 . Then, if we let R_1 be CH_3 , while we went through all the four billion R_2 's, then go to C_2H_5 and go through the four billion R_2 's, we would come out with 16×10^{18} again.

The Organic Acids⁹

If an aldehyde is oxidized, an organic acid is formed. The acid is characterized by the radical $-\text{CO}_2\text{H}$. There are as many possible organic acids as there are aldehydes which is a very large number.

The Esters¹⁰

If a molecule of water is split off between an acid radical of the acid and the OH radical of an alcohol an ester results, such as ethyl acetate ($\text{CH}_3\text{CO}_2\text{C}_2\text{H}_5$). If we represent the part that comes from the alcohol as R_1 as $\text{CH}_3\text{CO}_2 \text{R}_1$, then for every acid there can be as many esters

as there are alcohols. Since the number of acids and alcohols are approximately the same, the number of esters can be, for the molecules up to 30 carbons, something less than 16×10^{18} .

Amines¹¹

Now let us turn to the nitrogen organic compounds. We first think of the amines. These compounds can be looked upon as an alcohol with the OH replaced by NH_2 . The first of the series is methyl amine (CH_3NH_2). This type of amine is called a primary amine. Thus for every alcohol there can be a corresponding primary amine.

There are also secondary amines such as $(\text{CH}_3)_2\text{NH}$. We can represent the secondary amines by $\overset{\text{R}_1}{\underset{\text{R}_2}{\text{N}}} > \text{NH}$. Then the situation becomes the same as the ketones; the ethers and the esters and the number of possible compounds approaches 16×10^{18} for the molecules up to 30 carbons in each R.

Another series of amines is the tertiary amines such as $(\text{CH}_3)_3\text{N}$. Calculation of the possible numbers is too complicated. One can think of the number as extremely large, much larger than the number of secondary amines.

Nitrogen can have a valence of five as well as three. This makes the possibility of compounds such as $(\text{CH}_3)_4\text{NOH}$. This possibility multiplies the possible numbers many times.

The Nitro Compounds¹²

Another more or less common type of nitrogen organic compound is the nitro compound such as CH_3NO_2 . There can be as many of these as there are alcohols, which is a very large number.

The Sulfur Organic Compounds¹³

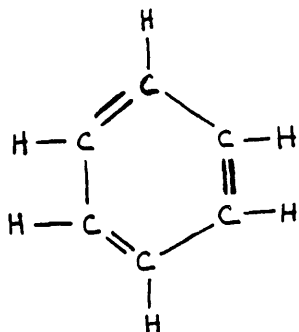
For every organic compound containing oxygen, a corresponding compound of sulfur is possible. These are the thiol, thiocids, thiesters, the thialdehydes, the sulfides, thiethers, and the thialsulfates. The number of these compounds is too large to estimate.

The Halogen Organic Compounds¹⁴

Most of the hydrogens in all of the alkanes can be replaced by chlorine, bromine, fluorine, or iodine. This means that if in the large molecule alkanes there are almost an infinite number of compounds, then the possible organic compounds represent approximately five times that infinite number!

Organic Ring Compounds¹⁵

So far in this discussion we have been considering many of the simpler organic compounds, but not all of them by any means. Now let us turn to the ring compounds of Carbon. Benzene is the best known and the simplest:



Each and every one of the six hydrogens can be replaced by any of the common radicals, OH, F, Cl, Br, I, CHO, CH₂OH, CO₂H, CO₂R, SH, SO₂H, CH = CH₂, or one at a time, or any number of them up to six. There are an equal number of less common, but well known radicals that may replace the hydrogens of benzene. It must be remembered that as long as a ring has one carbon in it, it is an organic compound.

This edition of the ring index gives just the bare rings. Any radical can be attached, at any corner where there can be a hydrogen. The Ring Index lists 4000 rings of various complexity, up to 19 rings in a molecule. (See Reference 15.)

Besides carbon at the joints of the rings there may be N, S, O, and various metals. The common elements N, S, and O may occur several times in any of the rings. A single ring may vary in size up to 18 atoms. At every joint there will be a substitutable hydrogen to build up the valence of Carbon to four, and nitrogen to three. No one could afford the time to try to estimate the number of possible ring compounds. As far as man is concerned it is a fully infinite number. God has all of it in His mind.

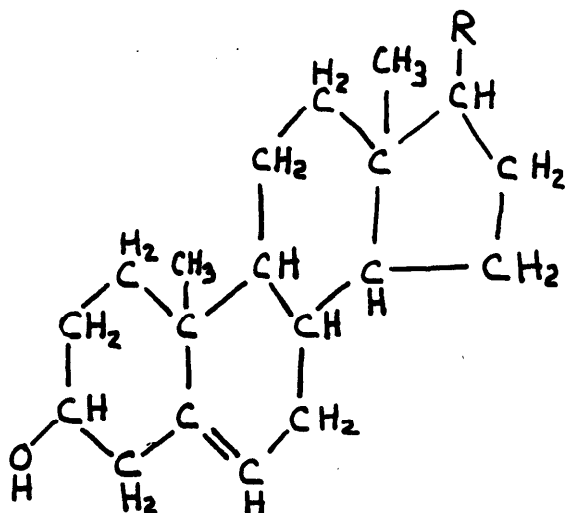


Figure 1. Steroids and cholesterol-like compounds are built on this 4-ring system. R is the varying and distinctive portion of the molecule making it, for example, cholesterol, vitamin D, a bile salt, or a sex hormone.

Chemists are presently specializing on certain ring compounds because of their great physiological properties. We have in mind the steroids and cholesterol-like compounds. These are built on a 4-ring system.

Chemists are patenting about 200 derivatives of this ring system every month. This can go on to "Dooms Day" without more than sampling the possibilities.

What we have pointed out so far is only the beginning of the possible organic compounds. One would be foolish to try to estimate the numbers of possible compounds in the more complex systems. Such complicated classes are the alkaloids¹⁶, the proteins¹⁷, carbohydrates¹⁸, cellulose¹⁹, polyesters²⁰, and dyes.

Only God fully understands all of organic chemistry. What he has revealed to man is only a small part of what He in his infinite wisdom knows. Each new discovery of man leads to many avenues that are unexplored and we see the truth of Ecclesiastes 8:17 illustrated in the field of organic chemistry: "Then I beheld all the work of God, that a man cannot find out the work that is done under the Sun: because though a man labour to seek it out, yet he shall not find it; yea further, though a wise man think to know it, yet shall he not be able to find it out."

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CREATIONISM AND OUR ECOLOGICAL CRISIS

JOHN W. KLOTZ*

The author examines the criticisms which have been raised against a literal understanding of Genesis in connection with the present environmental crisis. He points out that evolutionism is more likely to lead to exploitation than creationism. He pleads for a return to a creationist understanding of the relationship of man to nature.

Ecology and the environment are much in the news today. Not a day goes by without some mention of pollution in our daily newspapers; magazines of general circulation now have entire departments devoted to the environment. To be against pollution and to be for clean air and water are the "in" things.

There is no doubt that we face some very real problems as a result of our deteriorating environment. We may debate whether the term "crisis" is justified; yet it is obvious that we face some serious problems as a result of what we have done to the world about us. Morris Neiburger, the Los Angeles meteorologist, is wrong when he pessimistically suggests that all civilization may pass away, not from a sudden cataclysm like a nuclear war, but from gradual suffocation from human waste, for Peter tells us differently (II Peter 3:10). Yet most people agree that

man has been wasteful of the resources of the world in which he lives. He has ravaged its forests and soils and has plundered its mineral wealth; he has squandered and soiled its waters; he has contaminated its air. No reasonable person would suggest that man not use his environment, or that he revert to his primitive past, but no reasonable person can condone his wasteful excesses.¹

It is hardly necessary to outline the environmental problem. Anyone who reads or watches television or listens to the radio is well aware of the seriousness of the situation. Who is to blame? It is easy to point the finger at soulless corporations, greedy businessmen, vote-hungry politicians, apathetic voters, money-hungry developers, but the fact of the matter is that we have all contributed to the deterioration of the environment. To quote Pogo, "We have met the enemy and he is us."

Why Does Man Exploit?

But why? What has led people to exploit the environment, waste our resources, and cheat future generations of their legacy? There are a great many people who blame the Bible and

specifically the Christian church for our present crisis. For example, Lynn White, Jr., in a widely quoted article places the blame squarely on the shoulders of the Christian church. Christianity, he says, is the most anthropocentric religion the world has ever seen.

Christianity in absolute contrast to ancient paganism and Asia's religions (except perhaps for Zoroastrianism) not only established a dualism of man and nature, but also insisted that it is God's will that man exploit nature for his proper ends. . . . By destroying pagan animism Christianity made it possible to exploit nature with a mood of indifference to the feelings of natural objects. . . . Somewhat over a century ago science and technology joined to give man powers which, to judge by many of the ecological effects, are out of control. If so, Christianity bears a huge burden of guilt. . . . We shall continue to have a worsening ecological crisis until we reject the Christian axiom that nature has no reason for existence except to serve man.²

And Ian L. McHarg in his otherwise very excellent book, *Design With Nature*, says much the same thing:

Whatever the earliest roots of the western attitude toward nature, it is clear that they were confirmed in Judaism. The emergence of monotheism has as its corollary the rejection of nature; the affirmation of Jehovah, the God in whose image man was made, was also a declaration of war on nature. The great western religions born of monotheism have been the major source of our moral attitudes. It is from them that we have developed the preoccupation with the uniqueness of man, with justice and compassion. On the subject of man-nature, however, the Biblical creation story of the first chapter of Genesis, the source of the most generally accepted description of man's role and powers, not only fails to correspond to reality as we observe it, but in its insistence upon dominion and subjugation of nature, encourages the most exploitive and destructive instincts in man rather than those that are deferential and creative. Indeed, if one seeks license for those who would increase radioactivity, create canals and harbors with atomic bombs, employ poisons without con-

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straint, or give consent to the bulldozer mentality, there could be no better injunction than this text. Here can be found the sanction and injunction to conquer nature—the enemy, the threat to Jehovah.

The creation story in Judaism was absorbed unchanged into Christianity. It emphasized the exclusive divinity of man, his God-given dominion over all things, and licensed to subdue the earth. . . . When this is understood, the conquest, the depredations, and despoilations are comprehensible, as is the imperfect values system.³

So we creationists are said to bear an even greater burden than we have generally recognized. Apparently, according to some, we have been guilty not only of anti-intellectualism and anti-scientism by supporting the Genesis account of creation against the “findings” of modern scientists, but also we have encouraged exploitation of nature and have brought about the modern environmental crisis by insisting on accepting the Genesis account as literal and historical!

White and McHarg are probably correct in blaming our environmental crisis on exploitation. They may be right even in faulting Christians for exploiting, though Christians are certainly no more guilty than those who do not share their faith. We would even be willing to grant that some people have used God's statement to the “Father of us all” that he was to “rule over the earth and subdue it” as a justification for an exploitation of the resources which God provided.

Mankind Has Always Exploited

But both are wrong in making Christianity solely responsible for man's exploitation of his environment. White admits as much when he cites as examples of man's exploitation the human control of the Nile for six millenia, the fire-drive method of hunting which he believes was practiced by primitive man, and the cutting of forests by Romans to build ships to fight the Carthaginians. These certainly cannot be attributed to acceptance of Genesis.

It is evident, too, that Christianity can hardly be blamed for the damage man did to the fertile crescent, the cradle of civilization. The Tigris and Euphrates have their origins in the hills of Armenia which were originally forested. The rich alluvial plains of these two rivers nourished a flourishing civilization until Assyrian and Babylonian militarism required the cutting of the forests. The fertile soils soon washed away and were deposited in the Persian Gulf so that Ur of the Chaldees, once a seaport, is now 150 miles from the sea and its buildings are buried under 35 feet of silt.

Christianity can hardly be blamed for what has happened to the once fertile valley of the

Indus River, or the fertile Chinese countryside whose Yellow River gets its modern name from the silt which it carries. The exploitation of this country's resources is well documented in a recent article by Yi-Fu Tuan.⁴

He points out that the concern leading to the tradition of forest care in China arose in response to damages that had occurred already in antiquity. He also calls attention to the destruction of forests and consequent soil erosion which came from the expansion of cities, from the indiscriminate burning of woodlands to deprive dangerous animals of their hiding places, and even from the need for soot to make ink. Further Yi-Fu Tuan states that while Buddhism suggested the preservation of trees around temple compounds, it also introduced the idea of cremation which brought about timber shortages in the southeastern coastal provinces of China. He calls attention to overgrazing in Mongolia where the most abused land appears as sterile rings around the lamaseries; and he quotes a Japanese conservationist who blames most of the deforestation of his country on Buddhism which fostered the building of huge halls and temples.

It is Tuan's thesis that a wide gap may exist between a culture's ideals and their expression in the real world. He believes that there are conflicts between an ideal of nature or environment and our practice.

A similar point of view is expressed by Moncrief.⁵ He believes that the wide acceptance of White's “simplistic” explanation is based more on fad than on fact and states that to contend that religious tradition is responsible for our ecological crisis “is a bold affirmation for which there is little historical or scientific support.” He believes that various cultural and historical facts, such as the American development of a society made up of small landowners in which decisions to degrade the environment are made not by a few but by millions of landowners, are much more responsible for our problems than any set of religious beliefs.

Both these point to the thesis developed by Wright⁶ in an article, “Responsibility for the Ecological Crisis,” that it is not religious belief but human greed and ignorance that have allowed our culture to come to the point of ecological crisis. Creationists would certainly agree with Wright that to solve our ecological crisis we must come to grips with these basic aspects of human nature. The Bible points out that men have seldom lived up to their responsibilities in this or any other area.

Wayne Friar and Donald Monro make this same point in a discussion of Lynn White's article.⁷ It is not that Scripture has misled men; it is that, because of what the theologian calls original sin, men fail to follow Biblical precepts.

Biblical Precepts Reconsidered

White and McHarg and those who follow them are wrong in fixing the responsibility for encouraging this exploitation. Like so many other people they have forgotten to read beyond the first page of the Bible. God's command to man to subdue the earth and have dominion over the fish of the sea, and the birds of the air, and over every living thing that moves upon the earth can only be understood against the background of the Biblical concept of God's ownership of all earthly resources and man's position as a steward of what God has committed to him.

The Bible teaches that man is indeed the first or most important of God's visible creatures (Gen. 1 and 2). Moreover, man is to subdue the earth and to have dominion over it; for this purpose God gave him a superior brain, and set him apart from the animals by endowing him with ability to communicate, so that the culture and learning of the past can be transmitted to future generations.

Yet man's assignment to rule over the earth and to subdue it must be read in the full context and against the important background of other Biblical statements. Man can hardly claim to own anything. The psalmist proclaims, "The earth is the Lord's and the fulness thereof" (Psalm 24:1), and God says through the psalmist, "Every beast of the field is mine and the cattle on a thousand hills. I know all the birds of the air and all that moves in the field is mine." (Psalm 50:10f).

When one accepts the Genesis account of creation he recognizes that the land, the plants, and the animals and air and water belong to God because He made them. Man cannot claim to own anything, and he can hardly claim the right to exploit.

One of the concepts that runs throughout the pages of Scripture is the concept of responsible stewardship. Because man is the crown of God's creation, and because he has been given great intellectual endowments, man has a special responsibility and is expected to care for what has been entrusted to him. He does not possess it; it has been given him to "husband" and to tend, just as our first parents were to till the garden and keep it (Genesis 2: 15).

God is concerned also for the plants and animals which He created. He clothes the lilies of the field in splendor greater than Solomon's (Matt. 6:28ff). He cares for the insignificant sparrows not one of whom falls to the ground without His knowledge and permission (Matt. 10:29). If God is concerned for other living things, then man, his steward, must show similar concern.

One of the reasons for our environmental crisis is the crass materialism of the day. Men have

exploited the world in order to pile up profits. Here, too, the Bible has something to say about those who consider "things" all important and who plan to build larger barns to accommodate all their possessions.

Our Savior devoted a large part of the Sermon on the Mount to pointing out the foolishness of material cares and concerns. A Christian steward takes the long range view of that which has been committed to his charge. He realizes that he cannot pile up short term profits for himself at the expense of that which he will one day be obliged to turn over to his successors. He feels a real sense of responsibility to those who will come after him.

Evolutionary Theory Another Cause

Another important reason for the environmental crisis of the day has been the widespread acceptance of the theory of evolution. It is interesting that White speaks of the last 100 years as being the time when the environmental crisis has become acute because, he says, man has acquired the tools to exploit the environment.

While crass "survival of the fittest" has been repudiated by many evolutionists who find it repugnant because of what the Christian would call God's law written in man's heart at creation, it is a fact that exploitation of the environment by man follows logically from acceptance of the ideas of evolution and survival of the fittest.

In past decades men, who have accepted evolution, have reasoned:

(a) If the unfit are weeded out through ruthless competition, then man has a right to eliminate those species which cannot compete with him.

(b) If nature in an objective and impersonal way has brought man to his present stage of development, and if nature has given him the ability to exploit his environment, then certainly there is nothing wrong with doing just that.

(c) And as far as other plants and animals are concerned, extinction has been the law of evolution in the past. We get along pretty well without the dinosaurs, whose demise can be blamed on nature; why fault man for exterminating the passenger pigeon—and after all someone might say, "Who really misses the passenger pigeon today?"

That evolution and the evolutionary philosophy may lead to an exploitation of the environment is recognized. Frederick Elder in his *Crisis in Eden*, while praising the evolutionist, Loren Eiseley, criticizes Pierre Teilhard de Chardin as an exclusionist, who in his evolutionary system separates man from his environment and encourages man to exploit the environment. Teilhard wrote of transcendence coming at the end of the

(Continued on Page 49)

FITNESS OF EARTH FOR LIFE

WILLIAM J. TINKLE*

The physical and chemical properties of water and the atmosphere show a "fitness" of the environment for life, as William Whewell and Lawrence J. Henderson have so ably asserted. This article contains a review of such evidence as a testimony to God's authorship of the physical and chemical environment for life.

Let us suppose that you are taking a walk along a river among the trees and bushes. Somebody whom you cannot see throws a stone which hits a tree. If this occurs only once you think the stone was thrown at random; but if the same spot is hit nine times out of ten you feel certain that the thrower is aiming at that very spot. He is throwing with a purpose.

Earth and Life Agree

It is well known that living things are constructed in a way that fits their manner of life. Swimming birds have webbed feet, wading birds have long legs and long beaks. Plants have leaves in which sunlight combines water and carbon dioxide into sugar for the use of the plant.

Animals which eat leaves and grass have large stomachs and intestines to contain the large amounts of food which they must eat. Fish have a spindle shape which enables them to pass through the water with but little resistance.

A very long list could be compiled of these useful structures. The remarkable fact is that the earth has resources which fit these structures of living things. Dr. Henderson stated that:

In fundamental characteristics the actual environment is the fittest possible abode of life. Such is the thesis which the present volume seeks to establish. This is not a novel hypothesis. In rudimentary form it has already a long history behind it, and it was a familiar doctrine in the early nineteenth century.¹

Like the stone which hit the tree nearly every time, the earth is so planned and constructed that it supplies the needs and requisites of living things. Able observers have ascribed this correspondence to purpose in the plan of the Creator. But men who follow the negative, doubting thinking of the twentieth century, hold back belief, and refer to ascribe this reciprocal relationship to chance.

Nature Testifies

Seneca (A.D. 1-65) a prominent Roman, gives this testimony:

Every man knows without telling that this wonderful fabric of the universe is not without a Governor, and that a constant order

can not be the work of chance, for the parts would then fall foul upon one another. The motions of the stars, and their influences, are acted by the command of an eternal decree.²

A contemporary of Seneca, the Apostle Paul, writing to the countrymen of Seneca, makes this statement:

For all that may be known of God by men lies plain before their eyes; indeed God has disclosed it to them. His invisible attributes, that is to say his everlasting power and deity, have been visible, ever since the world began, to the eye of reason, in the things which he has made.³

This method of learning about God from the things which he has made is called natural theology, and it was very popular in the first half of the nineteenth century. Some theologians of more recent years do not approve, but their objections seem obscure. Natural theology is valuable in that it calls attention to God. Since it says nothing about Christ and the redemption which he accomplished, one should not stop with natural theology but use it as a corridor to the gospel.

William Whewell (1794-1866) wrote one of the Bridgewater Treatises entitled, "Astronomy and General Physics Considered with Reference to Natural Theology," in 1834.

Master of Trinity College for 25 years, Whewell was one of the most powerful men at Cambridge during the period of educational reform. . . . He received a Royal Society medal for his work on tides and furnished Faraday with the nomenclature he wanted for his work in electricity. The terms "anode," "cathode," "ion," "anion" and "cation" are due to Whewell.⁴

Whewell discusses 19 laws of the earth which indicate that the world was formed purposely as a home for living things. Henderson comments, "It is hard to understand how such ideas could have fallen into oblivion."⁵

Water a Unique Fluid

Space forbids comment on all of Whewell's arguments for purpose in creation but a most outstanding one must not be ignored. Water, like substances in general, expands when heated and contracts when cooled. But it departs from the rule very markedly when it freezes. Water has

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the greatest density—therefore occupies the least space—at four degrees Centigrade. If the cooling continues the water expands until at zero degrees it occupies about one-ninth more space and changes from liquid to solid.

This expansion at freezing is familiar to people in the bursting of pipes and car radiators, and as such seems to be unfortunate. But for living things in general and indirectly for mankind it is a distinct advantage.

The expansion of the ice causes it to float in any open body of water, whereas if it obeyed the general rule of contraction upon cooling it would sink to the bottom and the river or lake would freeze solid. While fish have been known to live after being frozen in ice, they would not do so after being frozen a long time, and while frozen there is a loss in their vital functions.

Bodies of water frozen all the way down would thaw very slowly, having a layer of liquid water collecting above the ice which would protect it from the warm air. In temperate climates it might not thaw to the bottom (if water followed the general rule of expansion) before the process of freezing started again.

A demonstration, credited to Rumford, has been repeated many times in classes. A piece of ice is inserted in a test tube of water and held at the bottom by a wire or some other device. Then the upper part of the test tube is held over a flame until the surface water boils before the ice at the bottom melts. The water when heated expands, rises to the top and remains there.

This anomaly of the expansion of water on freezing undoubtedly prevents the “closing of shop” of countless water habitats with their abundant fauna and flora. And the loss to man caused by freezing and bursting can be avoided because freezing always takes place at known temperatures.

The very presence of water on earth is a matter that excites our wonder. Long before the American astronauts went to the moon we knew there was no water there because there were no clouds to obscure the surface features when viewed through a telescope. Pictures and tests of Mars show very little if any moisture. Venus and Mercury are too hot to contain water in solid or liquid states. Jupiter, Neptune and Pluto are too far away to describe with accuracy but reveal no evidence of abundant water. Thus, earth is unique in having this compound in abundance.

Physical Characteristics of Water

The physical and chemical characteristics of water make it much more useful to living things than any other liquid. It is so formed that it dissolves more substances than any other except perhaps ammonia. In the human body it is necessarily true that foods are dissolved in the blood,

and wastes in urine. Plants dissolve their food in their sap. Being chemically inert, water does not change these solutes but simply transports them.

Water is unique in having a high specific heat. This is the amount of heat in calories needed to raise one gram of a substance one degree in temperature (Centigrade). The following table (from Henderson, *op. cit.*) shows that water has the highest specific heat of any substance mentioned except ammonia and hydrogen:

Specific Heats in Gram-Calories Per Degree Centigrade

water	liquid	1.00
	solid	0.50
	gas	0.3 -0.5
	lead	0.03
	iron	0.1
	quartz	0.19
	salt	0.21
	marble	0.22
	sugar	0.30
	ammonia	1.23
	chloroform	0.24
	hydrogen	3.4
	alcohol	0.5

Properties Fit Man

What do these facts mean to mankind? A man weighing 165 pounds produces at rest daily about 2400 calories, which is enough heat to raise the temperature of his body 32 degrees Centigrade. Of course the excess heat is removed by the temperature-controlling system of the body, unless one has fever. This removal is not only a comfort, but also a means of keeping the chemical changes from accelerating.

This important heat control is possible because water is the principal substance in the human body, and water has a high specific heat. If the body were filled with an average substance instead of water, a man would produce enough heat in a day to raise his temperature 100 degrees Centigrade.

Now let us consider latent heat, which is heat that becomes imbedded and lost and is not apparent for a time, nor detected by a thermometer. No doubt you have noticed that when you wash your hands and swing them until they are dry, they feel cool.

When a substance is evaporated from the liquid state or melted from the solid state a certain amount of heat disappears. This heat reappears when vapor is condensed into a liquid or a liquid is frozen into a solid.

At the beginning of a rain shower there often is an increase in temperature because water vapor is changing into liquid rain drops; and conversely, after the shower when vaporization is increased, there is a lowering of the temperature.

Latent Heats of Evaporation

		calories per gram		
water	536			
ammonia	295	"	"	"
chlorine	67.4	"	"	"
oxygen	58	"	"	"
sulfur	362	"	"	"
carbon dioxide	72.2	"	"	"
mercury	62	"	"	"

Here we have the basis of one of the cooling devices of the human body. Sweat is poured out upon the skin and its evaporation removes the excess heat of the body. Evaporation of water in lakes and streams removes heat from the air above them and also from nearby land. For this reason, islands and peninsulas have freedom from excessive heat, and the freezing of water in winter gives them some heat. The properties of water are well suited to the needs of living things.⁶

Fitness of the Atmosphere

From the foregoing facts we see that not only do living things have needs, but also the remarkable truth is evident that the environment is so formed as to supply those needs. As you know, our air is admirably fitted for living things.

Let us look at what it might be without planning. There is sulfur in soils and in foods such as eggs, but none in the atmosphere except around volcanoes and the chemical works of man. We should be thankful for the absence of the compounds of sulfur such as hydrogen sulfide, the stinking gas of rotten eggs, and sulfur dioxide, a gas used to kill bacteria and insects.

A man in the neighborhood of the writer had a contagious disease and was told to fumigate his clothes when he recovered. He decided to fumigate himself at the same time. Securing a sulfur candle he climbed into a piano box, let the lid down, lighted the candle—but got out faster than he got in.

Is it simply chance that keeps sulfur in the soil instead of the lungs of man?

Consider that important gas, oxygen, which composes about 20 percent of the atmosphere and is essential to the life of man and animals. It could have been possible for all of it to combine with other substances, if there had been no planning in the creation of the earth; it might have combined with hydrogen to form water or with silicon to form sand. Someone may say that it did so and that the oxygen now in the atmosphere came from diatoms and other plants in the ocean. But even so there would be evidence of planning.

Plants were formed with the capability of giving off oxygen, a substance which they liberate; not for their benefit at all, but for the untold benefit of mankind and animals in general. It is hard to escape purpose in accounting for free oxygen.

Carbon dioxide (one part carbon, two parts oxygen) is needed to build roots, stems and leaves, while carbon monoxide (one part carbon, one part oxygen) is a poisonous gas not found in normal air but in exhaust gas from an automobile. Carbon dioxide is a normal constituent of the atmosphere and is breathed out by animals and man, making plant growth possible.

Hydrogen, one of the elements in water, is not found in the free state in the atmosphere. If it were, it would unite with oxygen with a loud noise when a fire is lighted, as has been demonstrated repeatedly in chemical laboratories.

Ammonia is another gas which Wisdom has excluded from the atmosphere.

Planning Cannot Be Ruled Out

Some persons, who will not accept divine planning to account for life, prefer to maintain that a piece of ordinary matter chanced to turn into a living thing. They remark that, given enough time, the improbable occurrence can take place. Then chance made all sorts of types of plants and animals, the adapted ones remaining to the present, the failures becoming extinct.

If such a process had occurred, the fossils which we find would be bizarre types with no relationship to their environment. But far from being misfit creatures of chance, they were of the same types as living things, and can be classified in the phyla of present living creatures. Such hypotheses are clearly *ad hoc*; made to avoid recognition of divine creation.

However, even if natural selection were entirely effective it could not account for the fitness of the environment. Living things and the environment fit together like the pieces of a jig-saw puzzle. Chance might give an earth that would be fit in one respect, but only God himself could plan the earth as it is, or was before the fall of man.

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PALEOECOLOGY AND THE FLOOD

HAROLD W. CLARK*

Modern uniformitarians assume long geological ages, but in recent years advocates of the Flood theory of geology have found many problems that make it more reasonable to interpret the fossil evidence in terms of catastrophism rather than long ages of evolution.

The complexity of the Cambrian and other lower Paleozoic strata creates a very difficult problem for the evolutionist, but indicates that these rocks represent a natural habitat buried suddenly. The sudden extermination of the trilobites, and the irregular distribution of the ammonites all point to catastrophism. The coal beds have many problems that evolutionists fail to explain, but which can be solved if such beds are assumed to represent an ancient type of habitat or life zone. The extinction of the dinosaurs fits well into the same explanation, as also does the peculiar distribution of the mammals in the Tertiary rocks.

All in all, the Flood theory offers the most satisfactory explanation of ancient paleoecology, in what has been designated the "ecological zonation theory."

History of Uniformitarianism

Modern uniformitarianism was introduced by James Hutton to the Royal Society in Edinburgh in 1785. He imagined one cycle after another, and concluded that "the result . . . of our present inquiry is, that we find no vestige of a beginning—no prospect of an end."¹

Hutton's presentation was so difficult to follow that little attention was paid to it until John Playfair² published his commentary on it in 1802. He argued against a "debacle," as the Flood was generally called in those days, and proposed a purely uniformitarian theory. This idea was developed further by Charles Lyell, who in 1830 published the first textbook of geology.³

Lyell's *Principles of Geology* became very popular, going through several editions and being used as a text in colleges in England and America for over 50 years. It was written for the obvious purpose of establishing the uniformitarian theory of geology. Today Lyell's interpretation is almost universally accepted in scientific circles and taught in colleges and universities throughout the world.

Yet uniformitarianism was not accepted without some opposition. When Adam Sedgwick retired from the presidency of the British Geological Society, he argued⁴ that the distribution of life in the ancient seas must have been similar to that of modern seas. He opposed the uniformitarian view put forward by Lyell.

The theory of regular succession of faunas and floras throughout long ages was attacked by Herbert Spencer⁵ in 1859. He challenged the current "onion-coat" theory, as he called it, and argued that the fossil zones in the ancient world were distributed as they are today. Of course we must not gain the idea that Spencer was a creationist, for he was not, but he did see the flaws in the growing uniformitarianism.

These criticisms of the uniformitarianism seem to have had little effect, but they did stimulate the thinking of one young inquiring mind. In 1906, George McCready Price took up the idea under the same title used by Spencer, *Illogical Geology*.⁶ Price emphasized the lack of logic in uniformitarianism, and continued to do so in his later publications. For example, we read: "How simple this problem becomes, how natural the whole phenomenon appears, when we look upon the geological series as only old-time taxonomic series of a complete world all living contemporaneously."⁷ And, "They, [the geological formations] simply represent a taxonomic or classification series of the ancient world."⁸

As Price's contention became known worldwide, other scientific men who believed the Genesis record of the Flood to be that of a universal catastrophe became more and more interested in diluvial interpretation. They began to realize that stratigraphic geology should not be interpreted in terms of geological ages. The Genesis Flood interpretation may offer an explanation that encompasses all the valid data, but explains stratigraphy in terms of diluvialism.

Since Price wrote these words, some diluvialists have given considerable study to the problem of paleoecology. Several examples will be used and facts will be explained in terms of what may be called zoological provinces, life zones, habitats, or associations.

Example One:

The Complex Life of the Paleozoic

Inasmuch as these rocks are at the bottom of the geological sequence, it would be expected, if evolution were true, that their fossils would be simple. But such is not the case.

The complexity of Cambrian life gives great perplexity to the paleontologists. In all of North America more than 1200 kinds of animals are found in the Cambrian strata, representing all the major phyla except the vertebrates. And they are not simple, either, but are as complex as

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members of their phyla found in the higher strata.

One of the most interesting of all Cambrian formations is the Burgess shale near Field, British Columbia. This formation contains the remains of many soft-bodied animals flattened like flowers in a press, and perfectly preserved. As many as 130 species have been described from a bed only a few feet thick.

In the *Olenellus* fauna, named after a trilobite, we find, distributed worldwide, animals such as sponges, jellyfishes, corals, starfishes, worms, brachiopods, bivalves, and trilobites. How this elaborate assemblage of animals could appear so suddenly, without any evidence of ancestors in the Precambrian rocks, is a mystery.

The Ordovician strata are much like the Cambrian, with graptolites, corals, crinoids, bryozoa, and clams either new or in greatly increased numbers. In the Silurian Niagaran formation are found reefs extending from the Arctic to southern Illinois, and as far east as the mouth of the St. Lawrence River. Their average size is about one-half mile across. They are built up of corals, sponges, crinoids, bryozoans, trilobites, cystoids, and blastoids. Most of Alberta's oil comes from reefs with typical Devonian fossils.

Another peculiar feature of the lower Paleozoic strata is the occurrence in many localities of black shales. Many geologists believe them to have been formed from ancient soils. Another suggestion that has been made is that the Cambrian and Ordovician black shales appear to be similar to the black muds now being formed in depressions in the North Sea, Baltic, and other protected areas in the oceans, where fine sediments, mostly silts and clays, are known to be accumulating in basins and troughs where there is not sufficient current to disturb them.

When we take all these facts into consideration, and look at the lower Paleozoic rocks as a whole—Cambrian, Ordovician, Silurian, Devonian, and Mississippian—we can readily see how they could have been formed in deep, quiet waters, doubtless some of them before the Flood. Then when the Flood waters did begin their work, they quickly buried these deep-sea forms of life in mud and silt. Here is an example of rocks that can be explained, not by long ages of gradually accumulating sediments, but by the burial of the original habitats before and during the Flood.

Example Two: Paleozoic Exterminations

In the Cambrian rocks the trilobites are the dominant fossils. They are abundant in the lower Paleozoic, but none are known above the Permian, and even there only three species occur. Why did they "die out"? Geologic formations contain no clue to the puzzle. It is reasonable to

consider these rocks as representing an ancient habitat rather than a time-span of millions of years.

The ammonites, a peculiar form of coiled mollusk, are first seen in the Pennsylvanian rocks, according to some authorities. However, their history is very peculiar. So-called "primitive" types are represented in the Devonian and Mississippian.

Then when ammonites appear in great abundance in the Permian rocks, paleontologists are puzzled because so few of the Permian species persist. New families and a great abundance of species within them are present in Triassic rocks.

Again, only a few of these persist into the Jurassic and Cretaceous, but there are hordes of new species in these rocks. In the Cretaceous many peculiar variations in shape of the coiled shells may be seen. There are none of them in the Cenozoic rocks.

This peculiar distributional pattern, while it is perplexing to evolutionists, is quite easy to explain if we understand these different groups to be simply natural ecological groups at different levels in the ancient seas, which were buried by the rising waters of the Flood.

Another fascinating problem concerns the Paleozoic fishes. Several types existed which are entirely unknown today, such as the ostracoderms or armored fishes.

The ostracoderms are abundant in Silurian and Devonian rocks. They were somewhat similar to the modern cyclostomes, or lampreys. They had no limbs, or very small ones. Their armor consisted of bony plates, especially heavy on the front of the body. They had no jaws, and are considered to have been filter-feeders or mud-grubbers. The placoderms were much like them in appearance, though larger.

Other fishes, sharks and bony fishes, or teleosts, are found in the rocks all the way from the Devonian upwards. So abundant are they and the armored fishes in the Devonian rocks that this system has been called the "age of fishes." But the peculiar fact is that whereas the armored fishes all became extinct in the Paleozoic, the sharks and teleosts continue in the higher strata all the way up to the modern. Why should this be?

It is quite easy to imagine that the heavily armored, sluggish bottom-feeders or mud-grubbers would be overwhelmed and buried in muddy sediments, while the active fishes like the sharks and teleosts could escape, for the most part, and survive to a certain degree throughout the whole surge of Flood waters. I say "for the most part" because sharks and teleosts certainly did not escape completely. Many of their remains are found in all the stratigraphic column from the Devonian up. But the relation between

sharks and teleosts on the one hand, and the armored fishes on the other, is exactly what we would expect from the Flood theory of geology.

Example Three: Burial of the Coal Forests

Popular texts on geology describe the coal beds as having been formed in great bogs, where ferns and scale-trees and many other forms of vegetation fell and were buried in the mud of the bog. But the bog theory has many inconsistencies, and it is much easier to understand the coal beds as having originated in an entirely different manner, by Flood waters.

In many coal regions from 50 to 100 alternating beds of shale and silt occur between the coal beds. This would have required uplift and depression over and over again across areas of thousands of square miles in extent during millions of years. Such a phenomenon is extremely difficult to comprehend, and does not correlate with other evidences of past geological action. Furthermore, if such alternations had occurred, the whole region should show a series of sea-beaches repeatedly; yet there is no such evidence.

Another peculiar fact about the "coal age" is that it is assumed to have lasted for about 50,000,000 years, and yet during all that time, while there were quite significant differences in vegetation types, the plants in the upper beds show no changes that could be attributed to evolutionary progression.

The coal beds of Europe and America are not uniform in composition, but show differences in species composition that geologists attribute to shifting shore lines. These differences can be explained just as readily as changes in composition due to back and forth wave action. And also there are some "upland" species mixed with the "lowland" species—again an evidence of violent water action.

In the Appalachian region of North America the rocks show a very striking phenomenon. Streams rushing down from the eastern highlands, now non-existent, deposited a succession of shales, sandstones, and other materials in which much vegetation was included, but little marine material. A vast series of deltas was formed, reaching the whole length of the Appalachians, from as far down as the Devonian rocks up through the Pennsylvanian.

Coal beds in Nova Scotia and New Brunswick, where the Pennsylvanian rocks are 13,000 feet thick, are described as having been deposited in great basins between the mountains. The entire group is non-marine.

Yet in other coal regions there is a mixture of land and sea types. Shellfish of various kinds are abundant. Other marine invertebrates such as starfishes form some of the most abundant marine

deposits. This indicates that the sea waters were involved in forming the Pennsylvanian rocks.

All in all the Flood theory affords the most satisfactory explanation for the formation of the coal beds. It brings into reasonable correlation such apparently contradictory evidences as badly macerated material in some beds and finely preserved plant remains in others, and a mixture of marine and land forms. Wave after wave dashing on the shores would tear away the earth and carry off great masses of trees and other vegetation to be buried in layers of sand and mud. The alternation of coal with sandstone and shale and silt would be the natural result of these wave actions.

Example Four: Death of the Dinosaurs

Reptiles present one of the most outstanding groups of ancient times, with great variety of types. When the term *dinosaur* is used, most people think of huge reptiles, such as carnivorous and herbivorous species, flying reptiles, fish-like reptiles, etc. Some were adapted to open plains, others to marshes and ponds and lakes. Dinosaurs were only one among many types.

In order to understand the relation between the dinosaurs and the environmental conditions, we must examine fossil botany.⁹ We find that the plant life of the Triassic was similar to that of the Pennsylvanian, although the large trees do not seem to have been so abundant. It is suggested that the environment consisted of savannas at low altitudes, with valleys and swamps that harbored ferns and horsetails.

When we come to the Jurassic, where the dinosaurs are the most abundant, we find a different situation. The seed ferns persist, and so do many other ferns. But new assemblages of trees are evident, such as cycads, ginkgos, and conifers. *Araucaria* is the most prominent conifer.

The vegetation apparently consisted of widespread forests of the humid lowlands, with plants growing in and adjacent to the swamps. Above these were more or less open woodlands and plains, where the *Araucarius* and cycads grew. Ocean waters must not have been far away, for marine faunas are common. It was in this kind of surrounding that dinosaurs appear to have thrived.

Why did the luxurious "forest" growth of the Pennsylvanian vanish from the earth? And again, why did the Middle Mesozoic so quickly become replaced by modern types? Why did the dinosaurs vanish?

"The most dramatic and in many respects the most puzzling event in the history of life on the earth," says an eminent authority, was their sudden disappearance.¹⁰ The simultaneous extinction of this great assemblage of giant forms, says

the geologist Carl Dunbar,¹¹ is hard to explain. Edwin Colbert tells us that while they were abundant in Mesozoic "times," not one of them has ever been found in post-Cretaceous rocks. This is a big question, he declares, for which no satisfactory answer has ever been proposed.¹²

The lowlands of the earth were clothed in the peculiar vegetation which is now preserved in the coal deposits. Remains of amphibians are found among these beds, which naturally belong in the damp lowlands. There are few reptiles as might be expected. But as soon as we get into the Mesozoic rocks, particularly the Jurassic and Cretaceous, there is a great array of reptiles. Then in the Cenozoic the great reptiles have disappeared.

Why did the dinosaurs "appear" so suddenly and "disappear" so abruptly? It might be more meaningful if we asked why they disappeared at all. Why did dinosaurs not persist right on into the Cenozoic?

From all we can learn, the upper part of the Cretaceous beds have a very modern-looking assemblage of plants. There are magnolia, fir, poplar, beech, maple, oak, walnut, sequoia, and many shrubs. Grass and angiosperms are abundant. These continue throughout the whole sequence of the Tertiary. Why could the dinosaurs not have continued to live on, and to leave their remains in the rocks of the Tertiary if these represent valid time-sequences?

From the standpoint of Flood geology, the appearance of the dinosaurs in the rocks marks the rise of the Flood waters beginning to engulf their habitats. The disappearance of dinosaurs marks their extinction by catastrophic action. Perhaps this explanation appears to be too simple, but why invoke complicated ages of evolutionary progress and mysterious disappearance when the simple Flood interpretation will suffice?

In this discussion I have suggested that the Flood ended around the Cretaceous or early Tertiary. I realize that some workers think it ran clear up to the Pleistocene, while others feel that it ceased earlier, even as far back as the Permian rocks.

The Permian tectonics, however, are not great enough. Running the post-Flood period as far back as the beginning of the Mesozoic deposits would invoke too much violent action after the Flood.

In fact, the greatest of all worldwide upheavals, those of the American cordillera, the Alps, and the Himalayas, came around the close of the Cretaceous and the early Tertiary. For this reason, I place the death of the dinosaurs there at the closing paroxysms of the Flood, in connection with these earth-shaking movements.

Further evidence for this view may be seen in the transition of climate between the beginning

of the Tertiary and its end. In the plant and animal life, Miocene and Pliocene deposits give evidence of being post-Flood. The whole subject is too complicated to consider fully here, but I have discussed it at quite some length in a recent treatise on the Flood.¹³

Example Five: The "Age of Mammals"

Mammals have given diluvialists much difficulty. Why, it has been asked, should mammals be found only in the Tertiary rocks, if there was no succession of life throughout geological ages? Why, on the Flood theory of geology, should there be no mammals down in the Mesozoic, for example, or even in the Pennsylvanian?

It is easy to understand why mammals are not found in Pennsylvanian rocks, for these rocks show a type of environment that would not be suitable for them. In fact, about the only vertebrates found in these rocks are fishes and amphibians, and a few small reptiles. The presence of amphibians correlated with the general belief that the Pennsylvanian "coal forests" were dense, damp regions quite unlikely to shelter mammals.

But why should we not find mammals among the dinosaur remains in Jurassic and Cretaceous rocks? We do, and while it is true that the greater number of mammals are found in Cenozoic rocks, those found in Mesozoic rocks are significant, as we shall see.

The Rhaetic formation in western Europe, which is on the border-line between Triassic and Jurassic, has a few teeth of mammals in the muds and sands. In America similar remains are found up through the Jurassic, particularly in the Morrison formation, but they are small and "primitive" in structure. Simpson supplied important information on this problem.¹⁴ In the lower Cretaceous only teeth and fragments of teeth of mammals have been discovered, but in the upper Cretaceous some marsupials and insectivores are found, such as shrews and moles.

Here the fact stands out that all the Mesozoic mammals are "primitive," or generalized. The marsupials are sluggish and stupid, and the shrews and moles are burrowing types or types that frequent low spots among masses of vegetation. They would not be able to escape the rising waters. On the other hand, the larger animals could walk away from the flooding and escape to the last.

Dunbar speaks¹⁵ of the Cretaceous as the "time of the great dying." This has been described by some geologists as the last great overwash of oceans over the land. But if this is so, where were the mammals? We must remember that the Genesis record gives 40 days before the highest lands were covered. There was ample time for mass migration of intelligent types.

Thus it is possible that the mammals migrated upward until eventually they were overwhelmed by the waters. Their presence in the Tertiary rocks, therefore, is best viewed as resulting from their migration and final destruction rather than burial in their natural habitats.

Is there a trend toward modern types in the later Tertiary? It appears so, but these rocks are so interrupted in their distribution that it is difficult to interpret their sequential arrangement.

Sediments containing the last remnants of the antediluvian life might also contain bones of the first animals to move into the region after the Flood. There is evidence of a period of great violence for a long time after the Flood, and some of the rapidly changing deposits might easily have received recycled fossils as well as new material from the living animals.

Conclusion

In 1946 I suggested that we might interpret the fossil sequences in terms of ecological zonation rather than long ages of evolution. Then in *Fossils, Flood, and Fire*, a whole chapter was devoted to the subject. "The concept is simple, in fact so simple in its primary aspects that some may find it difficult to grasp. But its very simplicity makes it all the more reasonable. It is merely a question of *area* rather than time."¹⁶

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(Continued from Page 8)

The fossil record shows loss of order and design rather than evolution. This is in keeping with the second law of thermodynamics.

Mutations are degenerative changes in the genetic materials that cause changes resulting in loss of design and often death. This is in keeping with the second law of thermodynamics. This is not evolution, but rather degeneration.

Design requires a designer. The creation shows the intelligent work of the Creator.

Understand, ye brutish among the people:
and ye, fools when will ye be wise? He that
planted the ear, shall he not hear? He that
formed the eye, shall he not see? (Ps. 94:8,9)

For every house is builded by some man;
but he that built all things is God. (Heb. 3:4)

DECAY OF THE EARTH'S MAGNETIC MOMENT AND THE GEOCHRONOLOGICAL IMPLICATIONS

THOMAS G. BARNES*

It is now known, but not well publicized, that the earth's main magnetic field is decaying relatively rapidly. This paper considers a physical basis for this decay and experimental determinations that support it. The conclusion is reached that it is an exponential decay and that the half-life is 1400 years.

This rate of decay is assumed to have been constant since the origin of the magnetic field. It is then shown that the life of the earth's magnetic field should be reckoned in thousands, not millions or billions, of years. It is also shown that the stronger magnetic field in the past and its shielding effect would alter radio carbon dates, reducing the previously held dates.

Magnetic Moment: Source of the Earth's Main Field

The earth's main magnetic field has been shown to be due to a *magnetic dipole*.¹ The strength of a magnetic dipole is called its *magnetic moment*. The magnetic moment is due to circulating currents.

In the case of the earth these currents probably reside in the earth's core, which is thought to consist of hot liquid metal, perhaps iron. These currents are extremely large. There is no known mechanism to sustain these currents.² So, as one would expect, the earth's magnetic moment is decaying.

This paper considers the experimentally determined decay of the earth's magnetic moment. It is a surprisingly large decay rate for such a large scale phenomena.

The earth's magnetic dipole (Figure 1) is located about 300 kilometers from the center of the earth with the magnetic axis making an angle

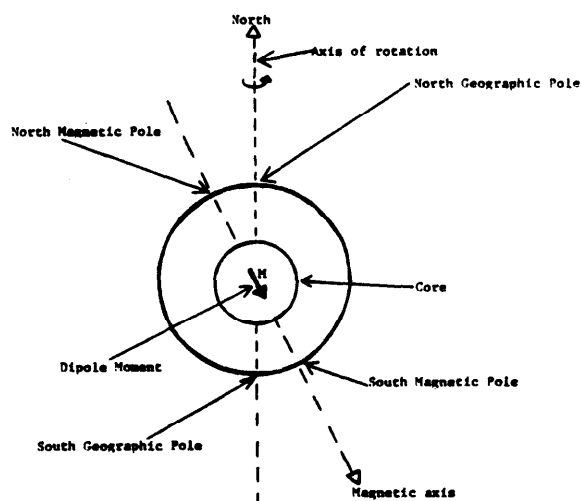


Figure 1. The earth's magnetic dipole moment, M .

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of approximately 11.5° with the rotational axis of the earth.³ The magnetic dipole moment, M , points southward, yielding a magnetic field that points *outward* at the South Magnetic Pole and *inward* at the North Magnetic Pole.

The field due to this magnetic moment is symmetrical about its axis and may be represented by two orthogonal components, B_θ and B_r , as shown in Figure 2. These components can be derived from the magnetic moment, M , by the following equations:⁴

$$B_\theta = \frac{\mu M \sin \theta}{4\pi r^3} \quad (1)$$

$$B_r = \frac{\mu M \cos \theta}{2\pi r^3} \quad (2)$$

where m is the *permeability*, a magnetic property of the medium. The value of m is usually taken as $4\pi \times 10^{-7}$, its value in free space, unless the medium contains an appreciable amount of magnetic material.

In order to have up-to-date units the "Système International d'Unités" (called SI for short) is

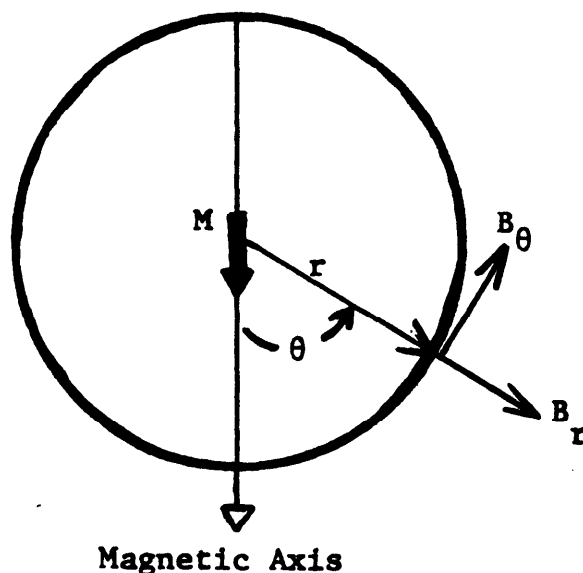


Figure 2. Field components due to the magnetic moment.

Magnetic Moment M and Equatorial Magnetic Field B_0 of the Dipole. 1835 to 1965
(Earth radius = 6.371×10^6 meter)

Scientists	Year (Epoch)	M (amp meter ²) $\times 10^{22}$	B_0 (tesla) $\times 10^{-5}$
Gauss	1835	8.558	3.309
Adams	1845	8.488	3.282
Adams	1880	8.363	3.234
Neumayer	1880	8.336	3.224
Fritsche	1885	8.347	3.228
Schmidt	1885	8.375	3.239
Vestine, et al	1905	8.291	3.206
Vestine, et al	1915	8.225	3.181
Dyson-Furner	1922	8.165	3.157
Vestine, et al	1925	8.149	3.151
Vestine, et al	1935	8.088	3.128
Jones-Melotte	1942.5	8.009	3.097
Vestine, et al	1945	8.065	3.119
Afanasieva	1945	8.010	3.097
U.S.C. & G.S.	1945	8.066	3.119
Fanslau-Kautzleben	1945	8.090	3.128
U.S.C. & G.S.	1955	8.035	3.107
Finch-Leaton	1955	8.067	3.120
Nagata-Oguti	1958.5	8.038	3.108
Cain, et al	1959	8.086	3.127
Fougere	1960	8.053	3.114
Adam, et al	1960	8.037	3.108
Jensen-Cain	1960	8.025	3.103
Leaton, et al	1965	8.013	3.099
Hurwitz, et al	1965	8.017	3.100

employed. In this system the unit of B is the *tesla* (equal to 10^4 gauss, the unit most often found in the literature) and M has the units *amp meter*² (reminding us that it consists of circulating *amperes* of current enclosing *meter*² of area).

The net field, B_0 , at any point on the magnetic equator reduces to the B_0 component and may be written as

$$B_0 = \frac{\mu M}{4\pi r^3} \quad (3)$$

because $\sin 90^\circ = 1$. Letting the earth's radius $r = 6.371 \times 10^6$ meter and $m = 4\pi \times 10^{-7}$, the equatorial value of B at the surface is

$$B_0 = 3.687 \times 10^{-28} M \quad (4)$$

This example illustrates how Equations (1) and (2) enable one to compute the earth's main field at any point (r, θ) on earth, or above the earth, if the earth's magnetic dipole moment is known.

Historical Values of the Earth's Magnetic Moment Indicate the Decay

The study of the earth's magnetism led Gauss to develop a magnetometer for making *absolute* measurements of B and to develop a mathematical method (spherical harmonic theory of potentials) for analyzing the magnetic surveys of the earth.⁵ Gauss was then able to determine the magnetic dipole moment of the earth. His determination for the year (epoch) 1835 is

$M = 8.558 \times 10^{22}$ amp meter.² This value of M and the date 1835 are taken as a key historical reference from which the decay in the earth's magnetic moment has been measured.

Table 1 contains the values of the earth's magnetic dipole moment, the net field value B_0 , the year (epoch), and the scientists who made the determination. The source for the magnetic moment values is a recent U. S. Department of Commerce ESSA publication⁶ produced by the Institute for Earth Sciences, Boulder, Colorado.

Values in that table were given in cgs units and have been converted to SI units through the conversion factor for magnetic moment, namely 1 unit of $M_{SI} = 10^3$ units of M_{cgs} .

The equatorial values for the field were computed by means of Equation (4). These computed values of B_0 check with those values which are listed in an early table by Sidney Chapman; after application of the conversion factor between SI and cgs units, namely, 1 tesla = 10^4 gauss.

It is clear from Table 1 that *the magnetic moment and the earth's main magnetic field have been decaying relatively rapidly since 1835*. Sidney Chapman states in his monograph *The Earth's Magnetism*,⁸ in which he had compiled the data up to 1945,

these results certainly suggest a decrease

of a few per cent. in H_0 and the earth's magnetic moment during the last century. When the great scale of the phenomenon is considered, this must seem a remarkably large and rapid secular change, not paralleled for any other worldwide geophysical property.

Chapman used the symbol H_0 instead of the symbol B_0 , used in this paper, but it refers to the same magnetic field.

Additional confirmation of the rapid decay rate of the earth's magnetic moment can be seen in the following quote from the aforementioned ESSA publication,⁹

Since the time of Gauss' measurements the earth's dipole moment has decreased, sensibly linearly, at approximately the rate of 5% per hundred years. Assuming these rates to persist, our analysis discloses that the dipole moment will vanish in A.D. 3991.

Exponential Decay of Earth's Magnetic Moment

One would expect the magnetic moment of the earth to decay exponentially because it is produced by *real* currents that dissipate energy through Joule heating. The magnetic moment of the earth is *not* produced by *amperian currents* (dissipationless currents), such as those that exist in permanent magnetization of material.

Permanently magnetized material has been rejected as the source of the earth's magnetic moment for two reasons: (1) It would require greater intensity of magnetization than has been observed in the crust of the earth, and (2) No magnetization exists in the core material, because the high temperature there would destroy the magnetization.

The temperature of the earth increases with depth to such a degree that it has exceeded the Curie point. For example at 25 kilometers the temperature has reached the Curie point for iron, viz 750°C, as reported by Jacobs.¹⁰

The earth's magnetic moment being due to a system of circulating real currents will undoubtedly have associated, with its loops of current and its imperfect conductors, an inductance, L , and a resistance, R . Since there seems to be no dynamo or other energy source in the earth that can generate these currents, the current that does exist in the core must be decaying exponentially. This means that the magnetic moment will also be decaying exponentially.

It is comparable to the freely decaying current in a simple series circuit in which the time to decay to e^{-1} of its initial value is equal to the ratio of the inductance, L , to the resistance, R . The problem is complicated by distributed inductance and resistance instead of the simple lumped elements of circuit theory, but the fundamental physics of the decay process is the same, namely exponential.

To be sure, the original magnetic energy contained in the inductive field of the earth was phenomenal to have been decaying as long as it has and still have such a sizeable amount of magnetic energy left. But, by no stretch of the imagination could it have been decaying continuously like this for billions of years.

Evolutionists will not accept this continuous decay process, because of the consequences it has on their preconceived ideas of billions of year age for the earth. But they have yet to propose any acceptable alternative explanation of the earth's magnetic field and its decay.

Note how the excellent work of Horace Lamb is rejected in a recent survey article on the Earth's Magnetic Field.¹¹

H. Lamb showed in 1883 that electric currents generated in a sphere of radius a , electrical conductivity s and permeability m , and left to decay freely would be reduced by electrical dissipation by Joule heating to e^{-1} of their initial strength in a time not longer than $4\sigma\mu a^2/\pi$. This time is of the order of 10^5 years, whereas the age of the earth is more than 4×10^9 years.

No other reason is given for excluding this theory. But note the futility of all other attempts to explain the earth's main magnetic field as expressed in this same article:

There has been much speculation as to the cause of the earth's main field and no completely satisfactory explanation has as yet been given. . . .

It seems that rather extreme assumptions are necessary to make any theory satisfactory—either an extreme geometry or extreme and implausible values of the physical properties of the material in the core and lower mantle.

It is this author's contention that Lamb's solution for the earth's main magnetic field is reasonable as a first approximation; that freely decaying currents are the source of the earth's main magnetic field. This makes sense because the data for the last 130 years indicate that the earth's main magnetic field is decaying at a rate that is at least as great or greater than one would predict with Lamb, that rate being dependent upon what assumption has been made for the value of the conductivity in the core—a value that is not easy to determine.

1400 Year Half-Life for the Earth's Magnetic Moment

When values of the magnetic moment, M , in Table 1 are plotted against time, t , on semi-log coordinate paper, the points lie approximately on a straight line as one would expect for an exponential decay of the earth's magnetic moment. This is also true of course for a plot of

B_0 against t . We therefore assume that the decay is exponential and write

$$M = M_0 e^{-t/T} \quad (5)$$

Where M_0 is the magnetic moment at some reference time, and M is the magnetic moment t years after that reference time. The *time constant*, T , is the time required for the magnetic moment to decay to e^{-1} of its reference value M_0 .

Rearranging Equation (5) and taking the natural logarithm, the following is obtained:

$$\ln (M_0/M) = t/T \quad (6)$$

Specifying M_0 at its 1835 value, M at its 1965 value, and t at 130 years (the time lapsed between these two values), we have

$$\ln (8.558/8.017) = 130/T \quad (7)$$

Solving for T , we obtain the time constant of 2000 years, the time for the earth's magnetic moment (or its main magnetic field) to decay to e^{-1} of its reference value.

To find the half-life Equation (6) is evaluated for t with the ratio M_0/M set equal to 2 and T given its value of 2000 years,

$$\ln (2) = t/2000 \quad (8)$$

This gives a rounded value of 1400 years for the half-life of the magnetic moment of the earth.

This means that in the year 3371 A.D. the earth's magnetic moment will be down to half of its present value, and there will be less protection from cosmic radiation.

Going backward in time, assuming this same exponential function, the earth's magnetic moment doubles every 1400 years of prior time all the way back to its origin. Table 2 gives the equatorial value of the magnetic dipole field (main field) on the surface of the earth as a function of time.

It is computed on the basis of 1400 year half-life or what amounts to the same thing, a time constant of 2000 years, with the reference value of 3.1×10^{-5} tesla (.31 gauss) in 1965. Time, t , is years backward from 1965. The exponential equation is

$$B = 3.1 \times 10^{-5} e^{t/2000} \quad (9)$$

and for convenience in computation it is expressed in the base 10 making use of the relation $e = 10^{0.43429}$ to put it in the form

$$B = 3.1 \times 10^{-5} \times 10^{0.0002171t} \quad (10)$$

The table is carried back one million years to show the *absurdity* of that age for the earth, if its magnetic field is assumed to be historically associated with its present processes. The value of 3×10^{215} is impossible, of course. This means that the earth is not a million years old, if its magnetic field originated at the time of the earth's origin and followed its present type of decay processes thereafter.

Table 2. Value of the Magnetic Field at the Surface of the Magnetic Equator for Various Dates in the Past as Computed from the 1400 Year Half-Life Decay Rate Currently Observed.

Date	Magnetic Field (Tesla)
1965 A.D.	3.1×10^{-5}
1000 A.D.	5.0×10^{-5}
1 A.D.	8.3×10^{-5}
1000 B.C.	1.4×10^{-4}
2000 B.C.	2.3×10^{-4}
3000 B.C.	3.7×10^{-4}
4000 B.C.	6.1×10^{-4}
5000 B.C.	1.0×10^{-3}
6000 B.C.	1.7×10^{-3}
10,000 B.C.	1.2×10^{-2}
20,000 B.C.	1.8
30,000 B.C.	2.7×10^2
40,000 B.C.	4.0×10^4
50,000 B.C.	5.9×10^6
100,000 B.C.	4.2×10^{17}
200,000 B.C.	2×10^{39}
1,000,000 B.C.	3×10^{215}

One cannot date the origin of the magnetic field because we have no way of knowing its initial value. However, it can be seen that this rapid decay process requires that it be a very "young" age. For example the magnetic field on the surface of the earth in 20,000 B.C., namely 1.8 tesla (18,000 gauss) is stronger than the field between the pole pieces of the most powerful radar magnets. It is not very plausible that the core of the earth could have stayed together with the Joule heat that would have been associated with the currents producing such a strong field.

Even now the currents in the core of the earth can be shown to exceed one billion amperes;¹² but, if the field at the surface of the earth were 1.8 tesla instead of its 3.1×10^{-5} tesla, the currents in the core of the earth would be more than 50,000 times greater than they are now. Joule heating in the earth is proportional to the square of the current, this means that the Joule heating in the core of the earth would have been 250 million times greater than it is now, a phenomenal amount of heating.

It would appear from these arguments that the origin of the earth's magnetic moment is much less than 20,000 years ago.

Secondary Magnetic Fields

It should be pointed out that there are many anomalies in the earth's magnetic field that are not associated with its dipole source. Anomalies are presumably caused by ferromagnetic deposits, telluric currents, and other more or less localized causes.

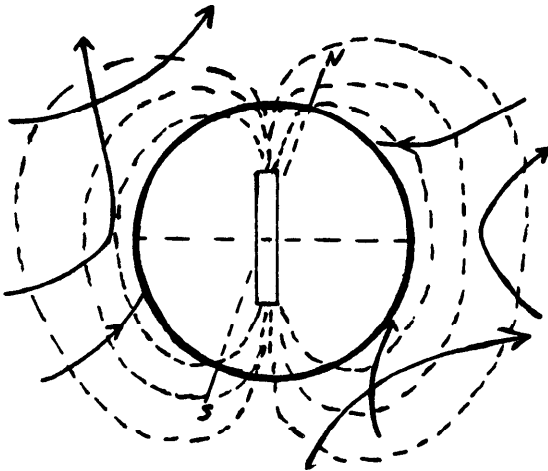


Figure 3. Earth's magnetic field tends to bend the paths of cosmic rays and to shield the earth.

Some of the anomalies may alter the earth's field over large regions of the earth. Sometimes the anomaly may cause a magnetic field that is larger than the dipole field in that region. However, when averaged over the whole earth, these anomalies are much smaller than the dipole field, otherwise the compass would not be classified as having *north-seeking* and *south-seeking* poles.

Solar winds, charges emitted from the sun, are considered to be the source of diurnal and other fluctuations in the earth's magnetic field. But these secondary fields are usually much smaller than the earth's dipole field strength. The main field of the earth is still the dipole field produced by the magnetic moment in the core of the earth.

It is the main magnetic field of the earth, the dipole field, that shields the earth from much of the solar wind. It also "guides" much of the radiation in toward the magnetic polar regions. It is this magnetic polar effect that locates the *auroral zones*.

It is this main magnetic field that shields much of the earth from some of the cosmic radiation. We shall next consider the influence of past stronger magnetic fields upon this radiation.

Effect of Strong Magnetic Field in the Past on Radio Carbon Dating

One of the consequences of the stronger magnetic field in the past was better shielding of the earth and its atmosphere from primary cosmic rays. This also reduced the rate of production of Carbon 14 in the atmosphere.

Primary cosmic rays interact with the atmosphere to produce neutrons which in turn transmute nitrogen atoms into Carbon-14. Hence, with the lesser number of cosmic rays striking

the atmosphere per second, a smaller rate of production of Carbon-14 existed in the past. A smaller production rate of Carbon-14 in the atmosphere than has previously been assumed would reduce the age of Carbon 14 dates.

Primary cosmic rays consist of high speed positively charged atomic nuclei. The earth is constantly bombarded from all directions with these charged particles. The earth's magnetic field tends to bend the path of those particles away from the earth as shown in Figure 3. This magnetic force, F , is a function of the magnetic field, B ; the charge, q , the particle velocity, v ; and the sine of the angle θ between v and B , that is,

$$F = qvB \sin \theta \quad (11)$$

Note that the shielding force is greatest when the particle motion is at right angles to the direction of the field B , and decreases as this angle decreases. Hence fewer cosmic rays reach the earth's atmosphere in the lower latitudes than in the polar regions. Figure 4 shows the cosmic ray neutron intensity vs. geomagnetic latitude at 30,000 feet as determined by J. A. Simpson, Jr.¹³

The present magnetic field has already reduced the cosmic-ray neutron intensity in the equatorial region down to 22 percent of its value at 65 degrees latitude. Hence there is a limit to how much more it can be reduced by a stronger magnetic field. But the stronger field in the past must have caused some reduction in the rate of production of Carbon-14.

The total process is quite complex and will not be analyzed in this paper. However, one might make a crude estimate, on the basis of Figure 4, that the world wide neutron intensity might have been reduced by as much as 10 percent about 2800 years ago, back when the field was four times as strong. This would affect the experimental results of radiocarbon dating by reducing the age of the sample.

Melvin Cook has already pointed out that a non-equilibrium condition exists now that reduces the experimental results on radiocarbon dating. This reduction is progressively greater with the age. From his analysis he concludes that

it reduces the computed age by an amount dependent upon the age of the sample by amounts increasing in time from about 20% in 1000 years, 30% in 4000 years and finally telescoping all the very long ages to 12,500 years or less.¹⁴

When the effect of the larger magnetic field in the past and the consequent lesser rate of production of Carbon-14 is included these ages will be telescoped still further.

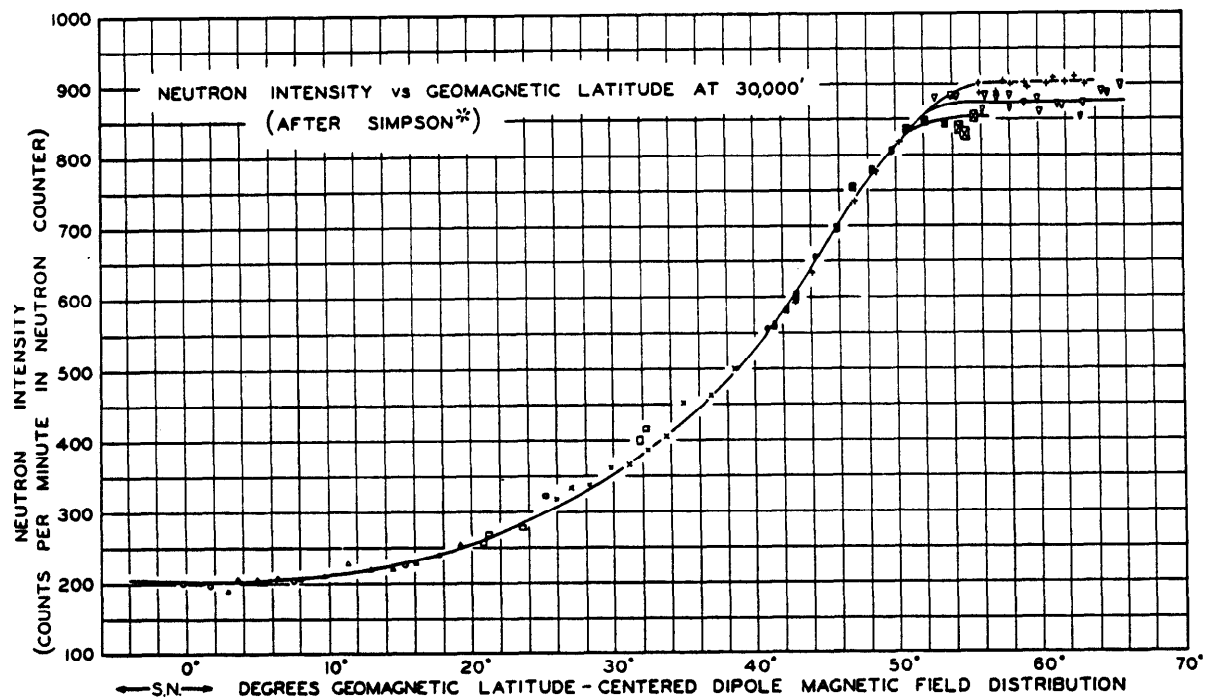


Figure 4. Variation of the cosmic ray neutron intensity vs. magnetic latitude at 30,000 feet. (Permission granted to use Figure 2 from *Radiocarbon Dating* by Willard F. Libby, Second Edition, p. 13. University of Chicago Press, 1955.)

Conclusion

The search for a physical explanation of the earth's main magnetic field and its decay rate seems to have been retarded by an evolutionary bias toward long ages. The physics seems inevitably to point to a much shorter age. It is believed that Horace Lamb's treatment of the freely decaying currents in a huge conducting sphere, such as the molten core of the earth, should be reconsidered as the source of the earth's magnetism.

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NATURAL SELECTION REEXAMINED

GEORGE F. HOWE* AND P. WILLIAM DAVIS†

The process of natural selection is defined from the standpoint of population genetics. Examples are presented to show how natural selection might act gradually to eliminate harmful mutant genes from the population or to maximize the reproductive potential of gene combinations which are successful in a given environment.

A harmful mutant gene which confers some definite advantage in the heterozygous condition may persist in a state of balanced polymorphism. It is shown that balanced polymorphism is of limited significance, producing variation within the kind but as far as is known, no innovative evolutionary development of new kinds.

Supposedly helpful mutations might conceivably accumulate in a population by action of natural selection, but such a process would be so exceedingly slow that it would not account for the major adaptations of plant and animal species. Although genetic drift might cause a more rapid shift in gene frequencies, it produces non-adaptive changes and is not a valid basis for evolutionary progress. It is concluded that natural selection may lead to variations within the created kinds but it gives no promise as a mechanism of evolutionary descent.‡

Definition and Discussion of Evolution

The term "evolution" must be carefully defined.¹ Confusion has arisen because the word can express at least two different meanings. The word "evolution" is sometimes employed to indicate *variation* or genetic change observable within a living kind (i.e., special evolution).

In a more comprehensive sense, the term is used to designate the *great changes* which are supposed to have occurred throughout vast epochs of time—changes by which all living forms are thought to have descended from common ancestry (i.e., general evolution).

Undoubtedly some variation occurs and a small amount of natural selection has been observed among the variants. But the likelihood of variation and natural selection causing *evolutionary change of one kind to another kind* (general evolution) must be evaluated as a separate question. "Evolution" throughout this paper will refer to *supposed major changes among kinds* (general evolution). Observable minor changes will be called "variation" or simply "change within the kind?*

Some of the concepts necessary to understand the argument of evolutionists are expressed succinctly in biology textbooks. Since some readers may be non-biologists and may not have taken a course in biology recently, most concepts employed will be defined and developed in some

detail. Equations will be derived and illustrated so that the non-mathematician may appreciate the quantitative implications of natural selection.

The Evolutionary Method Expounded

Many evolution theorists hold that gene combinations (not single genes or individual mutations) undergo evolutionary change to yield new combinations of genes. These accumulate to such an extent, in their view, that changes of species or higher categories are produced by a large number of genetic changes. One evolutionist has summarized this view in private correspondence as follows: "Life *proposes* (by mutation), the environment *disposes* (through natural selection), and the population *evolves* (as new gene combinations are continually being tested against a changing environment)." The evolutionist believes that minor variations will ultimately yield what we would think of as new kinds through this process of evolution.

Evolutionists hold that all living forms of today have descended from one or at best only a few common ancestors. Many of them believe that natural selection of gene mutations and gene combinations in a population is the means by which the proposed major changes occurred.

As a result, some evolutionists hold that sexual recombination is more the crux of the evolutionary mechanism than is mutation. By means of sexual reproduction, they visualize that genes are constantly being reshuffled and new combinations are being tested in the changing environment. The sexual process is possible only by means of gamete formation (involving meiosis) and union of gametes (syngamy).

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‡Although the authors assume full responsibility for this analysis of natural selection, they would like to thank the following scientists for assistance in reading the manuscript and making helpful suggestions: Dr. Larry Butler, Mr. E. Norbert Smith, Dr. John N. Moore, Dr. William Tinkle, Dr. Wayne Frair, Dr. Harold Clark, Dr. John Klotz, Dr. Walter Lammerts.

*"Kind" here has reference to the created types of animals and plants in the sense developed in the book of Genesis. In most translations God is spoken of as creating "Kinds" of organisms (Heb. *MIN*). Marsh has coined the term *BARAMIN* to designate these "kinds" which is synonymous with the present usage here.

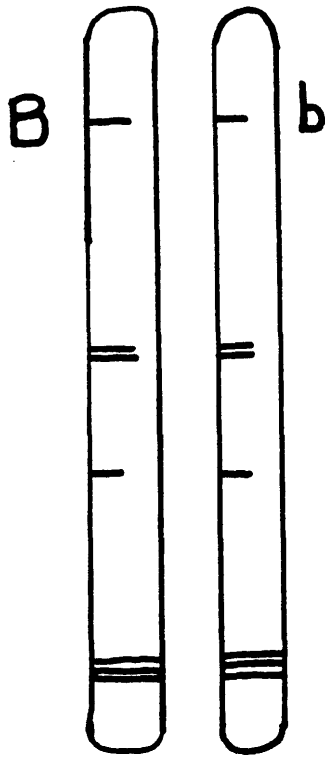


Figure 1. Gene Loci and Alleles. Here is a diagrammatic view of two similar chromosomes. Assume that there is a spot (locus) near the top of each where a gene for coat color exists. Assume that gene *B* is for black coat color and that gene *b* yields brown color. Genes *B* and *b* are thus *alleles* since they occur at the same locus on the same kind of chromosome. Any genes for color which could occur at this locus in corresponding chromosomes of other guinea pigs would also be alleles in this same series. Note also that each chromosome has many other loci, some of them represented here as lines along the length of each chromosome.

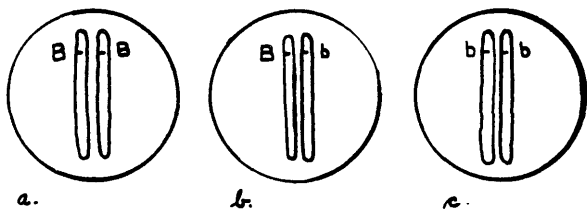


Figure 2. Chromosomes in a Body Cell. A body cell in an animal such as a guinea pig is said to be *diploid* because it contains two chromosomes of each type. Some animals may be "pure-line" or homozygous black (*B/B*) and they will have gene *B* in each of the two chromosomes of this type as shown in (a) at left. Some guinea pigs might be heterozygous for coat color with gene *B* in one chromosome and gene *b* in the other member of the pair—see (b) center sketch. At right in (c) is a chromosome set from the body cell of an animal homozygous for gene *b*.

William Stroud² has shown recently, however, that evolutionists are unable to account satisfactorily for the *origin* of sex. The formation of new kinds by evolution would require the action of preexisting sexual systems, the origin of which cannot be understood by the evolutionary process. This is a definite weakness in the evolutionary view.

But sexual reproduction actually serves only as a reshuffling agent in the breeding population. Sex can do little more than recombine the same genes already present in the population. Despite all statements to the contrary, the real dynamic in the evolutionary model must be the *gene mutation* which is then acted upon by natural selection. Although some evolution theorists assert that evolution results from changes in *combinations* of genes, this action, too, must consist ultimately of selection for or against the *individual mutant* genes which make such favorable combinations possible.

Natural Selection Among Alleles in the Gene Pool

The current neo-Darwinian concept of selection is held to operate by "differential reproduction" rather than by the physical "competition" of Darwin's original theory. Any gene combination which would improve survival among offspring would accordingly become the prominent combination in future generations. In this theory, the favorable genes upon which the fortunate combinations depend, will become more and more prevalent in the populations as time elapses.

In a large breeding population of sexually reproducing animals (or plants) the idea of the "gene pool" represents the totality of all genes carried by all gametes in the breeding members of the population. Thus the gene pool quite obviously gives rise to the next generation. Evolutionary natural selection is therefore said to operate primarily within the gene pool.

An "allele" is one of the genes at a given locus on a specific chromosome. Since chromosomes in cells of most larger plants and animals are present in pairs (a maternal and a paternal chromosome of each kind), a cell has two chromosomes of every kind normally, and thus a cell has two representative alleles of each gene locus.

For this reason, body or somatic cells carry two of each gene type, but reproductive cells (which have only one representative of a chromosome kind) carry only one of each gene. It is possible for every gamete in the population to bear the same allele at a given gene locus, but it is more likely that some sex cells will contain one allele and others will carry a different or contrasting allele (see Figures 1 and 2).

Every cell in a guinea pig, for example, carries two particular chromosomes, each with a gene for coat color. The population of guinea

pigs would produce gametes—sperms and eggs—and every gamete would possess one chromosome carrying the gene for coat color. Some gametes might carry the allele for brown coat color, *b*, at the color locus while other gametes could possess the dominant allele, *B*, for black coat color. The color of the next generation of animals would depend directly upon combinations of gametes from the gene pool that carried gene *B* and those that carried *b* (see Figures 3 and 4).

If any change is to occur in the gene combinations, it must arise as a shift in the frequencies of various alleles in the gene pool. For example, if gene *B* were to become increasingly more prevalent in the gene pools of future generations (and gene *b* were to diminish), this would be a change in gene frequencies in the gene pool—a change that would be reflected in coat color of future populations. There would be appreciably more black animals and fewer brown ones in time.

For the sake of clarity in explanation, the foregoing illustration has dealt with only two alleles of a particular gene locus. Actual allele combinations may be somewhat more complex as in the coat color of rabbits where genes for agouti (*c'*), chinchilla (*c^{ch}*), Himalayan (*c^h*), and albino (*c*) are all alleles-situated potentially at the same locus. Although the study of multiple alleles in a population will be more complex, the principles involved are similar to those seen in the present example, and the conclusions are essentially the same.

The Theoretical Hardy-Weinberg Equilibrium

If five basic assumptions are granted regarding a breeding population, Hardy and Weinberg noted that there would be no change expected in the frequencies of genes in the gene pool, nor would there be any variation in the successive generations. There would be no change via natural selection in a population of organisms:

- 1) if the population is large,
- 2) if there is no mutation,
- 3) if there is random mating among all genotypes,
- 4) if there is no selective advantage of any genotype above the others, and
- 5) if there is no selective immigration or emigration.

If these five assumptions would hold simultaneously, then the same gene frequencies would prevail in the gene pool and the percentages of various genotypes in the population would remain unchanged.

Such a stable, theoretical population is said to be *panmictic* and to exist in a condition of *Hardy Weinberg equilibrium*. The term “panmictic” indicates that the population experiences no change in gene frequencies as time passes. It

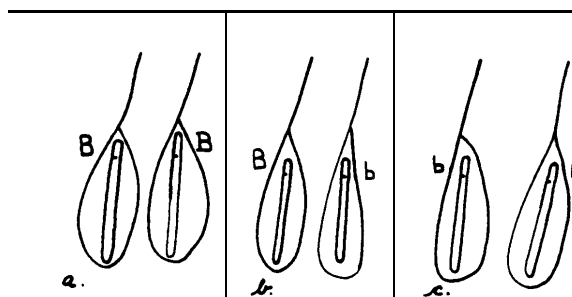


Figure 3. Gametes. When gametes form, the chromosome pairs separate. If cell (a) from Figure 2 produced gametes, the gametes (sperms or eggs) would all bear gene *B* (see left). If cell (b) of Figure 2 produced gametes, about half of them would carry a chromosome with gene *B* and the other half with gene *b* (center). Finally, if the animal with cells homozygous for gene *b*, (cell c) of Figure 2, formed gametes, they would all have the allele *b* (right).

		Sperms	
		B	b
Eggs	B	BB	Bb
	b	Bb	bb

(1)

	P	q
P	$P \times P$ or p^2	Pq
q	Pq	$q \times q$ or q^2

$$p^2 + 2Pq + q^2 = 1$$

(2)

Figure 4. Punnett Square. The letters *B* and *b* are used to represent the two kinds of sperms possible, and also the two possible egg types (see Figure 3). With sperms on the horizontal top axis, and eggs on the side vertical axis in square (1) above, the various kinds of offspring become apparent: BB, 2Bb, and bb. If the gene frequencies for *B* and *b* (*p* and *q* respectively) are substituted in place of the given letters, a new checkerboard results as in (2) above. This Punnett square shows the basis for Equation 2 of the text. Each individual box in the square represents one sperm-egg combination and all the boxes taken together represent the whole population of young formed from those matings.

also means that the population has no reproductive barriers, and that no natural selection is taking place.

Hardy and Weinberg pointed out early in this century that the workings of two alleles in such a theoretical population could be characterized by a very simple mathematical expression.³ Let p stand for the frequency (fraction of gametes) in the gene pool that carries one allele (gene B), and let q represent the frequency of the other allele (gene b) in the gene pool. If the number 1 is used to represent the entire gene pool (totality of all gametes in all breeding members of the population), then:

$$p + q = 1 \quad (\text{Equation 1})$$

Another way to state equation 1 is:

$$\%p + \%q = 100\%.$$

With these equalities in the gene pool established, the relative abundances of genotypes in the next generation may be calculated if they all have equal survival value. The chance of a sperm containing the B gene uniting with an egg carrying that same kind of allele is a simple case of multiple probability in which the probability of a complex event (fertilization or syngamy) is the product of the probabilities of each of the two independent events (independent involvement of a B sperm and a B egg.)

The chance of a B -bearing sperm uniting with a B -bearing egg is the product of p times p or p^2 . By the same token, the chance of individuals arising that have two genes (bb) is q^2 .

Heterozygous individuals may arise in the population two ways: 1) the egg could carry the B gene and the sperm the b , or 2) the egg might carry the b while the sperm provides the B allele. The result in either case is the same— Bb . Hence the Hardy-Weinberg expression for the heterozygous term is $2pq$.

With gene frequencies of p and q for the B and b alleles, respectively, the new generation will have the following distribution of genotypes:

$$p^2 \text{ of } BB; 2pq \text{ of } Bb; \text{ and } q^2 \text{ of } bb$$

(see Figure 4).

This is the Hardy-Weinberg equation and it indicates that the potential for the whole new generation can be summarized as:

$$p^2 + 2pq + q^2 = 1 \quad (\text{Equation 2})$$

Given a large population of guinea pigs (returning to the example under study) if there is no mutation, if there is random mating without selective advantage, and if there is neither selective immigration nor emigration, then subsequent gene pools would be as former ones were, and genotype frequencies in the population would remain unchanged throughout successive generations.

All of these stringent conditions are never fully met in any one natural population. For example, if there is a slight selective advantage, one would

expect this to cause a slight but measurable change in the gene frequencies.

Gene Pool Equations

Despite the fact that selection of a mate is far from random in human populations, consider the following theoretical example which is nonetheless based on fact. Two red blood cell antigens have been discovered and are called M and N , respectively. Researchers have noted that certain people have the M antigen only, some carry both the M and N antigen, some people carry only the N antigen.

Geneticists suggest that two allelic genes are operating. A person with the M determining gene at these loci is of the MM genotype and only the M antigen is formed in his red cells. Another person who is heterozygous, having a gene for M and one for N , will be of the MN genotype and produce both the M and N antigens. Then anyone who has both alleles for N (NN) will produce only the N antigen.

If one knows the number of people of each genotype (MM , MN , and NN) in a population, he may calculate the frequencies of the two genes in the gene pool.

Assume that a geneticist found among 100 people the following distribution of blood types: 64 MM , 32 MN , and 4 NN . The NN class here is 4/100 or 0.04 which is the q^2 term in Equation 2. If $q^2 = 0.04$, $q = \sqrt{q^2} = \sqrt{0.04}$. Hence $q = 0.2$ and $1 - q = p = 0.8$.

Applying such considerations to an actual count arising in the literature, W. C. Boyd tested 151 Aguaruna Indians of Peru and found that 40.4% were MM , 45.7% were MN , and 13.9% NN as reported by Gardner.⁴ These percentages will be rounded to 40, 46, and 14 for ease of computation. From Equation 2, allowing p to represent M and q to stand for N , p^2 (MM) is 0.40, $2pq$ (MN) is 0.46, and q^2 (NN) is 0.14.

It is obvious, once again, that selection of a mate is not random in human populations. Nevertheless, few Indians (or people of any race, for that matter) would allow information about MN blood type to determine their choice of mate! Hence, reproduction can be considered nearly random as regards this trait. If it is then assumed for purpose of illustration that this population was in Hardy-Weinberg equilibrium, it would be possible to calculate the fraction of gametes in the gene pool that would bear each gene:

$$p = \sqrt{p^2} = \sqrt{0.4} = 0.632$$

$$q = 1 - p = 0.368$$

But a common sense relationship exists which will aid in deriving other equations. If each individual were to produce one and only one gamete, one could tally the gametes and thereby compute p and q . Using percentage figures from Gardner,

40% of 151 or 60 people were MM , 46% or about 69 out of 151 were MN , and 14% or about 22 were NN .

Thus, 60 of the MM people would produce gametes that carried gene M . By the law of averages, half of the MN people would produce M gametes and half would yield gametes carrying gene N . Finally, all of the NN people would form N -bearing gametes. These results may be tabulated as follows:

People of Each Genotype	
MM 60	MN 69
Gametes with M 60.0	Gametes with N 22.0
34.5	34.5
94.5 M	56.5 N
Gametes with M 60.0	Gametes with N 22.0
34.5	34.5
94.5 M	56.5 N
	(Gamete Totals)
$\frac{94.5}{151} = M \cong 0.63 \sim p$	
$\frac{56.5}{151} = N \cong 0.37 \sim q$	

These obvious relationships can be summarized in terms of new and helpful equations. Let x stand for the number of individuals in the population who are of the MM genotype. Let y designate those of MN genotypes and z those of NN genotype.

$$p = \frac{\frac{1}{2}y + x}{x + y + z} \quad (\text{Equation 3})$$

$$q = \frac{\frac{1}{2}y + z}{x + y + z} \quad (\text{Equation 4})$$

Substituting:

$$p = \frac{34.5 + 60}{151} = \frac{94.5}{151} \cong 0.63$$

$$q = \frac{34.5 + 22}{151} = \frac{56.5}{151} \cong 0.37$$

Once the gene frequencies have been calculated (by use of either set of equations) one can calculate the fraction of the next generation which would be of each genotype under Hardy-Weinberg equilibrium conditions; MM (p^2), MN ($2pq$), and NN (q^2):

$$\begin{aligned} p^2 &= (0.632)^2 = 0.4 \\ 2pq &= 2(0.632)(0.368) = 0.46 \\ q^2 &= (0.368)^2 = 0.14 \end{aligned}$$

Assuming for simplicity that there would again be 151 people in the new generation, calculation of x , y , and z will show that this new generation would be essentially unchanged from the previous generations:

$$x = p^2 (151) = (0.4) (151) = 60$$

$$y = 2pq (151) = (0.46) (151) = 69$$

$$z = q^2 (151) = (0.14) (151) = 22$$

This could be repeated time and again. Given the second generation, by means of Equations 3 and 4 one could calculate the gene frequencies and then produce another generation. Repeated calculation will show that a Hardy-Weinberg equilibrium would permit no change in gene frequencies in one generation, 10 generations, or 1000 generations. As long as the population is large, as long as there are no mutations, and as long as panmixis generally prevails in regards to this trait, there would be no natural selection.

Although these data given from Boyd were actual counts, one must remember that this population may not have been panmictic regarding the M and N alleles, and remember that it was simply being used as an example for understanding concepts which are to follow.

How Does the Hardy-Weinberg Principle Relate to Natural Selection?

The evolutionist uses this stable base from which to launch an argument for change within gene pools. He asserts that the assumptions listed are important precisely *because* they are impossible to attain in actual populations. For this reason he views the Hardy-Weinberg equation as describing a hypothetical null set or "non-evolving" population to which real populations may be compared.

It is obvious, for example, random mating is generally unattainable in animal and human populations for a variety of reasons. Not all populations are large—some isolated population units may be quite small. It is also likely that mutations will be occurring (although infrequently). It is reasonable to suggest that a mutant gene will either help or hinder to some extent in the process of reproduction.

Assume that a mutation occurs which in combination with other genes is harmful when compared to other alleles of the same gene. The mutant could be either dominant or recessive, but assume it to be recessive as many deleterious changes are. Imagine that it is so harmful that when present in the pure-line (homozygous) condition, it often leads to death of the individual creature. This is simply to consider what geneticists know as a recessive "lethal" mutation.

In his genetics textbook, Gardner describes several recessive lethal mutations:

Recessive lethals are carried in heterozygous condition and may come to expression

when matings between carriers occur. Genes in *Drosophila* that control such conspicuous phenotypes as curly wings (Cy), plum eyes (Pm), and stubble bristles (Sb), adversely influence the viability of the flies when they are heterozygous. When homozygous, these genes are lethal. They are dominant with respect to the phenotypes for which they were symbolized, but recessive with respect to their lethal action. The reasons for lower viability and lethal action have been determined experimentally in some cases. Apparently, when alone, each of the genes can interfere with vital processes and thus influence viability, but a double dose of the same gene makes it impossible for the organism to live beyond a certain stage in development.⁵

It is clear in Dr. Gardner's discussion that recessive lethal genes are not only lethal, they reduce the viability of the heterozygote. For example, a homozygous plum-eyed fruit fly (Pm/Pm) would die. A heterozygous fly (Pm/+)* would survive, but would be less viable than the wild-type fly (+/+).

One can contemplate a large fruit-fly population which contains a certain percentage of genes for plum-eye in its gene pool. The population would certainly not be in a condition of Hardy-Weinberg equilibrium. The choice of mates would also be affected because the (Pm/Pm) individuals do not survive to reproduce. Since individuals of that genotype die, there is a selection coefficient (S) against the (Pm/Pm) genotype. Here the numerical value of S, the selection coefficient against genotype (Pm/Pm) is 1. The 1 indicates that *all* the flies homozygous for plum-eye will die before reproducing.

Since most mutations are harmful,⁶ a value of 1 is high but not astoundingly so. Any recessive lethal mutation which confers no selective advantage on the heterozygotes will establish a selection coefficient of 1 against the genotype it forms. A mutation which is harmful, but not altogether lethal in the homozygous condition, will have an S value less than 1 but greater than zero.

How can the change of gene frequency within the gene pool be calculated in such a case? The (+/+) individuals survive and so the x term remains unchanged (see Equations 3 and 4). Likewise (Pm/+) flies live so that the second term persists as y. But all the (Pm/Pm) individuals die, and some measure of change must be introduced in forming the value for p and q from the population. A revised version of Equation 4 will suffice for q:

*Note that "+" in the geneticist's symbols refers to the wild-type allele for any gene.

$$q = \frac{\frac{1}{2}y + z(1 - S)}{(x + y + z) - Sz} \quad (\text{Equation 5})$$

The new equation accounts in the numerator for the fact that the fraction of all (Pm/Pm) individuals will not reproduce. With an S value of 1, the 1 minus S term (Equation 5) becomes zero, indicating that the (Pm/Pm) individuals will not pass on any gametes to the gene pool. Likewise, the denominator must then be adjusted for the fact that the fraction of all the z group (Pm/Pm) will not be included in the total gamete pool so that Sz should be subtracted from the denominator.

By use of this equation, it is possible to show what would happen in one or more generations to the frequency of a recessive lethal gene. If the gene originally had a distribution in a fruit-fly population of 10,000,000 as follows: (+/+) 6,400,000; (Pm/+) 3,200,000; and (Pm/Pm) 400,000, using Equation 4, the frequency of genes Pm in the gamete pool by the Hardy-Weinberg formulation would have been:

$$q = \frac{1,600,000 + 400,000}{10,000,000} = \frac{2}{10} = 0.2 \quad (\text{See Equation 4}).$$

But since there is natural selection against the (Pm/Pm) genotype, Equation 5 must be used and calculations continue as follows:

$$q = \frac{\frac{1}{2}y + z(1 - S)}{(x + y + z) - (Sz)} = \frac{1,600,000 + 0}{10,000,000 - 400,000} = \frac{1,600,000}{9,600,000} = 0.167.$$

In one generation the frequency of gene Pm would be expected to have dropped from a value of 0.2 to 0.167. In future generations it would continue to fall gradually. Since nearly all mutations are of a negative character, this indicates that natural selection will serve largely to reduce the gene frequencies of harmful mutations in the gene pool.

Such "weeding out" would occur very slowly as demonstrated by Dobzhansky⁷ in a table entitled, "The Progress of Selection against a Recessive Gene." A gene starting from a frequency of 0.55 with an S value of 1 against it (as in the previous illustration) after 10 generations would have fallen to a frequency of 0.085, and after 1000 generations would still persist at a frequency of 0.001.

This slow reduction would not be expected to completely eliminate the gene as it would still be expected to remain within a large population, at low frequency in the gene pool. These considerations apply to eugenic plans. The elimination of all harmful genotypes in the human population would be at least as slow as natural selection.

Sickle-Cell Anemia

Many of the lethal or extremely harmful gene mutations will be reduced gradually to infinitesimally low levels in the gene pool by action of natural selection. Gardner reports that between 10% to 40% of certain human populations of tropical background are heterozygous for the gene which produces sickle-cell anemia.⁸

Sickle-cell genes arise in human beings as a mutation or variational change of a normal allele which causes the formation of normal hemoglobin pigment in the blood. A normal person will thus have two alleles for production of normal hemoglobin (hemoglobin-a) and normal red cells (Hb^a/Hb^a). A person heterozygous for sickle-cell anemia (Hb^s/Hb^a) would manifest the condition slightly but still survive.

The heterozygous gene combination is important in particular points because it has saved lives of African peoples faced with the spread of malarial parasites. People heterozygous for this mutant gene (Hb^s/Hb^a) have a greater resistance to malaria than those homozygous for normal hemoglobin (Hb^a/Hb^a).

The person having the sickle-cell gene at both loci (Hb^s/Hb^s) generally dies without reproducing. There are differing degrees of severity in this condition and sometimes the effect can be alleviated by diet—even in the homozygous condition.

Natural Selection and the Sickle-Cell Mutation

A human population with Hb^a (gene for normal hemoglobin) and Hb^s (gene or sickle-cell anemia and abnormal hemoglobin-s) present is certainly not in a condition of Hardy-Weinberg equilibrium. The choice of a mate is affected because the (Hb^s/Hb^s) individuals do not usually survive to reproductive age. Next, mutation has taken place and has led to the presence of this sickle-cell gene Hb^s .

Furthermore the equilibrium is violated since there certainly is a selection against genotype (Hb^s/Hb^s). Individuals that are (Hb^s/Hb^s) will die, thus there exists a definite selection coefficient (S) against this genotype. In this case S approaches 1 because (Hb^s/Hb^s) individuals generally die, as already indicated.

If there were no selective advantage conferred on the heterozygous individuals (Hb^s/Hb^a) it might be expected that natural selection would lead to the slow but inexorable demise of gene Hb^s in the entire human gene pool—as in the case of the plum eye gene (Pm) in fruit flies.

Sickle-Cell Genes and Balanced Polymorphism

Why do human populations of tropical ancestry (specifically Negroes) have this deleterious gene persisting in their gene pools—a gene that is virtually non-existent in gene pools of other populations? Merrell⁹ states:

This gene has a surprisingly high frequency in some parts of the world. In these areas malaria is endemic, and it has been found that the heterozygotes (Hb^s/Hb^a) for the sickle cell gene are significantly more resistant to subtertian malaria than are the homozygotes (Hb^a/Hb^a) for normal adult hemoglobin. Thus where malaria is prevalent, the heterozygotes are better adapted than the homozygotes, which are apt to die either from anemia on the one hand (Hb^s/Hb^s) or malaria on the other (Hb^a/Hb^a).

Although the gene for sickle-cell anemia in human beings resembles the gene for plum-eye in fruit-fly in that both are highly lethal in the homozygous condition, the sickle-cell gene differs in that it confers a *slight* but definite *advantage* in the heterozygous condition.

“Balanced polymorphism” is that condition in which a creature heterozygous for a lethal or otherwise harmful gene is adaptively superior to either homozygote. In tropical areas where malaria is a severe health problem, individuals who are heterozygous for sickle-cell anemia (Hb^s/Hb^a) are adaptively superior to the people homozygous for normal red cells (Hb^a/Hb^a), when malaria strikes. Under such conditions, both genotypes are preserved by natural selection—persons homozygous for normal red cells and those heterozygous for sickle-cell anemia.

A mutation for sickle-cell anemia may be considered somewhat advantageous in certain limited areas of the earth if conditions select against its normal allele. The sickle-cell gene may actually increase the survival potential of people in the tropics. Presumably the sickle-cell trait would have a greater geographic distribution in human populations if malaria organisms were of worldwide distribution. When such balanced polymorphism exists, a harmful gene will remain at a surprisingly high level in the gene pool. Populations of Afro-Americans living in Chicago, however, will probably tend to lose this gene if modern public health measures are maintained there.

Balanced Polymorphism and General Evolution

It is obvious, on the other hand, that sickle cell genes hardly qualify as examples of completely helpful mutations. It must be remembered that a fatal anemia usually develops when it is in the homozygous condition, i.e., Hb^s/Hb^s . Although the gene does provide some resistance to malaria in the heterozygous condition, *this effect will be beneficial only in the tropics where malaria is a continuing problem*. It is further obvious that the sickle-cell gene is not absolutely essential to human survival even in the tropics, because only about 18% of the people (48% at the greatest) carry this allele.

Even though the sickle-cell gene persists by balanced polymorphism in the gene pool of human populations of tropical history, there is no indication that the gene ever loses its harmful side effects. There is no basis on which to assert that it could change further to become a gene that would direct some new and totally helpful phase of metabolism. Its perpetuation in tropical populations is a local variation with no indication that any evolutionary event (change of "kind") has taken place.

Natural Selection and Creation

Perhaps natural selection was intended to offset the injurious effects of mutations coming after the Fall. Natural selection may have been initiated to minimize the burden of genetic mutation which would accumulate in future generations of human beings, plants, and animals. Certainly the "weeding out" effect of natural selection would fit with a creationist's concept of minor changes *within the* created kinds.

Perhaps the Creator used a certain amount of variation to provide adaptive potential for species in the changed environments after the flood. If a pre-flood vapor canopy collapsed during the deluge, the post-flood mutation rate would likely have increased because of a greater flux of cosmic radiation and scatter radiation.

While these suggestions are only speculative, they indicate that the small amount of natural selection known to occur in nature is not at odds with the Biblical account of creation. It is also possible that natural selection may very rarely act to preserve mutations which occur at the same time the environment changes so as to favor them. It is just as unlikely that a mutation could normally be an improvement in an organism as it is that a random change in the mechanism of a watch or a computer could improve it.

Slightly Harmful Genes

In the discussion to this point, one kind of evidence has been particularly scarce—evidence that natural selection will suffice for the formation of new adaptive types (new kinds). Despite the evidence that most known mutations are harmful, evolution theorists propose to fill this void by asserting that there are probably numerous mutations which have a very slight beneficial effect on the organism. For example, Snyder and David propose that:

15. Mutations with slight effects are much more common than those with marked effects. . . .
16. Mutations with no visible effects are the most common of all mutations. . . .¹⁰

To evaluate these statements, one must consider the origin of mutations.

The Origin of Mutations

The origin of mutations is not well understood. Mutation rates can be accelerated by a variety of agents including certain chemicals and ionizing radiation. Even in the absence of these agents, however, living things mutate constantly and at a rate too great to be accounted for by any known mechanism.

This much is known, however: mutations are changes in the genetic information carried in the cell nucleus—changes in the DNA (deoxyribose-nucleic acid) of which the chromosomes are composed. Some mutations are chromosomal in their origin (polyploidy, chromosome inversions, etc.). Here we consider those mutations which strictly involve the gene as such.

Chromosomes are duplicated in the *interphase* or so-called "resting" stage of cell division in which the cell engages only in its normal metabolic activities. This is necessary if the cell is to divide, because each daughter cell must possess a copy of all the genetic information the mother cell had.

Replication occurs in the interphase because only then is the DNA "unwound." During mitosis the DNA is bound up into the packages known as chromosomes. In interphase every bit of it is expanded and in contact with its molecular environment. In the average cell the total length of the thread of DNA in interphase is estimated at 38 inches!

DNA can be considered a polymer comprised of many *nucleotides* linked in a long chain. Each nucleotide consists of (1) a phosphate group, (2) a pentose or five-carbon sugar (deoxyribose), and (3) an organic base. These are linked thus: ...phosphate-sugar-phosphate-sugar-phosphate...

The organic bases are arranged at right angles to the phosphate-sugar chain. There are our kinds of bases:

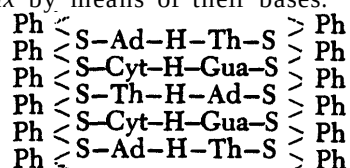
Adenine	} purines	Cytosine	} pyrimidines
Guanine		Thymine	

They are linked to *sugar* moieties, but any base can be linked to a sugar, and they can occur in any order, for example:

Phosphate	>	Sugar-Adenine
Phosphate	>	Sugar-Cytosine
Phosphate	>	Sugar-Thymine
Phosphate	>	Sugar-Guanine

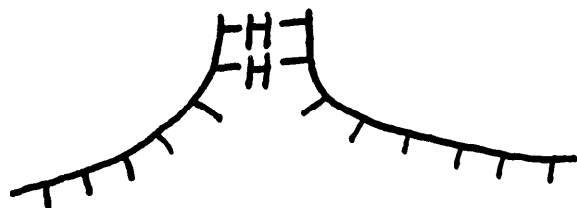
Nucleotides can also be linked to each other by means of their bases which are linked to one another through a hydrogen bond, for example: Adenine-H-Thymine. Adenine will pair with thymine; cytosine will pair with guanine. These are the only possible combinations. For instance, adenine will *not* pair with guanine or cytosine.

Generally, two strands of DNA are linked in a *double helix* by means of their bases:



One can predict the composition of one strand if he knows the composition of the other. This is something like the relationship that exists between a photographic negative and its print.

In interphase the helix separates into its component strands. The hydrogen bonds break and the strands separate (like a zipper). Each strand



then forms a new strand from free molecules (under the control of enzyme systems). In each case a new double strand then comes into existence, and *two double* strands of identical composition are formed.

Like DNA, RNA (Ribosenucleic acid) has a skeleton of phosphate and a sugar (ribose), but the base *uracil* is present in RNA in place of thymine. In general structure, however, RNA and DNA are similar.

Just as a strand of single DNA can build up a complement of itself (under the influence of appropriate enzymes and in the presence of essential starting molecules) a negative image or counterpart of DNA can be synthesized as RNA. The pairing of bases takes place similarly but is not quite the same because of the substitution of uracil. Thus:

Cytosine in DNA leads to an opposing
Guanine in RNA
Guanine in DNA leads to an opposing
Cytosine in RNA
Thymine in DNA leads to an opposing
Adenine in RNA
and Adenine in DNA leads to an opposing
Uracil in RNA.

It has recently been shown that the RNA of certain bacterial viruses is also capable of replicating itself in much the same way that DNA does in larger creatures. RNA also contains certain exotic bases in addition to uracil. These additional bases appear to be of only minor importance in larger creatures.

In cells of larger organisms, DNA occurs primarily (but not exclusively) in the nucleus. RNA is found in large quantities both in the nucleus

and the cytoplasm. RNA occurs in three major forms:

1. Ribosomal RNA. Ribosomes are complex little organelles made of protein and RNA. Ribosomes are associated with the "rough" endoplasmic reticulum. They seem to be manufactured in the nucleus and stored in the nucleolus. Evidently they are released into the cytoplasm by the dissolution of the nuclear membrane in mitosis.

2. Messenger RNA. This is an unstable substance which is manufactured in contact with DNA and reflects the information content of the DNA, which is "coded" in the sequence of bases which occur on the DNA strand. Messenger RNA will bear the complement of the genetic code specified on the DNA which has acted as its template.

3. Transfer RNA. This is never in contact with DNA. It has three free bases on one end which compose a triplet. These three bases pick up one appropriate and specific amino acid in the cytoplasm. Sixty-four combinations are theoretically possible. This particular amino acid is delivered to strands of messenger RNA which provide the scaffolding for the arrangement of the amino acids into proteins.

When the protein is complete, it is released and the RNA can make another like it. Since all life activities of the cell are controlled by enzymes, and enzymes are proteins, it is easy to see that the assembly of proteins controls the life of the cell and thus the life of the entire organism.

The general sequence of information transfer in the cell is:

DNA → mRNA → Ribosomal Assembly of tRNA → protein strand

If there is any biological fact that should stir one's heart to awe of the Creator, it is this: the libraries of information necessary to produce and operate the fantastically complex body of a human are contained (for the most part) in a nuclear package far too small to be seen by the unaided eye! There is no other example of miniaturization to be remotely compared with this.

These relationships are summarized in Figure 5. As is easily seen, a change or deletion in a single DNA base, or a misreplication of a single base will ultimately be reflected as a change in the amino acid sequence of the finished protein. Not so easily seen, perhaps, is the fact that it will usually affect not just one of the amino acids but the whole strand.

Sickle-cell anemia results from a change of just *one* amino acid out of the hundreds found in normal hemoglobin. A substantial change in any of the enzymes of the cell will make them non-functional. Thus a mutant is generally an

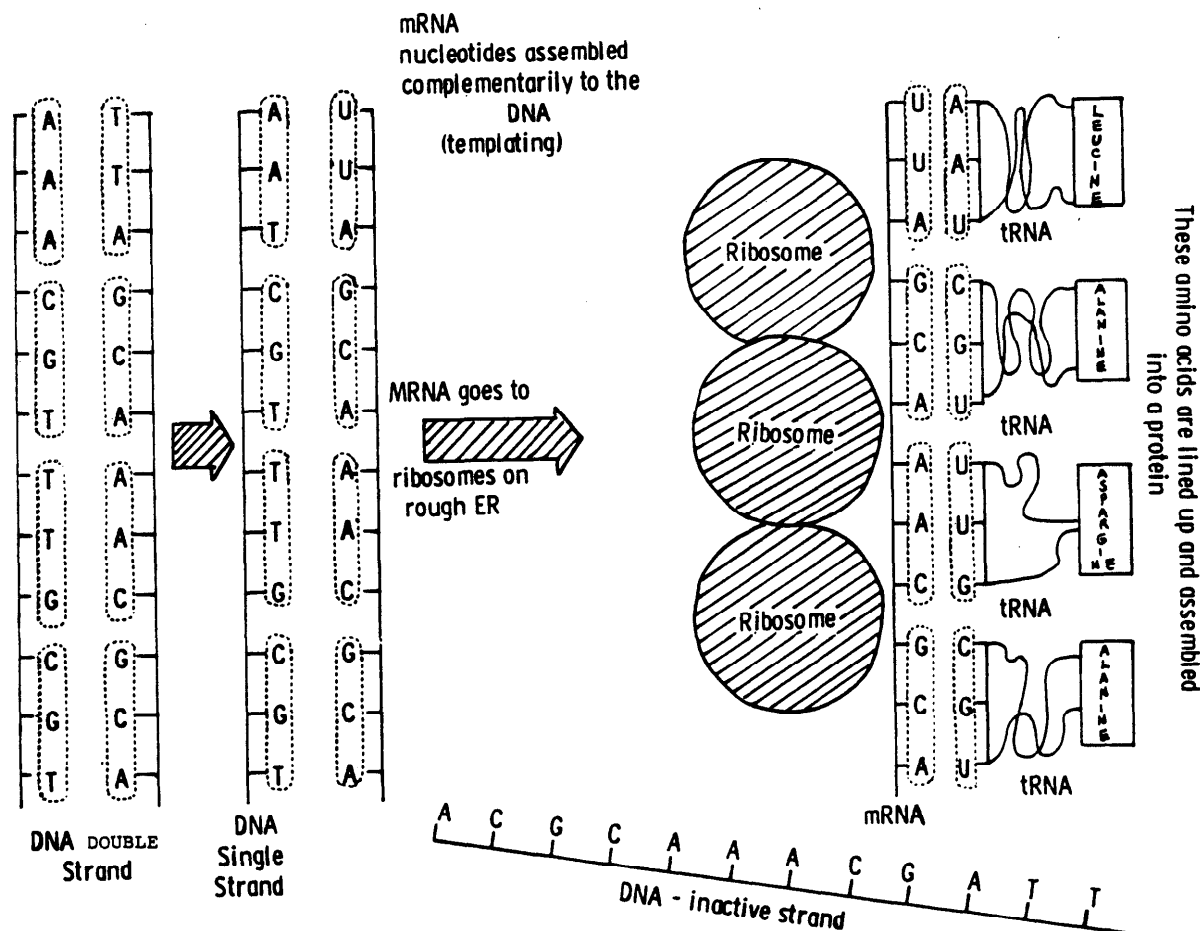


Figure 5. Information Transfer, DNA to Protein. The nucleotide sequence of one strand of DNA is complementary to that of its mate. During protein synthesis, the strands separate and the active strand assembles a unit of mRNA whose sequence is complementary to it. The mRNA then becomes associated in the cytoplasm with ribosomes which it binds together into *polyribosomes*. tRNA fragments are then assembled on the mRNA strand in a sequence complementary to it. Each tRNA bears an amino acid protein fragment. In this way the amino acid sequence of the finished protein is determined. Thus the nucleotide sequence of DNA ultimately determines the amino acid sequence of the finished peptide or protein.

individuals in whom some of the enzymes have been rendered useless or ineffective. The ultimate result is almost always a defective organism. It is no wonder that supposed evolutionary change through mutation and natural selection would proceed slowly. One is entitled to wonder if it proceeds to any important extent *at all*.

Slightly Harmful Mutations in Populations

Within the gene combinations of creatures in a breeding population, what would happen to such a mutation if it were only slightly harmful? If it were recessive, it would experience natural selection as the plum-eye gene did but would register a lower numerical value for the selection coefficient (*S*) against it.

Assume that there is a mutation in which the selection coefficient against a genotype (*a/a*) is

only 0.01. This indicates that only one out of every 100 (*a/a*) individuals would die before reproducing.

If the population had been: (*A/A*) 6,400,000; (*A/a*) 3,200,000; and (*a/a*) 400,000 (expected gene frequencies of $p = 0.8$ and $q \approx 0.2$, respectively, for genes *A* and *a*), the population with selection coefficient of 0.01 against the (*a/a*) genotype would have a reduced frequency of gene *a* according to this calculation:

$$q = \frac{\frac{1}{2}y + z(1 - S)}{(x + y + z) - (Sz)} =$$

$$\frac{1,600,000 + 400,000 (0.99)}{10,000,000 - 400,000 (0.01)} = \frac{1,996,000}{9,996,000} = 0.1997$$

The future of a slightly harmful mutation in such equations is obvious. It too will decrease

as successive generations follow. The only difference between a slightly harmful mutation ($S = 0.01$ against it) and the more drastically harmful mutation ($S = 1$) is that the slightly harmful mutation will be weeded out *more slowly* than the seriously harmful gene. But eventually and inevitably it too will vanish. Thus, previous calculations for plum-eye (Pm) indicate a reduction in the gene pool to 0.167 from 0.2 in one generation, while corresponding calculations for the slightly harmful gene have suggested a reduction from 0.2 to only 0.1997 in one generation. The effect is the same in either case—weeding out.

Selection Coefficients and Slightly Helpful Genes

Evolutionists often speak of minor mutations which have a slightly beneficial effect in combination with other genes. Data on these “slightly beneficial” mutations are hard to find, and most of the discussions are theoretical—being based on population equations and a priori demands of the evolution concept.

For the sake of following the arithmetic argument, however, assume that there are some of these slightly helpful mutations, and that they establish a selective coefficient of 0.001 favoring the recessive mutant genotype. What would a favorable S value of 0.001 indicate in the population? It would lead one to suggest that 1000 individuals of the mutant genotype (a/a) in the population will survive and pass on offspring for every 999 individuals of other genotypes (A/a) or (A/A) who survive.

Natural selection ought to cause such a slightly helpful recessive mutant gradually to infiltrate the gene pool after many generations. A new equation or q :

$$q = \frac{\frac{1}{2}y + z(1 + S)}{(x + u + z) + (Sz)} \quad (\text{Equation 6}),$$

denotes that each new generation would be expected to show a slightly *higher* fraction of gametes in the gene pool that carry the “helpful” mutant (a). Continued indefinitely, natural selection ought to yield a population in which nearly all gametes contain gene a .

Rates of Natural Selection Estimated

Evolutionists maintain that there would be thousands and tens of thousands of gene combinations moving through the process of natural selection concurrently. By this means they “envision” the gradual changes in populations which they feel would explain ultimately the major transitions of general evolution—“amoeba to man” or “alga to magnolia,” as the case may be.

One feature hindering the use of natural selection as the mechanism for general evolution is the rate. It would require extremely long periods

of time for each mutant gene to become established in a gene pool by this mechanism.

From calculations by Patau (based on a generous, favorable selection coefficient of 0.01), John Klotz¹¹ shows that it would take nearly 1,000,000 generations for a recessive gene to pervade 99.99% of the gene pool. Klotz discusses the dynamics of such change and concludes that a recessive gene must have a rather high initial frequency before it could play any important part in natural selection.

Yet a high initial frequency could arise only from a high mutation rate, or genetic drift (a topic which will be covered shortly), and each of these is an unlikely mechanism. Evolutionists assert that natural selection leads to variation in gene combinations and that this variation would ultimately yield new kinds, but calculations indicate the process would be fantastically slow.

Calculations of Dodson¹² indicate a similar dilemma in that it would require 321,444 generations for such a slightly helpful gene to go from the level of 0.000,001 to 0.000,002 in the gene pool. Continued calculations based on Equation 6 above would indicate that natural selection favoring a slightly helpful mutant gene would be amazingly slow. An organism such as a bear that gives birth to its young only once each year would require about 1,000,000 years to establish such a new gene throughout all or nearly all of its gene pool.

Concerning the rate of horse evolution through the supposed geologic ages, G. G. Simpson¹³ estimates that it took 50,000,000 years for the small, many-toed *Hyracotherium* (eohippus) form to yield the modern horse (*Equus*). Since he assumes that the direct lineage would involve some eight genera, he calculates the evolution of each intermediate genus as requiring about 6,250,000 years on the average.

Since 1,000,000 years might have been required to establish one partially adaptive mutation, Simpson’s estimate of 6,250,000 years for the production of a genus is not particularly convincing. Realizing that various genera in the supposed horse series appear in the strata at different rates, Simpson flatly rationalizes, “It is easy to see that the rate of evolution may vary greatly at different times within a single line of descent.”¹⁴

In another book,¹⁵ Simpson estimates that there would have been enough mutations (1,500,000) in enough individuals (1,500,000,000,000) to have changed the various organs of *Hyracotherium* into those of a modern horse. Instead of providing solid support for natural selection as an evolutionary mechanism, Dr. Simpson’s calculations merely show that evolution theory is sufficiently vague to escape absolute refutation. Thus it becomes what philosophers call an “unfalsifiable hypothesis,” meaning no compliment thereby.

Rather than asking if a tooth of *Hyracotherium* might have yielded a different tooth configuration in *Equus* 50 million years later, Dr. Simpson ought to ask if natural selection can explain the origin of the *major types*. A typical uniformitarian such as Dodson¹⁶ allows only 19 million years for the entire Eocene epoch of the Tertiary period.

Yet Dewar¹⁷ reports the presence of fossils classified in the following new placental mammal orders: carnivores, odd-toed ungulates, even-toed ungulates, Hyracoidea (hyrax types), edentates (sloths), rodents: Proboscidea (elephant, etc.), Cetacea (whales), sea-cow, bats, primates, pangolins, ardvarks, and at least six other orders now extinct.

These manifold mammal orders are all evident in *lower* Eocene strata but they are absent from the Paleocene (the next deeper layer). Using the uniformitarians' own time scale, this would indicate that most major mammal orders, and some orders now extinct, must have arisen within one or two million years (at the longest) between the Paleocene and Eocene.

If it requires 6.25 million years (as Simpson believes) for genera to evolve in horses, and if natural selection takes about 1,000,000 generations to establish just one new allele in a population, how could most major mammal orders have arisen in the comparatively short period between Paleocene and Eocene?

This same acute problem is repeated in the origin of most major groups and their subgroups—fish, reptiles, amphibia, and birds. As a mechanism for general evolution, natural selection appears to be inadequate even in the perspective of a vast time scale.

Effect of Natural Selection Examined

Coupled with this sluggish rate, comes the realization that the end result of natural selection would not be a spectacular evolutionary event or change in "kind" as "evolution" was previously defined. Gigantic spans of time would be required for any *one mutant gene* to become entrenched in the individuals of a breeding population.

If the slow workings of natural selection would involve about 1,000,000 generations to establish one new recessive mutation, how long would it take before the coordinated assemblage of genes necessary to form an eye would combine successfully in some ancient ancestor? It is possible that several genes would be evolving together so that it would not necessarily take longer for a dozen non-allelic changes to occur than for one. Yet even so, the time spans projected are staggering.

If one considers variations in plants, where S is 0.001 or even 0.01, how long would it take, and

how many mutations would be required to yield maturation of pollen dusting structures in a flower? It is obvious that natural selection of a *dominant* helpful mutation would be slightly more rapid and it is also obvious as stated, that more than one gene could be experiencing selection at a the combination of genes which govern the for-given time in the same population. Nevertheless, the time requirements for natural selection are known to be extremely large when compared to the "explosions" of new *kinds* apparently seen in the fossil series.

Genetic Drift Considered

Preceding calculations were all based on a large population with a certain amount of mutation and natural selection occurring. Evolution theorists reason that populations frequently become small and that variations may occur rapidly within small populations.

One must agree that greater deviations from expected ratios may arise (by chance alone) in small samples than in large ones. Someone who tosses a coin 10 times would expect (from theoretical probability considerations) to experience five "heads" and five "tails." Yet it is obviously possible in 10 flips of a coin to have eight heads and only two tails.

Such deviation may occur regularly in a small sample but becomes exceedingly less likely as sample size increases. In 1000 tosses of the coin, the chance of having 800 heads and only 200 tails is infinitesimally small. The 1000 flips would approximate the theoretical 50:50 ratio quite closely.

The principle of random variation in small populations is known as "genetic drift" or the "Sewall Wright effect." Genetic drift is a random shift in gene frequencies within a small population. It is believed to occur (as did the deviation in coin tossing) through a random sampling error in a small group.

Through genetic drift, one can conceive of a certain gene becoming quite prominent in the gene pool of an isolated population of squirrels. In an hypothetical example, assume that the recessive gene for albinism (a) is present in squirrel populations generally, but only 1 in 10,000 animals is homozygous albino (a/a). In addition, suppose that there exists a small population of about 20 squirrels isolated in a remote canyon and that one of the 20 happens to be an albino (a/a).

Imagine that a rock slide, flood, hunting overkill, or some other local catastrophe eliminates all but six squirrels. If one of the six surviving animals had happened to be the albino, the frequency of the albino gene a in such a gene pool would have increased markedly. Such change would be an example of genetic drift.

Because the population was small, a random "error" caused a change in gene frequencies that would have taken hundreds or thousands of generations to occur by natural selection in a large, panmictic population. The effect of such minor fluctuations within a larger group would have been minimized, or "swamped out," by the total numbers of surviving animals. Yet in a small population it would be important and would lead to a significant shift in gene frequencies. Similarly, any factor affecting gene frequencies will be more important in a small population—not just the chance factors.

If any evolutionary change is to occur (or even any *permanent* modification of gene frequency), an environmental change would be necessary at the same time as this population reduction to confer some selective advantage to the white mutant form. Otherwise natural selection would erase the effect of genetic drift, despite the temporary major shift in gene frequencies after the rock slide.

Perhaps the rock slide which drastically reduced the population would also expose a new greyish white surface of rock over a vast area, thereby making white fur an advantage through camouflage! A coincidence of this sort is quite unlikely and major permanent changes wrought by genetic drift are also unlikely.

Albinism—A Harmful Mutation

Although this has been an hypothetical example, albinism in squirrels does exist and has been described in Jack Kemmerer's fascinating account of the white squirrel populations in Olney, Illinois.¹⁸ According to the best historical records available, it all started when a certain man, Ezra Stroub, discovered an albino male and female squirrel while hunting. These young albino squirrels were raised and bred. As time passed other townspeople pampered and protected the growing population, finally turning them loose.

A testimony to the deleterious character of this mutation is the fact that there are very few colonies of white squirrels in the world. Albino squirrels are more conspicuous to their enemies than the normal colored squirrels and they have "... weak eyes due to lack of protective pigment."¹⁹

If the albino mutation is generally harmful, one may ask why the population at Olney has increased. The answer is very simple—they have been preserved and protected by man. A city ordinance of Olney (1925) protects the near-sighted squirrels by giving them the right-of-way on any street or crossing in town. Since 1943 there has been an Illinois state ordinance making it illegal to molest, trap, or otherwise kill a white squirrel.

Thus a white squirrel population in Illinois is to zoologists what navel oranges or delicious apples are to horticulturalists! If man acts to preserve a variant (artificial selection), rapid change can be wrought *within the kind*, as Walter E. Lammerts has so clearly indicated in previous papers. For a white squirrel population to be established by genetic drift, however, would be quite unlikely.

Genetic Drift—Another Illustration

Another illustration of genetic drift comes from envisioning a group of people stranded on a desert island. A preacher is along and over the course of years almost everyone gets married and has children. However, one of those present has the rare blood type known as "Duffy," and does not realize it. He happens to be one of the few who does not marry, because he is unpleasant. But his disposition can have no bearing on the selective advantage or disadvantage of his blood type! That gene is thereby eliminated from the gene pool at his death, *by chance*. Such an event is much more likely to happen in a small population than in a large one. In a city, for example, the unfortunate man might have been able to find a girl who would put up with him!

Significance of Natural Selection and Genetic Drift

Evolutionists maintain that evolution of the kinds of plants and animals proceeded despite the slothful pace of natural selection. It is further presumed by evolutionists that genetic drift took place at times in small populations to yield more drastic and rapid changes.

It is possible that changes comparable to those described as genetic drift may occur upon occasion in nature. But such variations would, by their very random nature, usually be temporary and non-adaptive. A gross change in color might follow, but with no apparent value or survival advantage for the animal species. Variations might be expected to arise by such means, but with no particular priority of meeting the environmental demands.

Since genetic drift and natural selection are by no means guided, they could not yield the directed change which would obviously be required by a plant or animal in producing a new organ, new organ system, or basic adaptation. Genetic drift provides no guarantee that changes will introduce "favorable" genes at an opportune time.

Overtones in Molecular Biology

Although genetic drift is a random process, some evolutionists suggest that natural selection enables genetic drift to play a creative or adaptive role in evolution—such as directing the species towards greater fertility. King and Jukes

go so far as to maintain that evolutionary changes in DNA and protein are primarily due to neutral mutations and random genetic drift.

There appears to be considerable latitude at the molecular level for random genetic changes that have no effect upon the fitness of the organism. Selectively neutral mutations, if they occur, become passively fixed as evolutionary changes through the action of random genetic drift.²⁰

Bryan Clarke, however, believes that the role of neutral mutations is not clearly established in protein "evolution." He suggests that natural selection is still the key mechanism rather than genetic drift. In de-emphasizing the role of genetic drift, Clarke states:

King and Jukes argue that random genetic drift has been primarily responsible for the majority of amino acid substitutions, but the weight of evidence does not support them. Protein sequences, like other characters, seem to have evolved under the dominating influences of natural selection.²¹

Miracles

If some (such as King and Jukes) would argue that genetic drift might have occurred at just the correct intervals of time, and in the proper localities to foster adaptive conversions of type or kind, then the timing of such events would be almost an appeal to the miraculous. A more satisfactory mechanism admittedly involving miracles is the Biblical account of God originally creating the plants and animals "after their kinds."

The creationist stance doubtless involves a step of faith, but it requires yet greater faith to hold that natural selection and genetic drift formed the basic kinds of living creatures. Apparently neither genetic drift nor natural selection lead to anything more than variation within the existing taxa.

Conclusions

Evolutionists forward natural selection in breeding populations as a key mechanism in producing a general evolution of major kinds of life. Under close scrutiny, however, natural selection is seen predominantly as a "weeding out" operation in which harmful mutations are slowly reduced in future populations. Any favorable selection which might occur would be uncoordinated and quite slow.

Associated phenomena of balanced polymorphism and genetic drift likewise supply little or

no basis upon which to support the sweeping changes which general evolution would require.

A Biblical format of origins "after their kinds" through rapid creation provides a suitable framework for viewing the magnificent adaptations of plants and animals. Furthermore, whatever change does actually take place in breeding populations fits well with a creationist's understanding of modification occurring "within the kind."

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THE NATURE OF EVOLUTIONARY THOUGHT

ARTHUR JONES*

The argument that modern science is objective, and that the Christian must therefore accept its conclusions with regard to the fact of evolution is answered from the standpoint of the philosophy of science. Scientific method is examined in order to highlight the hierarchy of explanatory frameworks which guide the scientist in his research. Paleo- and neo-science are then analyzed in order to reveal the radical differences between them in regard to these frameworks.

It is concluded that the frameworks of paleo-science (of which Darwinism is a prime example) cannot be scientifically proven or disproven. In order to gain empirical import these frameworks must be combined with frameworks of neo-science, and it is only the latter which can be scientifically tested. In the adoption and retention of paleo-scientific frameworks, philosophical and religious commitments are primary. The implications of this situation are discussed.

Introduction

In the debate over evolution one particular argument is often put forward against the creationist position. It can be set out as follows:

Science as we know it took root in Christian soil. The early scientists recognized that Nature is also God's book, and that they must go and humbly study His Creation, if they would learn its secrets.

In this way they by-passed the sterile controversies of (scholastic) philosophy and developed an objective procedure which is neutral with regard to philosophical and religious beliefs.

Even T. H. Huxley wrote that "the great truth which is embodied in the Christian conception of entire surrender to the will of God" is "Sit down before fact as a little child, be prepared to give up every preconceived notion, follow humbly wherever and to whatever abysses nature leads, or you shall learn nothing."¹

Thus if the present-day heirs of this Christian tradition tell us that their research demonstrates evolution to be a fact, then we must humbly accept this. We must rather devote our energies to the more important task of attacking the materialist philosophy of evolutionism which has been built upon the scientific data.

We must certainly not fall into the same trap as the humanist by introducing philosophical and religious considerations into the discussion of biological theories.

The very fact that such an argument can be seriously put forward is, I believe, a major indictment of our educational systems. Our scientific education is all but designed to restrict our critical ability. In particular the *history* and *philosophy* of science are almost completely neglected.

There is thus, for example, no attempt to see just how Christian the early scientists really were in their thinking, or even to discuss just what "Christian thinking" actually means in practice.

The effect of this deficiency in our education is plain to see in the debate on evolution.

Scientific Method

Since most scientists have little or no philosophical background it is not surprising that the philosophy of science is generally regarded as irrelevant. Indeed it is often portrayed as the mere speculation of the scientifically incompetent! This deeply rooted prejudice prompts many scientists to embrace a naively empiricist view of scientific method.

Thus the scientist is said to begin his task by collecting facts through observation and experiment. The inspection of these facts will reveal some features of order, some tendency, allowing the scientist to formulate a tentative hypothesis. Finally, if this hypothesis survives testing, the scientist will announce the discovery of a new theory or new law of nature.²

If true to life, such a procedure would clearly guarantee the objectivity and neutrality of science. But it is as mythical as it is popular. *However restricted the area of investigation may be, the scientist always faces such an avalanche of facts that if he sat down before them as a little child he would be crushed.* The scientist must come to his work with a (tentative) theory which will allow him to select those facts which are relevant to his problem. He has, as it were, a net with a certain mesh and what his net doesn't catch isn't fact.

But, his net is also a system of co-ordinates, for it *interprets* the facts. Without the context it provides he would not know what he was looking at. Indeed, on a naive empiricist base there is simply no room for a scientific problem: if I know what I'm looking for, there is no problem; if I don't know what I'm looking for, how can I ever hope to find anything?³

Conceptual Frameworks (C.F.)

But so far we have only deferred the problem. If there are a myriad facts that could be relevant to a given problem, there are also a myriad theories which could explain the myriad facts. Yet if we ignore, for the moment, periods of crisis,

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it is clear that a scientist will consider only a certain type of theory and may even have to be a genius to think of a single one. *At this level also the scientist wears blinkers in order to progress.*

Just as he selects those facts that are relevant to a theory, so he selects those theories that are specified by a theoretical framework—a *conceptual frame of reference for theories*⁴ (hereafter represented by C.F.) As examples of such C.F.s, we have logicism, intuitionism, and formalism in mathematics; atomic, thermodynamic, and quantum theory in physics and chemistry; and Weismannism, Mendelism, and Cell Theory in biology.

In other words, the theory that we bring to our work is a particular articulation of our (or someone else's) prior ideas about the nature of things. C.F.s in turn are informed by a philosophical view of reality.

But, rather than continue this analysis immediately, I now want to pass to the question of scientific status: how do we determine whether a theory, or C.F., belongs to science? That is, by what criteria can we distinguish between the concepts of chemistry and alchemy, or astronomy and astrology? I wish to restrict the discussion to Popper's criterion-falsifiability.⁵ This criterion is not at all adequate, but it does bring to light features of theories which are extremely relevant to an analysis of evolution.

The Status of Theories

In terms of Popper's criterion, we admit a theory as scientific if its logical structure is such that we can indicate observations that would *refute* it. This requirement is based on the logical asymmetry between verification and falsification—we can never verify a theory by observations (since another theory may also account for these), but we can refute it by observations.

The Status of Conceptual Frameworks

Here Popper's criterion reveals an important point: *C.F.s cannot be refuted by observation.* A law such as Boyle's—that the pressure and volume of a gas vary inversely at a given temperature—is refutable because the concepts employed are *instantiative*,⁶ i.e., the concepts "pressure," "volume," "gas" refer to things we can observe or experience (the *instances*). To test this law we derive a simple prediction:

- (1) This object is a gas.
- (2) Therefore this object will obey Boyle's law.

A C.F. law such as the first law of thermodynamics (that energy is always conserved, i.e., that it can be neither created nor destroyed) is much less tangible. "Energy" is a *non-instantiative* concept.⁷ This is an important point so it may help if I try to explain this distinction in another way.

Our everyday experience is of *concrete* things and events. Our experience of a dog is not cut up into separate experiences of its mathematical oneness, its physical mass, its biological growth, its aesthetic shapeliness, etc. Our experience of the dog (as of everything else) is quite integral and seamless.

However, in the sciences, we investigate such *first-order abstractions* as those which have been mentioned—the various physical, biological, etc., qualities or functions. Further we find that each of these types of function has a common denominator which enables us to derive *second-order abstractions*, such as "number" (mathematical), "motion" (kinetical), "energy" (physical), "life" (biological)—which denote that in our experience of the world which enables us to distinguish any type of quality from all other types.⁸

Now, because of this, any framework which contains only second-order, or non-instantiative, concepts cannot be refuted by observation. In order to work with the first law of thermodynamics we have to formulate specific *theories* dealing with known (i.e., specified) forms of energy-effect (mechanical, thermal (heat), etc. (Note that these are *first-order* concepts).

If any of these theories should be refuted, then the C.F. will tell us how to construct a new theory (possibly assuming the existence of a new form of energy—this actually happened in the case of nuclear energy). In the normal course of events the C.F. itself will not even be questioned.

Refutation of Conceptual Frameworks

The programmatic or regulative function enables us to formulate a (Popperian) criterion of scientific status. To be admitted as scientific, a C.F. must be capable of empirical interpretation; i.e., we must be able to tie down its terms and concepts to practical application within the context of specific refutable theories. Thus we are unable to accept Driesch's concept of "entelechy," but we are able to accept Newton's equally mystical "gravitational force."

If a C.F. allows the formulation of testable theories, then it can be refuted; namely, by *theories*, theories which are independently based.⁹ Thus Schrodinger's formulation of the wave-equation (which predicts the emission spectrum of the hydrogen atom) provides a theory which refutes the C.F. principle that energy occurs in all possible quantities.

This example reveals a crucial point. Our discussion so far might imply that falsification operates in *vacuo*, i.e., that it *must* lead to rejection. This is rarely the case. A refutation has the necessary power to eliminate a theory or C.F. only when it has the support of an *acceptable* alternative. In the absence of such an alternative, discordant observations are simply ignored,

shelved or explained away. Thus Schrodinger's wave-equation was developed *after* the quantum C.F. came into being and used the concepts which it provides.¹⁰

The Origin of Conceptual Frameworks

Adoption of a C.F. (i.e., the determination of acceptability) involves a decision in philosophy, not merely a decision in science. Alternative theories are generally being compared with respect to the same conceptual background (i.e., the same C.F.) which guarantees a stable meaning for the terms employed. *But alternative C.F.s may not have a single scientific statement in common.* Opposing C.F.s can never incorporate the same scientific data, because these will be completely permeated by the differing conceptual pattern.¹¹

Consider, for example, the different meanings given to the terms "space," "time," "motion," "matter" and "force" in Newtonian and Einsteinian physics. When the proponents of different C.F.s argue, they are bound to be fundamentally at cross-purposes, because neither side will grant the extra-scientific assumptions the other needs to make his case.

Evolutionary Conceptual Frameworks

The "theory of evolution" itself is, in fact, neither a theory nor a C.F., but a philosophical dogma of continuity. Within this philosophical view three main C.F.s have been articulated: Darwinism, Saltationism, and Lamarckism. It must be stressed that these are C.F.s—they cannot be either proven or disproven by observation.

Therefore, it is rather entertaining when evolutionists write that "we reject special creation as an adequate explanation because we can think of no means by which we can put it to a valid test, because we can imagine no observation falling outside the capabilities of a Creator possessing unlimited ability."¹² Precisely the same is, of course, true of Darwinism: "A lover of paradox could say that the main objection to selection theory is that it cannot be disproved . . . it appears impossible to indicate any biological phenomenon that would plainly refute it."¹³

Paleo- and Neo-science

It would follow from our previous analysis that although we cannot test Darwinism by means of *observations*, yet we can do so by means of *theories*. But in fact this is not so. We have tacitly assumed that scientific frameworks are all of a kind. This assumption is in fact false.

In this context we can distinguish two particular classes of framework: (1) those in neo-science, and (2) those in paleo-science. In the theories of neo-science (i.e., those dealing with present-day phenomena), there is a logical symmetry between explanation and prediction, i.e., if

an event can be explained deductively by a set of premises after it has occurred, then it could also, in principle, have been predicted from the same premises beforehand.

In these cases our explanation can be set out in the form of a statement of general laws and initial conditions, e.g., we can predict the amount of extension of a spring if we know, firstly, Hooke's law and, secondly, the load to be applied and the force-constant of the spring (the initial conditions). In other words neo-science depends upon two things: (a) there must be a repetition of events, and (b) there must be a system of laws to account for the repetition.

But evolutionary theories are "historical interpretations"¹⁴; i.e., they show that the phenomena (species distribution and diversity; homologies; fossil succession, etc.) can be explained as the outcome of an historical process. The events cannot be set forth in accord with general laws as instances of a kind; they are individual phenomena between which individual relations hold and they will not recur.¹⁵ Since these theories operate only *ex post facto*, they provide a basis for neither prediction *nor* for the refutation of another C.F.

Darwinism

The basic propositions of this C.F. are:

- (1) Random inheritable variation is constantly arising (Random = no correlation with the organism's adaptive needs).
- (2) Relevant variation is continuous, i.e., variational differences are small.
- (3) Natural selection is effective in utilizing this variation to bring about the adaptation of the organism to its environment.

The C.F. is untestable because the key concepts "variation," "adaptation," "selection" and "environment" are *second-order*, e.g., "variation" is a biological analogy of "motion" (i.e., *change of character*) and "environment" is a biological analogy of "space."¹⁶ The presence of these concepts in the C.F. and the C.F.'s position in paleo-science, thus ensure that Darwinism is scientifically irrefutable. It does not formulate any laws, but simply provides the categories under which the independent variables involved in the evolutionary process are to be arranged, and shows how these categories are conceptually related to one another.

But in order to work within this C.F. the scientist must give it empirical import; i.e., he must be able to articulate *theories* which specify concrete forms of the concepts employed. For example, he must be able to specify that gene mutation is to be regarded as the relevant form of variation, or that resting sites (such as blackened tree trunks) are the relevant form of environment. In other words he must *combine* Darwinism with C.F.s of neo-biology, especially with a

C.F. dealing with heredity. Thus the original Darwinian C.F. was based on the following postulates:¹⁷

(1) The heredity system is characterized by "blending inheritance" (To this Darwin added his Theory of Pangenesis).

(2) The relevant variation is the continuous, fluctuating variation seen in all organisms.

(3) This variation is inherited.

This combination entails that the C.F. is refutable, i.e., refutable in the sense that its neo-biological components are open to falsification. Thus Darwin's C.F. was refuted when the rediscovery of Mendelian theory led to the rejection of the neo-biological components.

During the 1890s an alternative C.F.¹⁸ to the Darwinian began to appear (Saltationism), and it was not until about 1930 that a new Darwinian C.F. emerged.¹⁹ This *neo-Darwinian* or *Synthetic Theory of Evolution*²⁰ is based on the neo-biological C.F.s of Mendelism and Weismannism:

(1) Heredity is atomic, i.e., the hereditary system has the property of dependence on discrete alternative states ("alleles") of the hereditary factors ("genes") which can segregate and recombine (Mendelism). In the C.F., this doctrine is transferred from the individual level to the population level (the gene pool concept).

(2) The relevant variation is produced by random gene mutation in the germ cells.

(3) Changes in the hereditary material are independent of, or only arbitrarily related to, changes in the soma (Weismannism). In the C.F., this doctrine is also transferred to the population level.

From our analysis it follows that neo-Darwinism is open to falsification in the sense that Mendelism and Weismannism may be falsified.²¹ This is certainly true and I hope to indicate in a later article one way in which this can be done. But here it should be noted that the internal development of Mendelism and of the neo-Darwinian combination has led to neo-Darwinism becoming a completely fossilized metaphysic (Darwinism itself has been this all along!).

Mendelism Explicated

C.F.s of neo-science are philosophically informed just as much as those of paleo-science. The philosophies available are primarily those of mechanism, vitalism and organicism, and it is in terms of the first that Mendelism is usually presented. It thus contains the following postulates:

(1) Organisms ultimately consist of genes which have purely physico-chemical properties.

(2) The body of an organism is a complex physico-chemical system whose molecular parts are causally linked to the molecular structure of the genes.

(3) Heredity is ultimately the physico-chemical process of gene duplication.

(4) Hereditary changes are brought about by the physico-chemical processes of gene recombination and mutation.

The dominance of this viewpoint is indicated by Hershey's reference²² to "the unwritten dogma, according to which biological evolution is solely the evolution of nucleotide sequences." Mendelism is what it is, not because of the facts, but because of the mechanistic philosophy in which it is set.

In order to support evolutionary continuity, invariance of species is replaced by invariance of genic processes. If species are the sum of genes, then by genic changes, species can be changed and the continuity of evolution can be explained. At least that has been the hope.

Classical Mendelism

The original Mendelian theory was based on the postulates that the gene: (1) is a corpuscle on the chromosome; (2) has a definite function; (3) has the capacity to mutate; and (4) is the smallest unit of recombination. That is, the gene was stated to be a unit of function, mutation and recombination, which stands in a 1:1 correspondence with an adult character. On this basis the elementary evolutionary process could be regarded as a systematic change of gene frequency in a local population.

Neo-Mendelism Contrasted

Breeding experiments soon upset the applecart, for it was found, for example, that the same phenotypic result could be produced through breeding different strains of plant or animal; i.e., in terms of the C.F., different genes, were causing the same effect. A new theory was necessary. Hence Neo-Mendelism modifies the postulates:

(1) Genes are (still regarded as) discrete.²³

(2) The units of function, mutation and recombination are rarely co-extensive.

(3) The *interactions* of the genes give rise to the observable characteristics of the organism.²⁴

This new theory may save the C.F., but it buries the gene beneath an epicyclic superstructure, if the secular persistence of any relationship between the genes and the characters is denied (as by Huxley,²⁵ Carter,²⁶ Waddington,²⁷ Mayr,²⁸ etc.). If, that is, the phenotype is the expression of the unspecifiable, changing and unpredictable interactions between the total of mutable genes (which further interact with the environment and even with the changing internal environment during development), then it is strictly meaningless to say that evolution is "change in gene frequencies."²⁹ The modern interpretation of the gene thickens the fog further:

when the "old-fashioned gene" turns into

a replicating sequence of bases in DNA which is active in controlling a DNA-RNA-protein sequence, theoretical biologists have little reason for any confidence that there are in existence sound theories of evolution and development waiting to be enriched, rather than thrown into chaos, by the new insight.³⁰

Neo-Darwinism and Neo-Mendelism

Modern Mendelism gives precious little clarity to Darwinism, and even the partial clarity is befogged by the importation of *ad hoc* hypotheses which obscure the relationship between Darwinism and Mendelism. The problem is created by the fact that the overwhelming majority of gene-mutations studied in the laboratory are admitted to be deleterious to the organisms concerned.

To obviate this difficulty three supplementary hypotheses have been put forward: (1) Fisher's theory of "suppressor (modifier or buffer) genes" (which render innocuous the effects of deleterious mutations); (2) East's theory that the relevant mutations are infinitesimally minute (i.e., not those normally observed in experimental studies); and (3) Dobzhansky's contention that the deleteriousness of a mutation is relative to the particular environment in which the organism finds itself.³¹

Whatever the truth or otherwise of these supplementary hypotheses, they *all* share the same methodological defect: *they explain away the difficulties created by the contention that gene mutation provides the variation utilized in evolution, without suggesting any novel consequences which can be tested.*³² This sorry state of affairs is quite typical of modern paleo-science.

Creationist Strategy

The preceding analysis has necessarily been rather involved, but the conclusion is a simple and indeed familiar one: *in the absence of revelation (i.e., the historical report of an eyewitness) we cannot scientifically investigate the past.* When Kerkut wrote, "It seems at times as if many of our modern writers on evolution have had their views by some sort of revelation . . .",³³ he was using the right language. Religious and philosophical commitments are decisive. There could have been no "evolution" in science without the prior acceptance of an evolutionism in philosophy, and a humanism in religion.

The analysis cannot, however, be closed on a purely negative note. The Christian is called upon to make a response. We must no longer be content with sniping (which evolutionists rightly ignore as irrelevant). Our apologetic must be both integral and all-embracing. We must remember Whose side we are on—and formulate a three-fold attack:

(a) *Attack by unmasking the philosophical structure and religious root of evolutionary thought.*

(b) *Attack by disclosing the self-destructive nature of all such man-centered thinking.*

The very structure of paleo-science precludes a purely scientific refutation of Darwinism. Instead we must cut through the undergrowth to the roots and proclaim their rottenness to the world. We must have the courage of our convictions to maintain that *only* in Christ-centered thought can we have real meaning in any area of life. This is as true in natural science as it is in theological science.³⁴

(c) *Attack by articulating comprehensive scientific alternatives to evolution, i.e., C.F.s and theories for cosmogony, historical geology and historical biology.*

Morris and Whitcomb have given us the lead in geology; Mulfinger³⁶ has provided a basis in astronomy, and it is for all of us to take up the challenge. Our efforts in science must always be tentative and subject to revision, but the Bible provides a solid foundation, and our Lord is not only a Saviour, but also the One who created and upholds the whole universe.

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(Continued from Page 15)

pursuit of the present direction, which Elder believes is likely to result in ecological disaster.

In moving toward the transcendence stage of Omega, man, to put it bluntly, crunches nature by the means of science and technology. Teilhard puts it more elegantly by saying, "Taken in the full modern sense of the word, science is the twin sister of mankind," for "the march of humanity . . . develops indubitably in the direction of conquest of matter put to the service of mind."

Thus Elder believes that Pierre Teilhard's evolutionary philosophy has led him to justify man's exploitation of the world in which he lives.

There is another aspect to be considered, and that is the creationist's attitude toward the world, as contrasted with the attitude of the evolutionist. The creationist believes that God created originally a perfect world, the intricacies of which show God's wisdom. Because God's wisdom is so superior to man's, it is unlikely that man will be able to improve on the world which God created.

Therefore, the creationist is in no hurry to change natural balances and to seek to alter the world which God has created. To be sure God expects man to serve as a sort of manager; he is not to take his talents and bury them in the ground.

Yet this management must be conducted in keeping with and not contrary to the complex balances which God has created. When the creationist sees how each organism fits into its niche, he marvels at God's wisdom and is reluctant to make any changes until he is certain that he will not be inflicting damage.

The evolutionist, on the other hand, regards these balances as the result of chance evolutionary changes. He believes that he can and ought to control and direct the changes which go on continually. The evolutionist is arrogant enough to believe he can improve on nature. He is hardly likely to hesitate to accelerate changes which he believes are bound to take place; and he counts on impersonal natural selection to guarantee survival of the truly fit.

Conclusion

We do have some problems. Perhaps some of the cries that have been raised are unnecessary calls of alarm. But there is enough evidence that the situation is serious and that it demands our attention. What we need is not a repudiation of Scriptural and creationist principles, but a rejection and repudiation of the evolutionary philosophy and a more wide-spread acceptance of the Biblical and creationist view of the place of man.

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ON THE RECENT ORIGIN OF THE PACIFIC SOUTHWEST DESERTS

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The history and migrations of the Pueblo Indian peoples are discussed in relationship to drying trends after the Noahic Flood. The decline of Lake Tulare, the Great Salt Lake, other surface reservoirs, artesian wells, and even glaciers are also correlated with flood geology. It is proposed that worldwide climate changes occurring after the Flood led to the migratory phases obvious in Pueblo Indian history. Finally, it is theorized that desert plants may have been catastrophically selected for survival in dry conditions when areas such as Lake Cahuilla became deserts.

Introduction

My interest in the question of how recently the Pacific Southwestern part of the United States became a desert was first awakened by a visit to the Bandelier National Monument near Los Alamos, New Mexico. On October 28, 1970, my daughter took me down to the Park Headquarters in Frijoles canyon and we looked at the many foundations of former Indian dwellings and ceremonial caves. Some of these have been reconstructed.

One of the most remarkable is Tyuonyi, a semi-circular apartment-house group of former Indian homes. Only the foundations now remain and indicate that each apartment was only 5 feet by 5 feet (Figure 1). The Pueblo Indians must have been very short people indeed! Archeologists have concluded that they lived in these apartments until about 1550 A.D.

Large caves were dug into the sides of the steep cliffs. One very large one, called the Ceremonial cave, contains ruins of a large religious ceremonial room or Kiva. Most of the dwellings were built right up against the steep cliffs, as shown in Figure 2. All of this building indicates a long period of canyon occupancy. The questions as to when they arrived, and why they left their cliff homes, began to interest me and the following is a rather well authenticated history, the dates estimated by pottery association and tree ring counting.

Pueblo Indians from 1100 to 1580

The golden age of the Pueblo Indians was from 1100-1300 when they lived on the Colorado plateau. Cotton woven into textiles and corn were their main crops. In the 1200's they began to leave and tree ring studies indicate a 200 year period of drought. The lands these people left had been their home for about 1000 years.

Some re-settled southeast in the North Rio Grande Valley, where the Bandelier National Monument is located. Others moved southwest into north-central Arizona. The Pajarito plateau in which Frijoles canyon is located was first settled in the late 1100's. At first the Indians lived on the plateau, and remains of villages having up to 800 rooms, such as Tsirege, Navawi, and Otowi, have been found. Most accessible, at the

intersection of State Highway 4 and the South mesa-access road, is Tsankawi with about 350 rooms.

An ancient reservoir 75 by 130 feet has been found about 120 feet west of the pueblo called Puye. This ruin is located about ten miles west of Espanola and 40 miles northwest of Santa Fe. Edgar J. Hewett writes:

Meagre amounts (of water) could be obtained by opening a spring in sand, but here, as on all parts of this plateau, a much more plentiful water supply than that now existing would be essential to the maintenance of such large settlements as once existed at Puye.¹

As the plateau became increasingly dry, the Indians moved down into the various canyons, such as Frijoles, and built their cliff houses. The attraction was the stream, much larger than now, and the small flat alluvial areas beside it on which they grew their crops of corn, beans and squash. The peak population was in the 13th, 14th, and 15th centuries and they were called the Jemez people.²

Then an even more serious drought, beginning in the 1500's, started driving them out and all but a few stragglers were gone by about 1580. Some of their descendants still live in Cochiti and San Ildefonso pueblos.

Even in recent years there is evidence of increasing drought. Mrs. Evelyn Frey, operator of the Frijoles Canyon Lodge, moved into the canyon with her husband, George, in 1925. She cites two great changes in the last 30 years:

The winters used to be much colder. We were always snowbound, but it was delightful. And the Rio de los Frijoles is only about half as wide as it used to be. There are hardly any fish left. The river used to swarm with fish that would bite at anything. You didn't feel ethical fishing in those days.³

We may conclude that this vast area was blessed with a surprisingly high rainfall until comparatively recent times (1500-1550) and that the drought is getting worse. The former high rainfall seems correlated with much colder winters.

Portions of California Considered

Turning now to California, I was amazed to read in a Pacific Gas & Electric Progress bulletin

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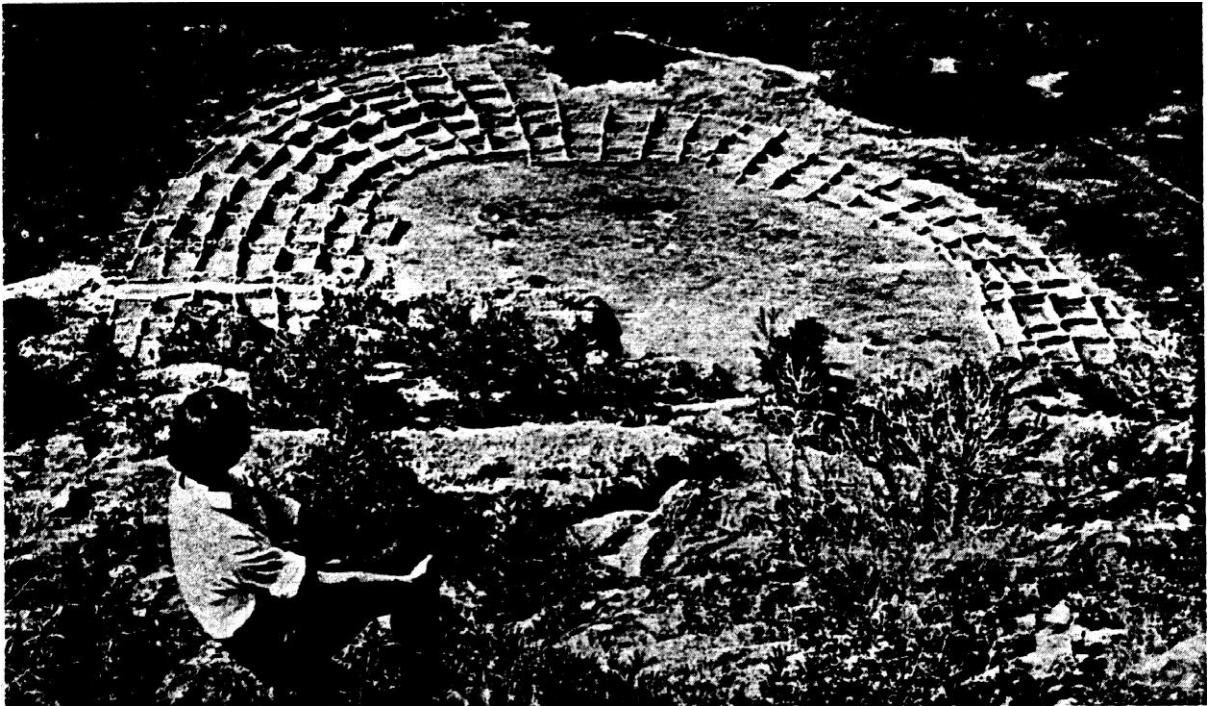


Figure 1. Tyuonyi apartment house type of Pueblo. Photograph reprinted by permission from the publication, "This Enchanted Land," University of California, Los Alamos Scientific Laboratory, P.O. Box 1663, Los Alamos, New Mexico 87544.



Figure 2. Typical ruins of former cliff dwellings of the Pueblo Indians. Photograph reprinted by permission from the publication, "This Enchanted Land," University of California, Los Alamos Scientific Laboratory, P.O. Box 1663, Los Alamos, New Mexico 87544.

of the recent existence of Lake Tulare.⁴ Primary sources of information were history books published in the 1850's to the 1870's, such as *Resources of California* by John S. Hittel.⁵ In 1875 the sidewheel steamer, *Mose Androsa*, was used to carry hogs and cattle across this lake, and it was joined in 1878 by the *Water Witch*, a shallow draft schooner used to catch terrapin.

In 1870, Lake Tulare was the largest lake west of the Rockies! Fed by the Kern and King's rivers, it was described in 1862 as extending for 60 miles north and south, being 36 miles across at its widest, and covering 800 square miles. Nearby were three smaller sister lakes—Buena Vista, Kern, and Goose Lakes. These great shallow, inland bodies of water sheltered an abundance of aquatic life, trout that weighed up to 40 pounds, perch, salmon, and sturgeon in quantities that supported a commercial fishing industry. Ducks and geese were abundant and great herds of deer and elk grazed along the seashores.

Thousands of Yakuts Indians lived along the shores, and on the islands. They fished from rafts and canoes made of tule reeds. Canadian and American fur traders, who trapped for beaver in the tules, kept the geography of the area a trade secret. Mosquitoes and tule fogs were so bad most of the year that the area was quite uninhabitable.

Seasonal variation in rainfall caused these lakes to wax and wane. Finally, a series of dry years shrank them considerably. In 1880 the state legislature passed an act permitting settlers to buy reclaimable land for \$2.50 per acre, \$2.00 of which was refunded when the settler spent it on levees or other reclamation.

This touched off a land stampede. Horses were fitted with planks so they could walk in the mud, and vast areas of swampland were drained and cultivated. The lake was doomed, and when the King's and Kern rivers were dammed, reduced to small reservoirs maintained by high levees. Yet last year the run-off from heavy snows caused this phantom lake to spread over 90,000 acres!

Great Salt Lake once had an area of 50,000 square miles, and was known as Lake Bonneville. The shrinking of this lake was more recent than usually supposed and correlated with the drought causing the decline of the Pueblo Indian civilization in the 1200's. More precise information is needed as to the exact times of greatest shrinkages. The decrease in the size of the Great Salt Lake still continues. Thus the big amusement palace built on the shore of the lake in 1925 is now over one mile from shore.

Though a detailed history of the Colorado Desert, in which the Imperial Valley, Salton Sea, and Coachella Valley are located, is beyond the scope of this paper it is of great interest to note that historian George Wharton James wrote:

Then came a flood which broke over the channel (of the Colorado River) and formed the course of what we call the Alamo River. Year after year it flowed, and maintained the fresh-water character of what had, in comparatively recent times, been an arm of the gulf, then a salt lake, then a dry basin. It was at this time that the fresh water shells were deposited, of which millions are now found. Possibly it was while the bed of the basin was dry that the aborigines first came and dwelt in it. If so this would account for their tradition that long after they occupied the region the floods came and drove them out.⁶

Considering another line of evidence, artesian wells once existed both in Santa Clara county and near the town of Artesia in Southern California. Hittel stated that there were 318 of them within a distance of six miles wide by fifteen miles long!⁷ The wells supplied about two million gallons in twenty-four hours. Artesia still had some functioning wells in 1918 when my family first moved into the area.

These wells ceased to be of practical value long before the population pressure became a factor. Thus again, Hittel wrote in 1863 "that many have gone dry because the soil is generally dried out." He mentioned the disappearances of Honey Lake on the plateau of the Sierra Nevada and Lake Elizabeth in the great Basin as further proof of the disappearance of surface water.⁸

A comparison of the rainfall in Northern California in the past 88 years is pertinent. In the 44 years from 1879-80 through 1922-23, the annual totals varied from 9.77 inches in 1917-18 to 43.72 inches in 1889-90 with 29 seasons having 20-37.20 inches. In contrast from 1923-24 until 1966-67 the variation was from 8.71 inches in 1923-24 to 36.59 inches in 1940-41, with only 18 seasons having a rainfall of 20 to 31.93 inches. Certainly the trend is still toward lower annual rainfall.

Relation to Biblical Statements and Flood Geology Concepts

As regards the Bible, the story of the Israelites' journey from Egypt has some statements unintelligible in terms of *present day* conditions. Thus, in Exodus 17:5-6, in response to the people chiding Moses for water, he was commanded to smite the rock at Horeb. "And there shall come water out of it, that the people might drink."

Under present conditions this would involve a double miracle, knowing where to strike the rock *and* creation of water in the rock strata. In terms of relatively recent aridity, that area still enjoyed much more rainfall than now, though *relatively* speaking it was already a desert area. Hence much more underground water and water pressure existed.

Later in the desert of Zin at Kadish in 1471 B.C., Moses was commanded to smite the rock and "with his rod he smote the rock twice: and the water came abundantly, and the congregation drank and their beasts also" (Numbers 20:10).

When the spies reported on Canaan they said, "We came unto the land whither thou sentest us, and surely it floweth with milk and honey and this (branch of grapes) is the fruit of it" Numbers 13:27). No one would describe the unirrigated part of Palestine in these terms now!

Even during the time of our Lord (4 B.C. to 33 A.D.), He and his disciples were castigated for going through the grain fields and eating the grain (called corn) on the Sabbath day (Matthew 12:1-2). Rainfall must have been heavier than now to cause such abundant fields of grain to grow without irrigation. It seems the decrease in rainfall has occurred since A.D. 100, but much more research is needed here to be exact.

Relative to Flood geology concepts, the decrease in rainfall seems to be correlated with two phenomena: (1) the drying up of such great lakes as Bonneville, and (2) the decrease in size of the glaciers and snowfields. Water in a sense begets water, and as the great inland lakes resulting from the Flood gradually dried up, the rain clouds generated by the moisture evaporating from inland lakes decreased, and finally were no longer formed.

Then the areas south of them no longer enjoyed rainfall from the storms generated in the vast lake and snowfield areas north of them. They became dependent on moisture from the west. This was **Phase I**, when the Pueblo Indians moved south from the Colorado Plateau.

Decrease in Glaciers Considered

Now the decrease in size of the glaciers is still continuing as a world wide phenomenon. When on our vacation in 1962, I hiked up to the 9000 foot level of Mt. Rainier, Washington, and had a good look at the Nisqually glacier. It was much smaller than even 40 years ago, according to records. Similarly the Paradise glacier had receded a lot, as could easily be seen from the many acres of terminal and lateral moraines. And in 1963, during a trip to Alaska, I was amazed to see how far back the Mendenhall glacier had retreated since measurements made fifty years ago.

Correlated with this decrease in the extent of the glaciers is the extent of the snowfields in the High Sierras. As may be seen from the historical records, the snowfields are not as extensive now as even in 1860. The effect on the size of the rivers of California is pronounced indeed. The King's and Kern rivers are not nearly as wide now, each spring following the snow melt, as they were about 100 years ago. Thus Hittel

mentioned in his *Resources of California* (1863) that the King's river was 80 yards wide where it left the mountains.⁹

With extensive snowfields on the High Sierras there would be much evaporation from them, in the spring and early summer, as they melted and decreased somewhat in size until replacement of snow the following winter. The prevailing westerly winds would carry this over the areas east of them, as clouds giving rain to a limited extent in these areas.

But as the snowfields decreased in size practically no rainfall from the storms originating in the Pacific would reach the inland areas. Moisture would all be precipitated as either rain or snow as the clouds moved higher and over the Sierras, leaving little if any for the valleys and mountain ranges beyond. This was Phase II when the Pueblo Indians had to move down into the canyons and build their cliff houses, such as are found in Frijoles canyon.

The above trend, from an abundance of water at the time of Lake Bonneville until there was so little rain that this whole area became a desert, has been known for a long time. What is remarkable is the *recency* of these events. Were it not for the Biblical record, I would be inclined by a study of the trends to believe that the Flood took place about 2500 years ago instead of over 4000!

Possible Research Project Listed

This study is but one of a series that should be made by Flood geologists. Just how recently did such great areas as Egypt, the Sahara, and Arabia become deserts? Orthodox geologists interpret these trends in terms of tens of thousands of years, mostly on the basis of Carbon-14 dating. Studies by some of our members have shown that these dates are not reliable.¹⁰

The recency of our Pacific Southwest deserts leads one to wonder if the deserts in other parts of the world may also be more recent than usually supposed. In terms of being a witness to the continual drying up of the world from the Flood, it leads one to wonder if the whole world may eventually become a vast desert?

The remarkable adaptations of plants to the Colorado desert might well be the subject of careful study. These plants include the mesquite, creosote bush, ocatilla, desert holly, and the very unusual cactus species shown by George Wharton James in full page illustrations, facing pages 222 and 224, in his book *Wonders of the Colorado Desert*, already referred to above. Whatever the origin of such plants, they most certainly could not have "evolved" their unusual adaptations in the short time since this area became a desert.

In recent prehistoric times, an area of over three thousand square miles was included in the

Gulf of California. The Colorado River then emptied near Pilot Knob, and in a few centuries formed a dam by the continual extension of its alluvial fan. The upper part of the Gulf became a great salt lake, following which it went through the stages of a dry basin, and then when the Colorado had another flood, a great fresh water lake.

This lake was 120 miles long by 30 miles wide. It was called Lake Cahuilla by W. P. Blake in his government survey report¹¹ of 1853. For many years the Colorado fed this lake by way of the Alamo River, but finally this ceased and the lovely lake became the desert it now is. At various times since then water has collected in this basin and later disappeared through evaporation.

At the very most, less than a thousand years have gone by since the existence of Lake Cahuilla. Accordingly, plants of the area, which are so well adapted now, must have been carried to the basin by seeds as it dried out. The whole problem of the origin of these desert plants is a fascinating one. Presumably they once grew under conditions of plentiful moisture, possibly in salt, marshes.

Thus the desert holly, *Atriplex hymenelytra*, is able to grow very well when given an abundance of water! A plant I transplanted into a pot in the desert and brought back to my greenhouse did very well when watered just as often as my regular flowering plants. It is still alive by one wall of my greenhouse where it gets an abundance of water.

Now many *Atriplex* species are salt marsh plants or grow in alkaline flats. They do seem to thrive on a high salt content in the soil or water. Perhaps then desert plants have been catastrophically selected by the relatively rapid conversion to desert conditions. Only those *already* having the potential for growing in the desert would survive; that is, those capable of tolerating a high salt level and having a deep root system. Transplantation studies of other desert plants to see if they actually grow well at high moisture levels would be most interesting in this connection.

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LETTER TO THE EDITOR

Your review of *The Flood Reconsidered** (March '71, p. 230) does not, I think, give a very clear idea of the book. May I add some comments?

Dr. Filby seems to have written this book as a "reply" to *The Genesis Flood*: it is an attempt at a compromise whereby Christians may believe in some sort of Noahic Flood without committing themselves to the revolutionary doctrines of Whitcomb and Morris. But it can scarcely be said that he has succeeded. On page 9 he writes: the authors (W. and M.) . . . have quite spoilt their book by trying, as George McCready

Price and others in the U.S.A. have done, to attribute almost all the geological ages to the Flood of Noah. The argument is thus reduced to absurdity.

Filby appears to accept the standard geological column as sacrosanct because it is drawn up by professional geologists, but when he comes to archaeology and Near East geology, he is prepared to back his own (amateur) opinion against a host of professionals.

The idea of a very extensive Mesopotamian flood was considered a possibility by archaeologists 40 years ago, but it has been steadily losing ground. Now the experts agree in dismissing the idea altogether, as is shown by the 1969 Collins New Bible Atlas (Edited by H. H. Rowley). Near East culture and civilizations are traced back continuously to 7000 B.C. without a break, and Noah's Flood is mentioned *only as a literary tradition or myth*.

Thus Dr. Filby's book is unlikely to convince

(Continued on Page 80)

*Editor's Note: Mention of this book on page 230 of the March issue of the *Creation Research Society Quarterly* was simply an announcement under the heading, "New Publications," and was not an actual book review. Readers will note that new books are frequently given this kind of cursory mention. It is gratifying to learn that the "New Publications" feature is read as evidenced by Mr. Watson's letter. His letter can now serve as a more extensive review of Filby's book. It is hoped that many of the volumes listed under "New Publications" will elicit expansive book reviews from qualified readers.

SOME ASTRONOMICAL EVIDENCES FOR A YOUTHFUL SOLAR SYSTEM

HAROLD S. SLUSHER*

Data concerning meteoric dust, the Poynting-Robertson effect, and disintegration of comets are shown to indicate much shorter ages for the solar system than those assumed by evolutionists. All of these methods are demonstrated to support ages much lower than 5×10^9 years commonly asserted by uniformitarians.

Introduction

Numerous arguments have centered on the age of the earth, the solar system, and the universe as a whole. Though the chronology of geological and astronomical events is based on many dubious assumptions and questionable ventures beyond the province of science, it is absolutely necessary for the evolutionists to try to establish a long chronology.

Most evolutionists believe that life began by a chance process in a shallow sea and that the world we see today came about by gradual and infinitesimal changes taking place over vast and almost limitless stretches of time. The evolutionist tries to eliminate problems which face his naturalistic scheme of origins by covering the whole issue with a veil of time.

Thus, long periods of time have become a tenet in the evolutionist's creed. For example, the physical appearance of rocks in the Franklin Mountains, El Paso, Texas, suggests the rapid deposition of sedimentary material and consequent movement of the rocks while in a somewhat unconsolidated or semi-plastic state. At one time a geophysicist of evolutionary faith viewed these rocks with me and agreed about the appearance of catastrophe. But, he resisted this ultimate conclusion by pleading for long time and gradual process in their origin.

Also, time is fostered as a rationale for the missing links in the evolutionary explanation of the fossils. While discussing the problem of missing links with an evolution-minded geologist, I asserted that the fossil links are still missing and probably were nonexistent. He reminded me that the links might have been present originally and then after subsequent erosion they are not to be found. I remarked that if the links could not be found, one could not know that they were present in the past. At this point an evolutionist places his faith in epochs of unknown time to solve his difficulties.

There are very basic difficulties and limits placed on working into the past. In the second law of thermodynamics, or law of entropy, physicists deal with the natural and continual tendency of the universe toward disorder. It is a study of deteriorative processes. The attempt to

work backwards into the past where deteriorative processes have dominated is fraught with many insuperable obstacles. Entropy of the universe is increasing, chaos is gradually replacing order. One cannot measure backward to the beginning by studying the decay processes, as has been shown by authors of past articles in this publication.

One of my college professors once remarked that, even if most or nearly all mutations are harmful to the organism, during a vast period of time a few beneficial mutations would occur and these would produce the upward progress of the organism. He overlooked the effect of lethal mutations upon the organism in the meantime. Given enough time, the evolutionist believes that the improbable becomes probable.

Dr. Harold F. Blum,¹ however, points out that an increased time span for a biological system increases the probability of reaction equilibria being set up in the chain and does not increase the probability of improbable reaction products being formed. Time cannot supply what the evolutionist needs even if it existed in the quantities he demands.

Yet in spite of strong evidence to the contrary, many people feel that if the earth is very old, evolution will somehow or other be the answer to the question of the origin of the universe and life in it. Therefore it is still quite pertinent to ask if things are as old as evolutionists claim.

Many telling attacks can be launched against the various methods of geochronology. Some of the very basic assumptions of these methods such as steady state existence of C-14 in the atmosphere, constancy of decay rates in the long radiological clocks, etc., seem to be erroneous. I will limit the present paper, however, to presenting several indicators which imply a rather short age for the Solar System. In pointing these out, I will follow the thinking of the scheme which is the basis of any dating system, namely: the measurement of some physical quantity produced in the time associated with some event (Q), the determination of the rate at which this quantity is produced (R), and, consequently, the calculation of the time involved in the production of the quantity (T), and consequent dating of the past event, where:

$$T = \frac{Q}{R}$$

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Meteoritic Dust Influx

The first of these indicators has to do with the influx of meteoric dust into the earth's atmosphere and finally down onto the earth's surface and into its oceans. This dust material is called micrometeorites since the particles are obviously very small. These particles are moving so slowly that they do not burn up with entry into the atmosphere and they settle very gradually to the ground.

The material may be collected in chemical trays, and then analyzed as to what is extraterrestrial. Only the mass of the magnetic meteoric material is used in the calculations, since stony meteoric matter cannot be clearly separated from terrestrial matter. Consequently, estimates of the influx of meteoric dust are very conservative since stony meteorites are considered far more abundant than iron meteorites.

Estimates of the influx range considerably with different investigators. The Swedish geophysicist, Petterson, estimates 14,300,000 tons of meteoric dust come onto the surface of the earth per year.² In five billion years there should be a layer of dust 54 feet in thickness on the earth if it were to lie undisturbed. This should, of course, put a tremendous amount of nickel (since it is a major constituent of meteorites) into the oceans.

Nickel, on the other hand, is actually a rare element in terrestrial rocks and continental sediments and is nearly nonexistent in ocean water and ocean sediments. This seems to indicate a very short age for oceans. Taking the amount of nickel in the ocean water and ocean sediments and using the rate at which nickel is being added to the water from meteoric material, the length of time of accumulation turns out to be *several thousand years* rather than a few billion years.

From the record of the lunar landings the accumulation of dust on the surface of the moon is very small (not much more than 1/8 inch).³ The moon moves through the same region of space that the earth does and consequently should have about the same influx of meteoric dust as the earth. N.A.S.A. scientists were worried that a lunar ship would sink down into the postulated huge amount of dust that should have accumulated on the surface in about 4.5 billion years of assumed time.

Also, in the "sea" areas, where the lunar ships landed, there should have accumulated more dust than elsewhere on the moon. Yet the amount of dust is amazingly small. What could have happened to all the dust?

Although more data and calculations are needed to substantiate this conclusion, from the absence of dust, we may deduce a short period of time for accumulation, and thus a young age for the moon. If the earth is about the same age as

the moon (as the Scriptures assert and as some astronomers suggest), then the earth is also young.

Poynting-Robertson Effect

A second indicator of youth (low entropy state) is given by the Poynting-Robertson Effect. Solar radiation has an important influence on the orbits of small particles, which have a large ratio of surface area to mass. Several points of consideration are significant.

First, there is a simple outward force from the sun due to radiation pressure. For particles with diameters of a few thousand angstroms or less, this force may exceed the gravitational attraction of the sun and blow them out of the Solar System.

Second, the solar radiation received by a particle is Doppler-shifted to cause an increase in radiation pressure if the particle is approaching the sun, and a decrease if it is receding; thus, changing elliptical orbits to circular ones.

Third, the angular momentum of an orbiting particle is progressively destroyed by the fact that it receives solar radiation, which has only a radial momentum from the sun, and re-radiates this energy with a forward momentum corresponding to its own motion about the sun. This produces a drag force on the particle causing it to spiral into the sun. This is called the Poynting-Robertson Effect.

The particle re-radiates energy it receives from the sun back into space as fast as it is received, thereby getting rid of momentum also. If it is radiating energy equally in all directions, this would not by itself alter either the direction or rate of its motion. After a loss of a millionth part (for example) of its mass, it would have lost a millionth part of its own momentum and the velocity of the remaining portion would be unaltered.

But during this time it would have gotten back the same amount of mass by radiation from the sun, so that its mass is the same as at the start, but its momentum is a millionth part less. Its orbital velocity will therefore be decreased by a millionth part. This effect is similar to that of the particle moving through a resistant medium. The orbit diminishes in radius and the particle moves into the sun along a very closely-wound spiral.

Robertson found that a particle of rock (density 2.7) one centimeter in diameter started at the earth's distance would fall into the sun in 10 million years. In a time of 2 billion years any masses of rock less than six feet in diameter within the earth's orbit would be cast into the sun. This "sweeping up" process would get rid of anything less than three inches in diameter inside Jupiter's orbit, and anything less than 1/10 inch in diameter inside Neptune's orbit.

Yet significant quantities of meteoric matter are known to exist! There are the particles grouped around the sun which reflect what is called the zodiacal light. A tremendous amount of matter is there! Although no attempt will be made here to determine a definite age for the Solar System using this information, it is possible to deduce a much smaller age than the evolutionist demands, when one considers that there is much particulate matter still circulating. Such would not be true if the Solar System was of great age!

Age of Comets Calculated

As comets travel around the sun, they are continually undergoing disintegration from gravitational and radiative effects of the sun and planets. This phenomenon may be taken as a third indication of young age of the Solar System.

Comets have been observed to diminish in size and even to break up. Debris for meteor showers remains along their orbits. Comets are generally of two types: short-period and long-period. Certain astronomers believe that comets, and the planets, came into existence about the same time. If this is true, then the lifetime of a comet can be estimated and the age of the planets accordingly determined.

Some Russian astronomers estimate the maximum life of a short-period comet is 25,000 years. Lyttleton⁴ estimates that no short-period comet can survive longer than approximately 10,000 years. Considering the "dynamical" effects of the planets in causing the long-period comets to be ejected from the solar system, Lyttleton estimates that only one in 10,000 could be left after 4.5 billion years. This does not take into account physical disruption of the comet which would further reduce this estimate.

Calculation of a short life for comets has led to a number of hypotheses to explain away the obvious corollary of a young Solar System. These attempts have ranged all the way from ejections of comets from the planet Jupiter to comets coming from the galaxy outside the Solar System. Certain astronomers have also suggested that there is something akin to a "deep-freeze" storage of comets outside the solar system toward the nearest star, which is continually replenishing the supply of comets to the Solar System.

Numerous attempts have been made to avoid the notion of youth, but as yet there is no real substantiation for any of these suggestions. Had the age turned out rather large by this method,

however, I assume that the evolutionists would have welcomed the results unquestioningly! Lyttleton makes the comment:

In the whole age of this system, a comet with average period 100,000 years would make 4.5×10^4 returns to the sun, and if at each one of these it lost only 1/1000 of its mass, through tail-formation and meteor stream production, the initial mass would have been more than 10^{19} times as great as the present mass-which at a minimum means several times the mass of the sun!⁵

When one adopts a naturalistic explanation of origins, he is soon driven to incredible extremes!

Other Indicators of Youth

There are other indicators for a smaller age in general, such as the destruction of the spiral arms of the galaxies due to differential rotation. Objects in the galaxies rotate in Keplerian orbits where the velocity decreases outward from the center of the galaxy. This causes a winding up of the spiral arms in a short time (relatively speaking). It is believed by some that the magnetic field maintains the coherence of the arms. However, the strength of the field seems rather small. Also, there is the rapid break-up of the star clusters. The helium content of the atmosphere is yet another interesting sign pointing to young age of the earth. Helium content of the atmosphere, its exudation rate from the lithosphere, and other considerations indicate a maximum atmospheric age of around 10,000 to 100,000 years.⁶

These are a few of the signs pointing to a young age of the earth and the Solar System. Much excellent work with regard to the age of the earth has been done already by Dr. Melvin A. Cook concerning the radiological "clocks." His work indicates that these clocks too may give very small ages for geological events when all external influencing factors are considered.

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WAS THE ORIGIN OF LIFE INEVITABLE?

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Authors of one widely used textbook of physical science imply that life was an inevitable natural sequel to the physical and chemical conditions of the early earth. An overview of enzyme chemistry, photosynthesis, and mathematical probability leads to the opposite conclusion—life was the result of careful planning and direct supernatural creation.

Misleading Emphases

Young people are being told that life arose from the dead materials by physical processes apart from the infinite wisdom, divine skill, and direct action of God's life-giving Spirit. All widely used biology textbooks and many other science books provide "bridges" which are supposed to span the gaps between non-living substances and living protoplasm.

Many authors assert that man may soon close the gap by achieving more thorough knowledge of biochemistry and processes involved. Few or no statements are included in such books to show the complexity of protoplasmic substances and processes, or to show the distinctiveness of life reactions.

Physical Scientists Say "Life Inevitable"

For the benefit of students and science teachers, an example is taken directly from a science textbook currently in use throughout the nation at college level. The following statement by Konrad Krauskopf and Arthur Beiser in their basic text, *Fundamentals of Physical Science*, illustrates the kind of misrepresentation commonly seen in educational literature:

Today the "mystery" of life no longer seems as impenetrable as it once did, and the transition from lifeless matter to living matter, though still hardly an open book, nevertheless seems more to be an inevitable sequel to the physical and chemical conditions that prevailed on the earth some billions of years ago than a supernatural event.¹

Note their phrase "... an inevitable sequel. . ." as though life had to happen under these certain circumstances. These authors must realize the grossness of their words, for they later admit a gap between fatty acids and fats; and between nitrogen bases, amino acids, and proteins (which can only be bridged by very complex essential enzymes).

Yet in their analysis of DNA, Krauskopf and Beiser again claim that a wide gap has been surmounted:

And given these latter compounds, most notably the nucleic acids which govern protein synthesis and are able to replicate themselves, the emergence of primitive cells, the basic biological units, becomes inevitable.²

Herein is the false implication that life should be defined in terms of nucleic acids and not much else.

The same authors attempt to bridge a gap and to supply mathematical acceptability in a statement which is both illogical and contradictory:

But although pure chance must have dictated which molecules came together and reacted to form a more complex one, when the reaction occurred, and where it did, the ultimate outcome seems not to have been a matter of chance at all.³

Omitting hosts of questions surrounding the "time" and "place" of the theoretical reaction discussed by these authors, how is it possible for random components to come together and synthesize any complex compound, which would not also be a chance product? Neither protoplasm, nor the complex interactions of its components, could have been the results of chance products combining, as these authors have glibly asserted.

Were Enzymes Inevitable?

It has long been known that biochemical reactions in cells can take place at the proper rate only in the presence of enzymes. Further, it has been found that enzymes are proteins which are quite complex, frequently involving a non-protein portion. They are essential for combining smaller components to form larger molecules and vice versa. Because of their size and complexity, no enzyme molecules were fully understood or synthesized until very recent years.

As an example of enzyme complexity, mention could be made of ribonuclease, which has a molecular weight of about 14,000 and consists of 124 amino acid of about 19 different kinds.⁴ How could this enzyme, which depolymerizes polynucleic acids of ribose type, have been synthesized with precision in the environment of the ancient "water pools" which evolutionists envision-static electricity, water, methane, and ammonia?

Like ribonuclease, most other enzymes are also highly specific for the chemical reactions they hasten and are quite numerous in a single cell. The structures and processes of one single cell are so intricate that they are claimed to be as complex as an entire oil refinery.⁵ Even the supposedly self-duplicating deoxyribose nucleic acid (DNA) requires the enzyme polymerase to control its own self-duplication!

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Digestion of fats requires the complex enzyme lipase. If man has not been able to discover the chemical components of numerous biological compounds, and if he can synthesize them only with difficulty in favorable laboratory conditions, should students be told that it is probable for these same compounds to have been synthesized in a supposed ancient environment, where there was neither isolation of materials nor selectivity of substances present? How likely is it that a lipase molecule (along with polymerase and all the other enzymes necessary to the processes of life) arose by chance in an ancient ocean?

Photosynthesis and Simple Sugars

It is well known to biologists that the only direct source of energy for cellular metabolism in protoplasm is derived from what is stored in simple sugar molecules such as d-glucose or d-fructose. Adenosine triphosphate (ATP) stores energy derived from the breakdown of such sugar molecules.

The source of simple sugar is the process of photosynthesis in the green parts (leaves, stems, etc.) of most plants. Much has been discovered about the process of photosynthesis, but many of its most intricate details are still unknown. Some of the details are as follows:

(a) Light furnishes energy to activate the ejection of an electron from the central magnesium atom of the chlorophyll molecule. This electron is used in reactions which split a water molecule.

(b) An electron from the water molecule passes through a complex sequence of electron carriers such as the cytochrome pigments. While the electron jumps along this series of electron carriers, energy is harvested as chemical energy stored in ATP molecules.

(c) The ATP is then used in another set of reactions to convert the carbon atoms of carbon dioxide molecules to the carbon atoms of simple sugar molecules.

All of the above reactions and apparently many more take place in small but intricate sub-cellular bodies known as chloroplasts.

The reverse process involving breakdown of sugar for energy has many breakdown stages and requires about 100 enzymes for the many stepwise reactions.⁶ Is there not evidence enough for an Intelligent Mind back of all this? Man has spent millions of dollars and many years trying to discover all details of the process of photosynthesis. Thus there is nothing particularly "inevitable" about the function of chloroplasts, or the origin of all these enzymes related to the synthesis and breakdown of simple sugars.

Certain chemosynthetic bacteria are able to obtain energy from oxidation of inorganic molecules or ions, and are thus not dependent on photosynthesis for their source of energy to build

sugar. No "evolution" has been observed from any of these to higher forms of life, however, and their origin from anything supposedly simpler is not demonstrable. Furthermore, the complex schemes by which energy is removed from inorganic chemicals, and used to produce fuel in each of these chemosynthetic bacteria, is a testimony to the Creator's genius.

Mathematical Improbability

The likelihood that molecules or atoms would ever come together at random in the precise order and arrangement to form essential components found in protoplasm (without the usual enzymes) has been calculated on a probability basis by mathematicians. The Swiss mathematician, Charles E. Guye, has computed the chance that joining amino acids would yield proteins having the properties of life.⁷ He found the odds were against such an occurrence by 10^{160} to 1. On the same basis, for spontaneous generation of life to occur on earth would require almost endless billions (10^{243}) of years. du Nouy has stated:

If the probability of appearance of a living cell could be expressed mathematically, all figures expressed on such a probability figure would seem negligible.⁸

The odds against the formation of life, or even a protein molecule, by random process show it to be far from "inevitable" despite erroneous statements of educators to the contrary.

Other Examples of Complexity

Protoplasm of organisms consists of very highly complex organic chemical compounds and structural organization. For example the "jelly" of a slime mold will remain alive if allowed to pass gently through a cheese cloth, but if forced through quickly, it will die.

The high precision of the exact amino acids of protein molecules can be illustrated by the harmful effects of X-rays which cause mutations of the genes. Such mutations are usually harmful to the offspring from such individuals.

An example of delicacy of structure is seen in the hemoglobin protein molecule common in red blood cells. Sickle cell type of anemia in man has been demonstrated as caused by a change in only one of the 574 amino acids which constitute the giant hemoglobin molecule.⁹

Conclusion

Although basic organic substances, including fatty acids, amino acids, and others of biological importance, are synthesized by use of static electricity in a mixture of water, methane, and ammonia; some of the raw materials are toxic or unsuitable for most organisms. Ammonia, for example, is particularly toxic to protoplasm. Only the most simple compounds of a very stable nature will be synthesized to any extent in this manner.¹⁰

All protoplasmic components, complex organic compounds, and processes show much greater order and complexity. This is evidence for overall control, planning, and specificity of cellular structures. It is more logical and reasonable to accept the Biblical account of special planning and creation by the omniscient God, than it is to assume that the origin of life was inevitable.

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YOUTH'S DILEMMA WITH ANSWERS FROM MODERN BIOLOGY

JOHN J. GREBE*

No thinking youth can fail to see that, man's mass behavior is most discouraging. A young person knows that man's history, according to ancient records up to the latest TV report, proves a general depravity that is replete with wars, sensuality, and plunder.

Many youths are faced with the stress of believing the generally expressed opinion that there is no guide and no truth for life; that we live under vicious competition which results in the survival of the fittest. Many youths thus have good reasons to put their hope in change alone, change for the better in the broadest and deepest sense.

As man's control over natural sources of energy increases—even to the point of tapping that potent source of energy used by the sun, the atom, the changes man can make become bigger and more pervasive. Thus young people learn that the most powerful nation of the world is forced to act not in obvious common law justice but in fear of the super bomb, the first release of which is now controlled by communistic sadists. They see that we, as individuals, must spend a large portion of our national and private resources of time and energy to protect ourselves against the negligence, the subversive cunning and the violence of man—even in our daily lives.

Youth Believe in "Try and Test"

In search of something new and better, youths turn to what they have been taught to be the source of all progress. They have been led to

believe in the inexorable drive of "spontaneous evolution." "Try and test." That is the way they have been told that evolution works—without a plan, without direction, without rules of the road and without specific objectives. This theory of naturalistic evolution has been taught in their books from the nursery and on through college. Unfortunately, evolution theory permeates the literatures of a majority of their churches too.

But the current indoctrination of our youth has failed. In a day when many religionists teach that the old moralist precepts are obsolete, it is the teaching of evolutionary faith instead that has become obsolete as a result of new and a million times as precise biological data. Top scientists in their fields have shown the errors of current evolution theory and youth can see the facts by turning to the field of biology.

"Evolution" Refuted by New Data

One of the most potent of the top scientists who testify to this is Dr. George Gaylord Simpson—head paleontologist of Harvard and American Chairman of the Darwin Centennial celebration of Chicago, 1959. Dr. Simpson and many other scientists have studied data gathered by Nuclear Magnetic Resonance instruments that measure the exact forces and distances between individual atoms in the DNA and which identify precisely the specific atoms, the kinds of bonds, their locations, and their interrelations.

They have seen that the DNA code of man, which determines his inheritance, is so far removed from that of any other mammal, that if man's flesh could have been "evolved" from that of any other living organism, it would more likely

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be the snake. Dr. Simpson has stated that man must have branched off far down in the evolutionary ladder because of this difference in DNA components, and Dr. Simpson even allows for possible creation by a Superior Power.

Implications of these new data are seldom discussed as professors, who know, realize that it makes their old suppositions, their life's work look ridiculous. It will take real work on the part of creationist scientists and independent citizens to convey correct implications of the new scientific findings of the new science of molecular biology. Or else we will have to wait another generation!

Simpson has explained also that the first human couple must have been produced by the equivalent of virgin birth from the same flesh. He acknowledges that the fantastically small changes favoring origin by evolution of one specific kind of life (man) could not be duplicated (at the same time and place) to yield the first mating pair. This is because the DNA of plants and man are all equally complex in their basic atom arrangement and sequential structure. Fantastic detail is built into them. Each atom carries many, points of information defining the inheritance of the offspring.

Dr. Bruce Wallace wrote a book in 1966 to bolster the shaky theory of evolution. He admitted that there is no proof of evolution; he admitted that there simply is no such evidence, nor can there ever be. He also unwittingly gave evidence for order, system, plan, direction and the utmost efficiency in the use of genetic material—all these being contrary to the basic tenets of evolution by chance and random actions. It is preposterous to believe, as evolutionists do, that organisms which are billions of times more complex and efficient than a jet liner were produced by random origin and assemblage of parts by hit and miss chances!

Evolutionary Improvement Impossible

In December, 1969, thirteen high ranking scientists each reported on what might be future evolutionary improvements of man.¹ None expected any improvements by chance! One scientist, Dr. Thomas H. Jukes, Assistant Director of the Space Sciences Laboratory at Berkeley, cast sly ridicule at the whole idea of chance improvements by proposing, in clever sarcasm, that population expansion be limited by mental control.

Human DNA contains about three billion base pairs on which random single points of mutation come about accidentally every one or two years. About 10,000 point mutations would be needed to allow for control of the discharge of semen by the mind. Accumulating about 10,000 point mutations by chance (all in the right places, directions, and kinds out of 10^{87} wrong ones—of

the three billion possible spots—without any undesirable changes elsewhere) would thus require at the very least 10,000 years. Furthermore, reproducing this variant in the mate would require virgin birth.

Dr. Jukes' point is clearly made! Most people know that doses of X-ray (which produce random mutation) can lead to the formation of deformity and imbecility but not to improved progeny. Thus actual improvement by mutation has been proven impossible during some 40 years of research studies on billions of fruit flies. One can then understand that the concept of evolution is a blind FAITH in random action.

Consequently, part of youths dilemma arises from the fact that evolutionary theory is the foundation for "the" one philosophy of life that is legal to teach in our public schools—naturalism. Even many church supported colleges teach Marx's and Lenin's assumptions as the supposed scientific basis for existence and behavior. With such educational training and philosophy, our youth cannot help but become aimless, drifting probers. At best they look for the subjective and undefined "common good." Some young people say, "Our test is what gets by—what survives." The question is not what is right, or wrong, but what can they get by with. Can you blame them? Remember they are taught that there are no absolutes, excepting the survival of the fittest. This has become their philosophy—their religion! They believe it is based on infallible science when in reality evolution was never more than an hypothesis, because it does not have the supporting evidence required to rate it as a possible theory. Nazis and Communists all live and act by this philosophy. Yet the concept of evolution precludes the comprehension of man as a fallen creation, in need of regeneration.

Important Personal Anecdote

I was fortunate to recognize that the haughty teacher who tried to teach evolution to me in grade school, in Germany, was a tool of materialistic thinkers. I do not know how many of Hitler's youths the teacher did inspire. But right here, in the United States, today, some of the nicest teachers, using government financed textbooks, dutifully expound random formation and survival of the fittest in the name of unfailing science.

This is in great contrast to what I found in the grade, high school, and college level upon coming to this country in 1914. Then I learned to share and enjoy the love of all natural things from inspiring teachers. I was left with a firm faith that all things are for the good of those who love the Creator. What a pity it is that youths are now brought to feel alone—even cut off from parents by the so-called "science" taught to them

by unwitting followers of materialistic philosophy.

It is here that personal action enters. Since this "evolutionistic bunk" called "science" has been totally discredited, we must see that the "inputs" of the educational process are changed. Computers have built-in barriers to inconsistent, incomplete and illogical inputs. The minds of our youth should not be expected to sort out the conflicting and internally incongruent idea of random chance beginning of fantastic order, lest they continue to respond with their nonsense probing of anything they please.

One Texas couple—the Mel Gablers—has been a stalwart example, showing what can be accomplished. They worked untiringly for eight years and wrought profound changes in the Texas state textbook situation, all because their son rebelled against evolutionary biases presented to him in

the classroom. This son is now an expert in computer logic.

The answer to youth's dilemma lies in the data of modern molecular biology. The complexity of cell structure and biochemical intricacy of DNA point unerringly to Divine special creation. Rather than pointing to an ethic of "survival of the fittest" by try this, try that, the knowledge of modern biology directs one back to the Bible, the "Wisdom of the Ages." Herein is direct knowledge gained about creation of life, the fall and history of man, personal salvation through Jesus Christ, and guidance for daily life.

Youth needs to experience this other knowledge—let's begin the task!

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ROCHE'S LIMIT AND THE PATTEN EPIC*

PHILIP H. HOFF†

The flood mechanism postulated by Patten¹ depends critically upon Roche's limit. Since Patten did not provide a reference to Roche, and since this writer is not an astronomer, a great deal of searching of the literature was necessary to establish that there indeed ever had been such a person as Roche who had calculated a limit.

Reference to E. Roche's work was found finally in the writings of J. H. Jeans.² The journal in which Roche published over 100 years ago is not available in the library of the University of California at Berkeley, if indeed it is still published.³ I am, therefore, indebted to Jeans for his re-derivation of Roche's limit.

Two Objections Raised

There are two aspects of Roche's formulation that combine to make it completely unsuitable for the purposes to which Patten tries to put it. The first aspect or objection is that the very involved mathematics required to compute Roche's limit are predicated on the presence of only two gravitationally interacting and perfectly spherical bodies.

Suppose that Mercury was indeed an "invader" from deep space. As it approached the earth, how many bodies would have a significant gravitational interaction? Of course the earth would be one and Mercury would be another. The sun would certainly affect the balance of forces sig-

nificantly, and the moon probably would also, depending on its position.

If the ice (which Patten postulates Mercury carried) were present as an icy satellite, it would be the fifth gravitationally interacting body. Thus on this basis alone it would be necessary to reject application of Roche's limit to the problem. If Mercury carried the ice in the form of rings, then the deep space invader would not be a perfect spheroid. This, combined with the multiplicity of interacting bodies, would invalidate the Patten hypothesis.

The second objection to Patten's use of Roche's limit is much more fundamental. To introduce this objection let us inquire whether or not physical intuition would suggest a dependence of the critical distance for fragmentation on the material of the fragmenting body and/or its size. If not, why do not our communications satellites fragment? Why doesn't everything on earth fragment?

All objects on earth are certainly within Roche's limit. Yet Roche's formulation shows no dependence on these factors. Is it in error then? The answer is that, as far as can be determined, it is not in error, since it was derived only for liquid bodies.

Other Aspects of Roche's Limit

This information answers the questions of dependence on material and size. The requirement that the bodies be liquid precludes the possibility that the fragmenting body has any tensile strength. It is because of differences in this quantity that we would intuitively expect one solid body to be harder to "tear apart" than an-

*EDITOR'S NOTE: See "The Ice Age Phenomenon and a Possible Explanation" by Donald Wesley Patten, *Creation Research Society Quarterly*, 3(1):63-72. May, 1986.

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other. The application of Roche's limit to an icy body is then valid to the same extent that it is equally easy to tear apart "chunks" of ice and water.

Stated in another way, in Roche's formulation, the critical distance is that at which the gravitational pull of the larger body just overcomes internal gravitational forces of the smaller body. Once these forces are cancelled, dissolution is immediate and automatic. If however, the internal gravitational forces of a solid planet were cancelled out, it would still be held together by its own tensile forces, which are generally thousands of times stronger than the gravitational forces tending to hold the planet together.

It might seem that a liquid body could not exist in the vacuum of space, but it is known that, if a liquid body is large enough, its cohesive gravitational forces can balance the outward pressure gradient.

Answering the question of whether or not Roche's limit should depend on the size of a liquid body, we note that unless there is adequate mass there never will be a body in the first place, and that all the larger body has to do is to reduce the smaller one to "chunks" of less than the minimum size in order to effect its complete dissolution.

Summary

In summary, it might be stated that, if Mercury or some other deep space invader with an icy satellite had swept close enough to earth, earth's gravitation might indeed have snatched the ice away, but that it would not have fragmented. It

might have gone either into stable orbit around the earth, or else into a decaying orbit, which would then have caused it to plunge to the earth, probably having fragmented somewhat due to the effect of air friction on the outside and thermal stresses between the outside and inside.

It might be noted in closing that Patten also invokes his "intruder" as the mechanism of mountain formation on the earth. This viewpoint has a subtle, inherent pitfall. It is now widely accepted by both creationists and evolutionists that the Americas were once joined to Africa and Europe. Many creationists think that Gen. 10:25 is the place where the Bible records the dividing of the original land mass. It should be noted that this was after the flood.

Thus, if the mountains were formed during the Flood even, as Patten supposes, the land masses would not have had the same orientation as they do now. Thus the arcuate form of the mountain chains to which Patten attaches so much significance⁴ would not be really significant at all. The land masses might have moved into their present positions after the mountain formation, and thus the present position could not be used to make any inferences about their formation.

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THE RELEVANCY OF ROCHE'S LIMIT TO THE FLOOD-ICE DUMP THEORY

LOREN C. STEINHAEUER*

The flood-ice dump theory of Patten is examined in view of objections to the use of Roche's fragmentation limit. A modified Roche's limit for rigid bodies with tensile strength is calculated and the tensile strength is found to be unimportant for an icy body of appropriate size.

One of the key axioms of the flood-ice dump theory of Patten¹ is the fragmentation of an icy body at a certain distance above Earth known as Roche's limit.² The theory suggests that after the demise of the icy visitor, the fragments interacted with the solar radiation and the geomagnetic field; were deflected along the magnetic lines, and descended over the magnetic poles in a period of a few weeks. The arrival of such a large quantity of ice in the magnetic polar regions caused the great ice age.

The strength of any theory depends on its ability to withstand legitimate objections that

may arise regarding its claims. One such objection to Patten's theory is the application of Roche's limit (an idealized construction) to a somewhat less than ideal situation. This work seeks to examine several facets of this basic objection and to present mathematical evidence for the fragmentation of an icy visitor near Earth.

Gravitational Tension Forces

Although the mathematical derivation of Roche's limit (as recorded by Jeans³) is somewhat involved, the basic physical idea behind it is relatively simple and in fact is exactly analogous to the lunar tide effect. Due to the inverse square law for gravitational forces, the part of Earth nearest the moon is attracted by a force 7% greater than the part farthest away. The

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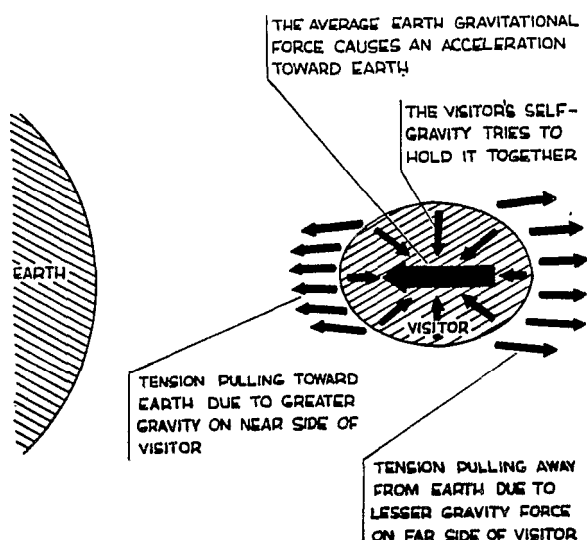


Figure 1. Forces on a visitor to Earth's gravitational

average force causes Earth to accelerate toward the Moon, which it does by virtue of its orbit about the Earth-Moon center of mass,

The 7% difference in the force serves to distort Earth, putting it in tension along a line through its and the Moon's centers. Earth's own self-gravitational force acts to hold it together in a near spherical shape.

Applying the analogy, an icy visitor experiences the same tension force due to Earth's gravitational field as does Earth due to the Moon's. The forces acting on such a visitor are shown schematically in Figure 1.

The gravitational tension in a body becomes greater and greater as it approaches Earth. At some critical distance, the tension force caused by Earth will overpower the forces holding the body together, and it will literally be pulled apart. In 1850, Edouard Roche² calculated this critical distance for the case of a binary star in circular orbits about the center of mass of the system. He assumed the larger star to be a rigid sphere and the smaller to be liquid.

Searching for equilibrium configurations, he found that if the centers of the stars are closer than 2.44* times the radius of the larger, no equilibrium configurations exist at all. The reason is that the smaller (liquid) star is pulled apart by the gravitational tension from the larger

*Roche calculated the number 2.44, but this was later refined by Sir George Darwin⁴ and found to be 2.4554. It is indeed ironic that Darwin was so familiar with Roche's limit, for it was Darwin who proposed that the Moon was born out of the Pacific Ocean and slowly spiraled out to its present position (tidal evolution theory⁵). His theory is incompatible with Roche's limit because the Moon would fragment if it were so close to Earth.

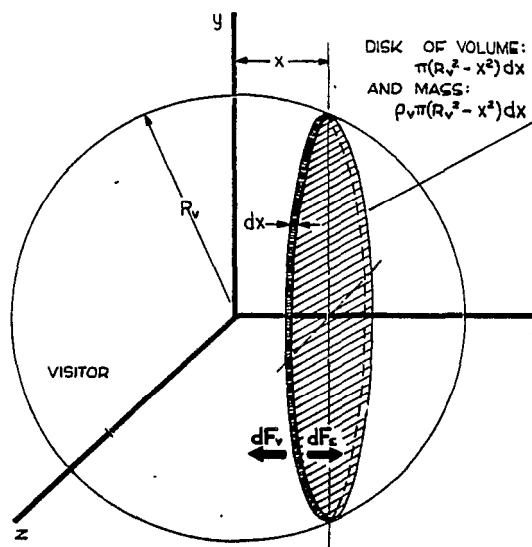


Figure 2. Geometry of a thin disk in a sphere subject to gravitational tension.

one. The critical distance he calculated has since been labeled "Roche's limit."

Refinements on Roche's Model

At first glance it seems somewhat improper to use Roche's simplified model in the flood-ice dump theory. The icy visitor of the theory is not a liquid, nor is it in a circular orbit around Earth. Thus it is appropriate to calculate a "modified Roche's limit" for a rigid spherical visitor with tensile strength.

Consider the configuration of Figure 2. If R_v , the radius of the visitor is somewhat less than r , the distance between the centers of Earth and the visitor, then Earth's gravity field in the visitor is essentially parallel to the x axis. It can be expanded in a Taylor series:

$$F'(x) = -\frac{GM_E}{r^2} + \frac{2GM_E}{r^3}x + \text{small terms}, \quad (1)$$

where F' is Earth's gravity force per unit mass, G is the universal gravitational constant and M_E is the mass of Earth. The first term on the right side of equation (1) is not of interest as it represents the "average force" which accelerates the visitor toward Earth. The second term (gravity gradient term) produces nearly all the tension. Considering only the gravity gradient term, the differential force on the thin disk of the visitor shown in Figure 2 is given by

$$dF_E = +\frac{2\pi GM_E \rho_v}{r^3} (R_v^2 - x^2) dx, \quad (2)$$

where r_n is the density of the visitor.

The visitor has its own gravity which pulls the other way on the disk,

$$dF_v = -\frac{\pi GM_v \rho_v}{R_v^3} (R_v^2 - x^2) dx, \quad (3)$$

which was found by adding the x-components of the differential forces on each part of the disk. The net gravitational force on the disk is the sum of the parts due to Earth and the visitor, $d\mathbf{F} = d\mathbf{F}_E + d\mathbf{F}_V$.

$$\mathbf{F}(x) = \int_x^{R_V} d\mathbf{F}; \quad (4)$$

i.e., all slices beyond x exert a tension force on the surface at x . The average stress on this surface is $F(x)$ divided by the cross sectional area of the surface. The maximum stress will occur at $x = 0$. If this maximum stress exceeds the tensile strength of the visitor, it will be pulled apart. Then the fragmentation distance, $r = r_f$, is determined by the condition; $\sigma_{\max} = F(0)/\pi R_V^2$, where $\sigma_{\max}$ is the maximum tensile stress of the visitor. Evaluating the integrals and solving for r_f gives

$$\frac{r_f}{R_E} = \left(\frac{2\rho_E/\rho_V}{1 + \alpha} \right)^{1/3}, \quad (5)$$

where α is the tensile strength parameter,

$$\alpha = \frac{3}{\pi} \sigma_{\max}/GR_V^2\rho^2. \quad (6)$$

As a point of reference; for a spherical body without tensile strength and of the same density as Earth, this calculation gives $r_f/R_E = 1.256$, which is less than Darwin's 2.4554. There are two reasons why Roche's fragmentation occurs farther out. His star, being a liquid, elongates along a line passing through its and the other star's centers. This elongation produces a greater tension in the liquid star than if it were spherical.

The other reason is that the liquid star is rotating as well as revolving about its partner. The rotation produces a tension exactly analogous to the tension in a spinning flywheel. These two additional tensions cause it to fragment earlier.

Objections to the Fragmentation of an Icy Visitor

Now that Roche's limit has been appropriately refined, the objections to the fragmentation phase of the flood-ice dump theory can be examined. There are basically four objections to the use of Roche's limit as applied by Patten. One is that the density of an icy visitor is not the same as the density of Earth. But applying the correct densities to equation (5) indicates that fragmentation will actually occur at $r_f/R_E = 2.30$, which is 33% farther out than if the densities were the same.

The second objection is that the interaction of two bodies (Earth plus visitor) is an oversimplification, and that the effects of the Moon, Sun, and planets invalidates the result. The response to this is that the gravitational fields of the Moon, etc., also have gradients and also produce a tension (though much smaller) in the visitor. Any

additional tension will only cause the visitor to fragment *sooner* than the model of equation (5) predicts. The model is conservative.

The third objection is that the body may not be spherical. Actually, a nonspherical body will experience a moment tending to align its longest axis along a line through its and Earth's centers. This will again cause it to fragment sooner than predicted. Roche's liquid body elongates into this configuration which contributes to its earlier fragmentation.

The fourth objection states that the tensile strength of the visitor will far surpass any gravitational tension force, and the example of the human body (which obviously doesn't fragment) can be cited. The response to this is to apply to equation (6) the tensile strength of ice.

Unfortunately, a strength of materials table won't list such an unlikely building material as ice. A conservative substitute, cast aluminum, is used for $\sigma_{\max}$. Then for a visitor of radius 250 km (roughly the volume of the ice dump⁶), the parameter α is 1.73 and the fragmentation distance is reduced by 39%. Using the actual strength of ice, it would scarcely be reduced at all.

The physical reason for the small effect of tensile strength is the nature of the gravitational tension forces. The analogy of a "tug of war" game is instructive. If there is only one man on each team, the rope will not break. But if a large enough number are on each team, the rope will break where the tension is greatest (in the middle) due to the cumulative force of all the men. In the same way, the gravitational tension exerted on a small body (such as a human body) is not very significant. But the cumulative gravitational tension in a large body may be very great.

Thus it is seen that in each case, the general trends predicted by Roche's calculation are carried over into the more refined calculation. A rigid icy body of the appropriate dimensions will fragment at a distance of about 2.30 Earth radii from Earth's center.

* * *

It is hoped that this paper is a satisfactory response to Dr. Hoff's questions. Regarding his comment on continental drift, in the author's opinion, this theory is hardly a foregone conclusion—but that is another study in itself.

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COMMENTS ON SCIENTIFIC NEWS AND VIEWS

HAROLD ARMSTRONG*

Echo-Location—This Time in Insects!

There is no doubt now that several kinds of creatures, such as bats, whales, and possibly some birds, practice "echo-location." Each sends out sounds and locates objects by the echoes. It has been suggested that the water beetles such as the Gyrinidae, have a somewhat similar technique. But instead of sound, they rely on surface waves on the water upon which they are walking.¹ It is said that the water beetle:

. . . appears to use capillary waves as a means of locating food. . . . The beetles are carnivorous, and they rapidly approach and seize a small insect that has fallen on the surface of the water and is producing capillary waves . . . the beetle might detect reflections of its own waves. . . . Whether . . . beetles actually use this form of echo-location has not been conclusively shown . . . their jerky swimming pattern may aid. . . . Pulsed waves help to avoid confusion. . . . They usually are used in echolocating devices. . . .

Is it reasonable to suppose that the way of life, indicated by these considerations, could have evolved? The ability to walk on the water, and to obtain information from the waves, had to be almost perfect before such behavior could be of any use at all. How, then, could these abilities have evolved gradually?

Indeed, the walking on water should not be considered a simple thing. If a "daddy-long-legs," e.g., should fall into the water, surely he does not walk on it, but rather becomes wet and is dragged down.

Do water beetles have feet of some special design? Maybe one of our Christian schools could investigate this question (although an electron microscope might be needed), and also see conclusively whether they do practice echo-location.

High-Fi Speakers and Insect Antennae

We are all at least slightly familiar with the elaborate horns which are often used in "high-fi" systems. It appears now that an insect has been doing the same thing for a long time.²

The male mole cricket, *Gryllotalpa vinaea*, it is said, constructs a horn leading out of its burrow, or rather, a pair of horns branching off from one tube. The shape of this horn assembly is "remarkably constant," and the walls are extremely smooth.

The cricket takes up a certain position and makes its sound, which has the purpose of attracting females. Not only do the horns serve

to amplify the sound, but there is another effect. Splitting the sound between the two outlets causes the assembly to be directional, the sound being concentrated in a disc-shaped region with an axis on the line joining the two outlets. The females apparently fly through the disc of sound and by hearing it are attracted to the burrow.

Electrical engineers will recognize here the principle of a directional antenna, two or more sources being arranged at suitable distances and worked together. Such tricks came into their own only as late as the 1930's, but the insects have evidently been using the principle for a long time. Indeed, I built such a thing, in which sound was split between two outlets, a few years ago, to demonstrate the interference of sound. Little did I realize then that the crickets were ahead of me.

One may well ask how such a structure could have evolved. The (proto-) crickets would have had to evolve, not only the proper vocal organs, but also the instinct (or whatever it is), to build a certain kind of burrow and to call from it. Unless the burrow were built "just so," it would not help at all.

How could it have evolved by Darwinian selection? Indeed, the same question could be raised about very many so-called "instinctive" actions. Such actions would have to be about perfect to be of any use at all. On the other hand, does it really mean anything to talk of mutations of instincts?

The importance of this kind of objection to evolution cannot be stressed too much. For if the nature of some creatures cannot be explained by selection, or mutations, then these are not universal causes. Every case must be examined on its merits.

Questionable Evolutionary Hintsights on the Cicada

Everyone has listened to the sound of the cicadas. Recently a curious fact about them has been discovered.³

Apparently two species, *Magicicada septendecim* and *M. cassini*, emerge at the same time and live in the same place. The sounds made by the two species, however, are in different ranges of frequencies; and the hearing of each species is most sensitive in the range of frequencies in which it makes its sound, and rather insensitive in the range of frequencies belonging to the other species.

Of course, some evolutionary significance has been sought for this peculiarity. It is suggested that the loud sounds drive away birds, which would otherwise prey on the cicadas, and that

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the two species, making sounds in different ranges of frequencies, can drive the birds away more effectively.

But it is not explained why one species, making a sound over a wider range of frequencies, would not have worked as well. Besides, while a loud blast of the sound might drive birds away, a milder blast, which does happen sometimes, would surely attract birds, which otherwise might not notice the cicadas. So the evolutionary explanation is not very convincing.

A creationist is not under any necessity to manufacture any such explanation. He knows that (if we may say so), God likes variety. Whether He created the two sorts of cicada in the beginning, or whether He let them diversify from one sort (for whether or not they are well considered separate species, they are surely both of the same 'kind,' in the Biblical sense), we can perhaps not now tell. But certainly He did it as seemed good to Him.

Ornithological Fraud—Connections with Piltdown?

Revelation of a deception which had gone unsuspected in ornithology for many years might be of some interest. It appears that a taxidermist at Hastings, England, had imported hundreds of foreign birds and claimed that they had been shot in the vicinity. Thus these birds became entered into ornithological lists.⁴

Apparently suspicion of what was going on (or had been going on), arose in 1939, but nothing was said until 1947. Even then the matter was hushed up, at the urging, it is said, of certain ornithologists. Finally it has come out in 1970.

It was remarked that Hastings is not far from Piltdown, and hinted that there might be some connection between the two deceptions. But there seems to be no positive evidence for such a suspicion. If, as Thompson has suggested, the Piltdown man was a fraud intended to bolster the theory of evolution, it is hard to see what it would have to do with the birds.

On second thought, is there a connection to the extent that the deception of the birds was presumably for the sake of notoriety? Do not many evolutionists seek just that—notoriety? Be that as it may, it is clear that official science has been guilty of deceptions as bare-faced as any fake miracle perpetrated by any most misguided Christian.

As for fraudulent evidence for evolution, when we consider whose cause is helped by propaganda against God's Word, and who is the father of lies, we are not surprised to find it.

Satellite DNA, an Evolutionary Problem

There are certain kinds of DNA, it now appears, which are not a long sequence of parts, but rather a short sequence repeated many

times.^{5,6} It is rather hard to see what purpose this serves. Author of the first reference asks,

... what possible function can be served by a DNA which consists of tandem duplication of a sequence of only six base pairs, and why should an animal such as the guinea-pig require some 10^7 copies of this short sequence in all its cells?

While the purpose is not at all clear, perhaps it might be suggested that, in view of the enormous redundancy which we often find in living creatures, maybe we should not be too much surprised at even ten million repetitions of a pattern. But the fact that such DNA exists may be used against any too mechanical theory of its action.

The second reference above gives the facts on which the previous comments were based. In the discussion, the author tries to bring in evolution, but, of course, it is purely hypothetical.

Evidence from these studies suggests that there is satellite DNA associated with the centromeres of chromosomes in various species. This DNA as apparently non-genic although it is not necessarily non-functional. It is localized in heterochromatic regions.⁷

It may function in the mitosis process and may be involved in the meiotic pairing of chromosomes, among other things.

The amount of satellite DNA varies widely between otherwise similar species of the genus *Mus* in the rodents.⁸ One species, for example, has only 2% while another has 10%. How could there be such wide divergency of DNA via evolution?

Mutations and "Non-Darwinian" Evolution

While it is hard to tell just what to make of it, it may be worth while to mention a recent note, concerned with mutations, their probability, and whether they will persist. The discussion is quite technical and mathematical; it is concluded that "... the reality of non-Darwinian evolution has yet to be demonstrated. . . ."⁹

It might be remarked that non-Darwinian, or any other kind of evolution, not only has not yet been demonstrated, but it never will be, if demonstration is meant in the strictest sense. For it is not like the theorem of Pythagoras, say; even if evolution had happened it would still be conceivable that it might not have done so.

To try to demonstrate such matters is like trying to demonstrate that the battle of Waterloo actually happened. Such things are matters of history, not of demonstration. What is intended, of course, is to demonstrate that evolution is not impossible. Maybe it is not; neither would it have been impossible for Columbus to have turned back, and not to have discovered the New World. But in fact he did not turn back; and in fact, we maintain, evolution never happened.

Instincts and Creationistic Insight

It is uncommon enough to see a real criticism of the usual evolutionary dogma in the scientific journals, and still more so in the popular scientific publications. I was especially surprised, then, to see in the *New Scientist* a letter which made some of the points that creationists have been making for some years.¹⁰

The letter written mentioned especially instincts in animals and their inheritance. He pointed out,

Instincts . . . would be represented by extremely complex chemical and anatomical arrangements in the central nervous system . . . it would not seem reasonable that any such pattern could have come into existence complete, as the result of a single mutation. How, then, is the inheritability of some instinctive behavior to be explained which appears only to be purposeful when complete?

It might have been added that the explanation would be much more difficult if the instinct has to be correlated with some special bodily features, as, e.g., in such cases as spiders making webs and bees honeycomb.

It may be that it is futile at this stage to try to explain instincts in terms of "chemical and anatomical arrangements"; for that leaves the arrangements to be explained. Maybe instinct is to be explained in terms of something not corporeal, or at least not entirely so; and the inheritance of bodily features in terms of something like instinct.

Be that as it may, it is clear that the undoubted inheritance of instincts is another in the myriad of difficulties which face proponents of the usual evolutionary dogma.

Dinosaur Revisions and the Flood

Everyone has seen pictures of dinosaurs in text books. Often the animals are shown half-submerged in water, only their necks and heads sticking out. Now it is argued that, for one well-known kind of dinosaur, at least, such a picture would be quite wrong.¹¹

This article concerns the brontosaurus. It is maintained, partly on grounds of their anatomy, that they were not semi-aquatic at all, but lived on dry land. Their way of life, it is suggested, may have been something like that of elephants. Like elephants, they may have been able to swim; but they did not live in the water.

If this is true, it is interesting as an example of the way in which, once someone has jumped to a conclusion, that conclusion can be carried along for years as if it had been proved. How many more notions are there, connected with evolutionary dogma, which are really unproved and arrived at only by speculation?

One remark in the article may be of interest. The author writes, "The sedimentology of the sauropod-rich Morrison formation offers more refutation of the supposed aquatic habits. Morrison brontosaurus quarries represent flood-plain deposits. . . ." So they did not bog down and turn into fossils, as the uniformitarian theorists would have it; a flood-plain is surely at least a mildly catastrophic thing. This fits in well with the contention of creationists that the remains which became fossils were indeed left by a flood.

Lupines, Lemming Burrows, and Little or No Evolution

Recent mention appeared in the magazine, *Grace*, of a discovery which, while now three or more years old, seems still to be of some possible interest.¹² It concerned the finding, in the Arctic regions, preserved in the frozen muck, burrows of lemmings, *Dicrostonyx groenlandicus* (*D. torquatus*) containing seeds of lupine, *Lupinus arcticus* Wats.¹³

The seeds looked so well preserved that some were planted, to see what would happen; and they did grow into lupine plants, said to be indistinguishable from those growing wild at the present. The seeds were estimated to be 10,000 years old or more, apparently by radioactive carbon. (We know that ages greater than 3,000 years or so, determined by these methods, are often inflated, but still we can grant that these seeds were quite old.) It is remarked, "Under normal conditions a lemming burrow would be poorly ventilated and seed stored in it would certainly be subject to dampness and mold during the summer months . . . we think it necessary to assume that some catastrophic event . . . caused the prehistoric tundra to be buried: . . ."

So once more we find that catastrophism is a necessary concept.

Incidentally, 10,000 years (if we accept that figure for argument), is one per cent of a million years. Here is a case in which we can compare plants of such an age with present plants; not fossils with plants, but plants with plants. Apparently they have not "evolved" at all. But if not at all in one per cent of a million years, surely not much in a million. Are they that perfectly adapted? What about supposed evolutionary changes during all that time?

Catastrophism and Geomagnetic Polarity

Although uniformitarianism seems still to be an official dogma among those who accept the evolutionary hypothesis, more and more it is becoming necessary to admit catastrophes. A recent article¹⁴ is a very good example of this.

Sediments from deep parts of the south Pacific were studied for magnetization and other fea-

tures, and the fossils also were studied. It is concluded,

Studies of deep-sea sedimentary cores . . . show that some volcanic maxima occurred when the geomagnetic polarity was changing. . . . Coincidences of faunal extinction and geomagnetic polarity changes may be explained by corresponding volcanically induced climatic changes.

In other words, there was once a catastrophe which exterminated whole kinds of creatures. But this is just what creationists have been saying. The volcanic activity might well have been related to breaking up of the fountains of the great deep.

As for the change in the Earth's magnetism, it has been suggested before that, since the Earth is the only solid planet to have much water, and is also the only one to have much of a magnetic field, these two things might well be related. If so, the great change in the disposition of the water, which happened in the Flood, might well have caused changes in the magnetism.

The great difference is that authors of articles such as the one being considered want to have the catastrophe much more than four or five thousand years ago. But problems with the conventional methods of dating may indicate ages much too great and these serious problems have been given in past C. R. S. Quarterly issues and elsewhere.

Icebergs and Glacial Gouge Marks, a Connection?

It is reported that a Canadian expedition, using specially insulated diving equipment, has been studying the action of icebergs scraping along the bottom of the ocean.¹⁵ One of the men concerned said, "... when you look behind, you find the sea floor gouged out as though a giant ploughshare had gone through."

Does this not suggest something about the gouge marks, etc., commonly ascribed to glaciers during the ice age? Might many of these marks not be due to icebergs scraping along the bottom? And if so, is it not reasonable to suppose that the scraping may have happened during the Flood?

It has been suggested before that many of these marks may have had to do with water. Moreover, it is often supposed that the ice ages, to such an extent as they happened at all, had something to do with the Flood. Certainly there was much freezing at some time in the past; the frozen mammoths, etc., attest to that.

Is it possible that the freezing occurred in conjunction with the Flood? Perhaps the supposed ice ages did not involve huge sheets of ice over much of the earth, but rather icebergs, sometimes floating and sometimes scraping the bottom.

Carbon-14 Fluctuation.

It is now being admitted that the amount of radioactive carbon in the atmosphere is not constant over ages, and that the variation is bound to affect dating.

A recent discussion of the variation (which is called there the Suess effect), says that, "atmospheric carbon-14 concentrations appear to have been within 1% of the natural level for only about 45% of the last 6000 years."¹⁶ (It might be remarked that it is an assumption that any level is "natural").

It is estimated that in 1890, 1950, 1969, 2000, and 2025, the specific activity due to the radioactive carbon in the air was (or will have been), reduced by 0.5%, 3.2%, 5.9%, 23%, and 50%, respectively.

What happens, of course, is that the carbon dioxide in the air is diluted by carbon dioxide produced by the activities of man. Much of this is from the burning of fossil fuels, but the burning of limestone to make cement causes an appreciable contribution.

There is also some discussion of possible effects on the climate of increases in the amount of carbon dioxide. The article is quite detailed, containing much information that might be of use to anyone interested in this matter.

It might be argued that enough evidence is now available to cast severe doubt on the whole notion of dating by radioactive carbon, unless some sort of check with actual history is possible. It is admitted that artificial activities can change the level of carbon dioxide. Is it not then possible that some natural activities might have done so in the past?

Continental, Drift and Paleomagnetism

Many people take continental drift almost as an article of faith nowadays. Creationists probably have nothing against the notion, except that many do not believe that there has been enough time necessary for continents to get anywhere if their (alleged) motion in the past was no faster than their motion (if any), today. Some geophysicists, however, have rejected the notion of continental drift on quite different grounds.

A recent letter by Jeffrey¹⁷ concerns this matter. He points out some reasons, based on the physics of the matter, for doubting whether the continents have ever drifted. There is some useful information here.

* * *

Most of the current arguments about continental drift have been based upon measurements of magnetization of rocks. But, at first the arguments were based on fossils; and, it may be that the fossils are returning to a place of importance in the discussion.

Some studies have compared fossil ostracods

from Brazil and from West Africa. Similarities are taken as evidence that those continents were once joined, and that “. . . drifting must have started later than Weldean times in the Cretaceous period. . . .”¹⁸

One reason why this will be of interest is that so many things seem to have happened toward the end of the Cretaceous period (according to the usually accepted scale of geological time). Something unusual must have happened then. It has been suggested before that, what is commonly called the end of the Cretaceous period, may have been the Flood.

* * *

Paleomagnetization, the magnetization of rocks, has recently been tried as a way of finding the dates of materials. Now one author asks, “Could paleomagnetism be wrong?”¹⁹

This question seems to have grown out of some studies concerned with (alleged) continental drift, in which paleomagnetic data were compared with fossils. It was concluded that “. . . paleontological and paleomagnetic evidences are thus in conflict . . . one or the other is wrong.”

One might point out that if we know that one or the other is wrong, but do not know which, then it is possible that they are both wrong.

Ancient Calendars Reported

Some recent findings, it is suggested, have shown that men have had some sort of notation, and a calendar, farther back than anyone had supposed.²⁰

Evidences found include pieces of bone, antler, or stone, on which are certain marks. These things are found all over Europe, and are assigned ages from 10,000 to 34,000 years. It is believed that the marks have to do with changes of the moon, and thus the objects were a sort of calendar. Dr. H. Movius, of Harvard, and Dr. R. Solecki, of Columbia, are mentioned as engaged in the investigation.

The newspaper account, it might be mentioned, had a heading: “Landmark in evolution”; and the article writer spoke of “. . . the evolution of human cognition.” But, of course, these findings provide no evidence that anything ever evolved. Evidently man has always possessed a sense of time and a capacity to construct calendars.

It is not clear how the ages mentioned were established. But we know of the tendency to inflate these ages.

If records of some sort have been kept so long ago (even allowing for inflated ages), that idea should make it easier to accept the chronologies in the Bible, especially in Genesis. Of course, those of us who believe strongly in inspired revelation have never been troubled on this matter, but it may be that this new evidence will help

persons who are not completely convinced.

It has been suggested before that the Biblical sections marked by “These are the generations of . . .” might indicate a record written by the man named. This seems especially likely when we compare it with the well-known ancient style of introduction, e.g., “This is the history of Herodotus. . . .” How interesting, to think that we may have notations actually made by the patriarchs!

Meteorites and Origin Speculations

Much talk has arisen lately from the finding, in a meteorite, of certain organic chemicals. Some reports even suggested that this showed there is life outside the Earth. Since, however, organic chemicals can be produced inorganically in the laboratories (so to speak), it would seem that this no more proves the existence of life outside the Earth than does the presence of iron in meteorites prove that there are blast furnaces out there.

Dr. J. M. Greenberg,²¹ at a recent meeting of the A.A.A.S., reported that he had frozen water, ammonia, and methane at very low temperatures, irradiated the resulting “dirty ice” (as the mixture was called) with ultra-violet rays; and then found in the result some fairly complex organic compounds “resembling,” it is said, “those of biological interest.”

It is believed that these materials, water, ammonia, methane, etc., may be common among the residual matter scattered in space. Sometimes it may be gathered into grains, maybe in conjunction with fragments of iron, rocky material, etc.

Naturally, this had to be applied to the “origin” of life; and Greenberg “. . . conjectured that the prebiogenic materials in the universe may be created independently of the formation of the planets.” If this remark is intended to suggest how life came into being, it is rather like the suggestion, by Lord Kelvin I believe, that life came to the Earth from other planets.

Is it not strange how things change? Yesterday the origin of life was to be sought (we were told), in volcanic pools or hot springs, today it is in the cold of interplanetary space. But the same sort of objection may be offered to either theory; viz. to explain the formation of a few organic chemicals is not even to begin to explain the formation of living beings.

On the other hand, in Him who is the same yesterday, and today, and forever,²² we find the answer to the problem of the origin of life—and to any other problems that we might encounter.

Apologetics and Physics

Christians are to defend the Faith once delivered to the saints against attacks made in the name of science falsely so called, and that science is nowadays usually biology. It was not always

thus as Berkeley in the 1700's, devoted much time to defending the faith against unbelieving mathematicians.

Those people would now be called mathematical physicists. They were following in Newton's footsteps (or so they claimed although Newton actually was a believing Christian and gave much thought to prophecy), and they wanted to develop nothing but mathematical explanations of things. Especially in his "Analyst" and his "Alciphron," Berkeley exposed the hollowness of these people's views.

Today concern of creationists is not so much with physics, as far as defending the faith goes, and yet specialists in the other sciences seem sometimes to take physics for an ideal. Physics is usually in the public view, and thus it will be judicious for us to notice what the public attitude is concerning physics. Two recent items in *Physics Today* may be of interest, both for the reasons already mentioned, and to suggest questions which one might ask about the branch of science in which he is interested.

One letter²³ commenting on the present apparent over-supply of physicists, argues that they themselves are partly to blame. The author complains of the "progressive trivialization" of research in physics, and suggests that "... most physicists seem utterly incapable of assessing the importance of their own work. . . ."

An editorial, in the same issue, commenting on an essay, "Science and Technology" by L. Mumford, concedes that physics, by imparting a mechanistic viewpoint, may have had a bad influence on biology.²⁴

This last point may be important to creationists. In the long run, the mechanistic dogma may be as inimical to Christianity as the evolutionary—maybe, in fact, they are only different aspects of the same dogma. But trivial research is surely not confined to physics.

Now a Christian should not be doing trivial research at someone else's expense. Indeed, he should probably not be doing it at his own expense; for, while triviality is probably not a sin, most would agree that it does not benefit a Christian, who certainly should be able to find enough important matters with which to occupy himself.

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THE DAY-AGE THEORY

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The Concordist Approach

Many Bible expositors have felt that the geological ages were so firmly established by scientists that it would be folly to question the adopted system. Therefore, some means of accommodating Genesis to geology must be devised.

The most obvious way of attempting this is to interpret the Genesis account of creation in such a way that the ages of geology correspond to the history of creation. Since the latter is given in terms of six "days" of creative work by God, the creation week must somehow be expanded to incorporate all of earth history from its primeval beginning up to and including man's arrival. Hence the "days" must correspond more or less to the geological "ages."

In fact, some writers have even built what they feel is a strong case for the divine origin of the Genesis account on the basis of an assumed "concordance" between the order of creation in Genesis One and the order of the development of the earth and its various forms of life as represented by the geological ages. That is, in both Genesis and geology, first comes the inorganic universe, then simple forms of life, then more complex forms of life, and finally man.

However, such a proposed concordance can hardly be pressed successfully for more details than that. Theories about the early history of the earth and the universe are still quite varied and indefinite. The very general order noted above is only what must be postulated for *either* creation or evolution and therefore proves nothing at all. That is, if the evolutionary ages really occurred, the necessary order must be from simple to complex.

Similarly if God employed a six-literal-day week of special creation, as the Bible indicates, again the order must logically be from simple to complex, with the inorganic world first prepared for plant growth, which was then created for animal life, which was then created to serve man, who was finally created in God's image. Since the same order is clearly to be expected in both cases, the fact that it thus occurs in both cases has no apologetic value whatever.

The day-age theory is normally accompanied by either the theory of theistic evolution, or the theory of progressive creation. Acceptance of the geological ages would seem to require one or the other. It can be shown, however, that neither theistic evolution, nor progressive creation, is

tenable Biblically or theologically, and thus the day-age theory must likewise be rejected. In this paper, nevertheless, we wish to consider specifically the day-age theory as such, showing that it is quite unacceptable on both exegetical and scientific grounds.

The Meaning of "Day"

The main argument for the day-age theory, other than the desire to obtain a framework corresponding to geologic theory, is the fact that the Hebrew word *yom* does not have to mean a literal day, but could possibly be interpreted as a very long time. Such usage would parallel usage in the English language also, such as when one speaks of Napoleon's day, or of Germany's "day in the sun." Specific Biblical warrant for such an interpretation is presumably found in II Peter 3:8 "... one day is with the Lord as a thousand years."

There is no doubt that the Hebrew word can be used to express time in a general sense. In fact it is actually translated by "time," 65 times in the King James translation. On the other hand, it is translated by "day" almost 1200 times. In addition, in the plural, *yamim*, it is translated by "days" approximately 700 times.

It is obvious therefore that the normal meanings of *yom* and *yamim* are "day" and "days," respectively. If a parabolic or metaphorical meaning is intended, it is made obvious in the context. In approximately 95% of its occurrences, the literal meaning is clearly indicated.

Furthermore, in those cases where a general meaning is permitted in the context, it is always indefinite as to duration. That is, it means "time" in a general way, such as the "time of adversity" or the "day of prosperity," never to a specific duration of time. It could as well refer to a very brief time, less than a day, as to a very long time.

In fact it would actually be very difficult to find even a single occurrence of *yom* which could not possibly be interpreted to mean simply a literal solar day, or which would have to mean a long period of time. Whenever the writer really intended to convey the idea of a very long duration of time, he normally used such a word as *olam* (meaning "age" or "long time") or else attached to *yom* an adjective such as *rab*, meaning "long," so that the two words together, *yom rab*, then meant "a long time." But *yom* by itself can apparently never be proved, in one single case, to *require* the meaning of a long period of time, certainly nothing in any way commensurate with a geologic age.

Now someone still might contend that even though *yom* never *requires* the meaning of a

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long age, it still might possibly *permit it*. However, the writer of the first chapter of Genesis has very carefully guarded against such a notion, both by modifying the noun by a numerical adjective—"first day," "second day," etc., and by indicating the boundaries of the time period in each case as "evening and morning." Either one of these devices would suffice to limit the meaning of *yom* to that of a solar day, and when both are used, there could be no better or surer way possible for the writer to convey the intended meaning of a literal solar day!

To prove this, we need only note that whenever a limiting numeral or ordinal is attached to "day" in the Old Testament (and there are over 200 such instances), the meaning is always that of a literal day. Similarly the words "evening" and "morning," each occurring more than a hundred times in the Hebrew, never are used to mean anything but a literal evening and a literal morning, ending and beginning a literal day.

As if that were not enough, the word is clearly defined the first time it is used. God defines His terms! "And God called the light Day, and the darkness He called Night. And the evening and the morning were the first day" (Genesis 1:5). The *yom* is here defined as the light period in the regular succession of light and darkness which has been continuing ever since as the earth rotates on its axis. This definition absolutely precludes any possible interpretation as a geologic age.

Objection with Respect to Sun

The objection is sometimes raised that the first three days were not days as we know them since the sun was not created until day four. One could of course turn this objection against those who raise it. The longer the first three days, the more catastrophic it would be for the sun not to be on hand during those days, if indeed the sun is the only possible source of light for the earth. The vegetation created on the third day might endure for a few hours without sunlight, but hardly for a geologic age!

Obviously, therefore, regardless of the precise length of the first three days, there was some source of light available to separate light and darkness, evening and morning. It was apparently not the sun as we now know it, but of course, God is not limited to the sun as a source of light. Whatever it may have been, the earth was evidently rotating on its axis, since evenings and mornings were occurring regularly for those three days. The placing of the two great "light-bearers" in the heavens need have no great effect on the rate of this rotation, so that the duration of days four and following was most probably the same as that of days one through three.

It is interesting to note that Genesis 1:14-19 further clarifies the meaning of "day" and "days"—"Let there be lights in the firmament of the heaven to divide the day from the night: and let them be for signs, and for seasons, and for days, and years . . . the greater light to rule the day, and the lesser light to rule the night. . . . And the evening and the morning were the fourth day." It would certainly seem that there could be no possible doubt as to the meaning of *day* after at least this fourth day.

In view of all the above consideration, it seems quite impossible to accept the day-age theory, regardless of the number of eminent scientists and theologians who have advanced it. The writer of Genesis One clearly intended to describe a creation accomplished in six literal days. He could not possibly have expressed such a meaning any more clearly and emphatically than in the words and sentences which are actually used. No judgment seems possible other than to pronounce the day-age type of exegesis as either careless or dishonest, nothing else than a "wresting of Scripture" (II Peter 3: 16).

But, not only is a six-literal day creation taught in Genesis, but also in Exodus, this time in the Ten Commandments, written on a tablet of stone by the very hand of God Himself (Exodus 31:18). The fourth commandment says:

Remember the sabbath day to keep it holy. Six *days* shalt thou labor, and do all thy work; But the seventh *day* is the sabbath of the Lord thy God, --- for in six *days* the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh *day*, and hallowed it. (Exodus 20:9-11)

Nothing would be more clear than that the six work days of God are identical in duration with the six days of man's work week. The basis for this very precise commandment is trivial and vacuous otherwise.

Furthermore the plural *yamim* is used here for six work "days" of God. This word is used over 700 times in the Old Testament and never, when used thus in the plural form, can be shown to mean anything other than literal days.

Length of "Day" Per Secondary Arguments

Two or three secondary arguments related to the word "day" need to be mentioned. It is frequently urged that since it is used in other than a strict literal sense in Gen. 2:4, it is proper also to interpret it that way in Genesis 1. This verse says, "These are the generations of the heavens and of the earth when they were created, in the *day* that the Lord God made the earth and the heavens."

At the most, of course, this verse could be rendered "in the time that the Lord God . . .", and we have already recognized this to be a

proper use of *yom* when the context so justifies. The context does *not* so justify in Genesis 1, as we have seen. On the other hand, this verse may itself primarily refer to the first day of creation when, as stated in Genesis 1:1, "God created the heavens and the earth."

Another argument has been that since God is still "resting" from His work of creation, the seventh day is still continuing. Then, if the seventh day has a duration of at least six thousand years, the other six days also may have been long periods. The so-called Jehovah's Witnesses, in fact, teach on this basis that, since the seventh day is 7000 years in length (including the coming millennium), each of the days is 7000 years, so that God's work week was 42,000 years long! Theistic evolutionists or progressive creationists would on the same basis have to say that God's rest day has been at least a million years long since the appearance of man on earth.

Such exegesis is strained, to say the least. The verse does not say, "God is resting on the seventh day" but rather, "God *rested* on the seventh day." In Exodus 31:17, it even says ". . . in six days the Lord made heaven and earth, and on the seventh day He rested, and *was refreshed*." It is recorded that God "blessed" and "sanctified" the seventh day (Genesis 2:3), but such a beatitude can hardly apply to this present evil age.

God's rest was soon to be interrupted by the "entrance of sin into the world, and death by sin" (Romans 5:12), so that He must set about the work of redeeming and restoring His groaning creation. As Jesus said, "My Father worketh hitherto, and I work" (John 5:17). Were it not for the weekly rest-day, recalling God's all-too-brief rest after creation, and now also commemorating His victory over death and the grave, "all the works that are done under the sun . . . are vanity and vexation of spirit" (Ecclesiastes 1:14).

Similarly the familiar verse in II Peter 3:8, "one day is with the Lord as a thousand years" has been badly misapplied when used to teach the day-age theory. In the context, it teaches exactly the opposite, and one should remember that "a text without a context is a pretext." Peter is dealing with the conflict between uniformitarianism and creationism prophesied in the last days. Thus, he is saying that, despite man's naturalistic scoffings, God can do in one day what, on uniformitarian premises, might seem to require a thousand years.

God does not require aeons of time to accomplish His work of creating and redeeming all things. It is even interesting that on the above equation—one day for a thousand years, or 365,200 days, the actual duration of God's work with the earth and man—say about 7000 years—

becomes about two and a half billion years, which is at least of the order of magnitude of the "apparent age" of the world as calculated by uniformitarianism!

Scientific Contradictions

Even if it were possible to understand "day" in Genesis as referring to something like a geological age (and it is not hermeneutically possible, as just seen), it still would not help any in regard to the concordist motivation. The very *vague* general concordance between the order of creation in Genesis and the order of evolutionary development in geology (and as noted earlier such a *vague* concordance is necessarily to be expected in the nature of the case and thus proves nothing at all) becomes a veritable morass of contradictions when we descend to an examination of details.

At least 25 such contradictions between Uniformitarianism and the Bible exist. Just a few will be noted:

1. Matter existed in the beginning, versus matter created by God in the beginning.
2. Sun and stars before the earth, versus earth before the sun and stars.
3. Land before the oceans, versus oceans before the land.
4. Sun the earth's first light, versus light before the sun.
5. Contiguous atmosphere and hydrosphere, versus atmosphere between two hydrospheres.
6. Marine organisms first forms of life, versus land plants first life forms created.
7. Fishes before fruit trees, versus fruit trees before fishes.
8. Insects before birds, versus birds before insects ("creeping things").
9. Sun before land plants, versus land vegetation before the sun.
10. Reptiles before whales, versus whales before reptiles.
11. Reptiles before birds, versus birds before reptiles ("creeping things").
12. Woman before man (by genetics), versus man before woman (by creation).
13. Rain before man, versus man before rain.
14. "Creative" processes still continuing, versus creation completed.
15. Struggle and death necessary antecedents of man, versus man the cause of sin and death.

The above very sketchy itemization shows conclusively that it is impossible to speak convincingly of a concordance between the supposed geological ages and Genesis. Entirely apart from the question of evolution or creation, the Genesis record is stubbornly intransigent and simply will not be accommodated to the standard system of geological ages. One must decide for one or the other—he cannot have both!

Theological Problems

The most serious fallacy in the day-age theory is that it impugns the character of God. It, of course, provides the basic exegetical framework for either so-called Biblical evolutionism or progressive creationism. The God described in the Bible (personal, omnipotent, omniscient, purposeful, gracious, orderly, loving) simply could not use such a process of creation as envisaged by our leading evolutionists, with all its randomness, wastefulness, and cruelty.

But Christians need to realize that the geological ages are to all intents and purposes, *synonymous with evolution*. When they accept the geological ages they are implicitly (though many do not realize it and would even deny it) accepting the evolutionary system.

The geological ages obviously provide the necessary framework of time for evolution. If the universe began only several thousand years ago, then evolution is impossible. It requires billions of years to have even a semblance of plausibility.

But, conversely, the only real assurance we have of the geological ages is the assumption of evolution. That is, since we assume evolution must be true (the only alternative is creation, and this is not a scientific concept!), therefore, we know that life and the earth and the universe must be extremely old.

The various geologic systems and epochs are identified, and even named (e.g., Paleozoic, Mesozoic, Eocene, etc.) on the basis of the fossils found in the rocks, interpreted and dated on the basis of the supposed "stage-of-evolution" of the corresponding faunas. Whenever any other identification or dating technique (lithology, radiometry, etc.) conflicts with this approach (as is quite often the case), these paleontologic criteria always govern.

Thus evolution is the basis for interpreting the fossil record. The fossil record is the basis for establishing and identifying the geologic ages. The geologic ages with their supposed fossil sequences provides the basic framework and the only "evidence" of any consequence for evolution. Here is one of the most classic and explicit examples of circular reasoning in all the sad history of metaphysical opposition to Biblical creationism. The Bible-honoring Christian somehow must realize that the geologic ages are merely one component in the whole evolutionary package. If he wants to have the framework geologic time), he must also accept the glue which keeps it together (evolution).

Again, however, even if one deliberately rejects or ignores the evolutionary implications of the geological ages, he must still face the massive problem of why God chose to use five billion years of chance variations, natural selection, geo-

logic upheavals, storm, disease, extinctions, struggle, suffering, and death as an inscrutable prelude to His creation of man right at the very tail-end of geologic time. "God is not the author of confusion." Yet, He is said to have surveyed the whole monstrous spectacle and pronounced it all "Very good!" (Genesis 1:31).

The Bible is quite explicit in teaching that there was no suffering and no death of sentient life in the world before man brought sin into the world (Genesis 3:14-19; Romans 5:12, 3:20-23; I Corinthians 15:21,22; Revelations 21:4,5; etc.). But if the rocks of the earth's crust were already filled with fossilized remains of billions of animals, and even of hominid forms that looked like men, then God Himself is directly responsible for creating suffering and death, not in judgment upon rebellion and sin, but as an integral factor of His work of creation and sovereign rule. And this is theological chaos!

Variants of the Day-Age Theory

Some expositors, acknowledging that exegetical honesty compels recognition of the "days" of Genesis as literal days, have tried two other devices for harmonizing the geological ages with literal days. One method is to suggest that the literal creative days were each separated by vast spans of geological time. The other is that the six days were six days of *revelation*, rather than *creation*.

As to the first theory, it should be noted that the six widely-separated days of creation included creation of the earth, heaven, the stars, sun and moon, oceans, lands, plants, fishes, birds, reptiles, mammals (all of them), and man. Seems like nothing much is left for the vast spans of time between the days, so why are they needed?

As for the revelatory-day theory, there is not a single word in the entire record that suggests such a thing. "Visions and revelations of the Lord" are frequently encountered in Scripture, but the writer always says so, when it is so. In refuting such a presumptuous idea, God Himself, in His own direct handwriting, said (Exodus 20:11), "In six days, the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day." (Why would He wish to rest on the seventh day, if all His actual work on each of the previous days consisted of about one minute of speaking to some unidentified vision-recipient?)

Now, in addition, all the previously mentioned scientific contradictions and theological fallacies apply in exactly the same way to the isolated-day and revelatory-day theories as they do to the standard day-age theory. We conclude therefore, that the day-age theory in any form is unacceptable Biblically, scientifically and theologically. It should be unequivocally rejected, and discarded by serious Christians.

ON EVOLUTIONISTS AND THEIR CLOAK OF IDEAS

*** A PARALLEL ***

JOHN N. MOORE*

Many of you remember (the Hans Christian Anderson) story of *The Emperor's New Clothes*, a penetrating account of the **fraud** perpetrated upon a pompous Oriental potentate by a pair of astute confidence men.

Playing upon the strings of human vanity and conceit, these knaves represented themselves as skilled tailors, who at a monstrous price, fashioned clothing for the high-born from a magical fabric woven only by them and visible only to persons of noble character, unsmirched reputation, and superior intelligence. The scoundrelly tailors, of course, neither wove fabric nor made clothes, but they performed convincing motions of weaving, cutting, fitting and sewing.

And so persuasive were they that the emperor paid them richly with gold for clothes which did not exist, for he feared that his character, his lineage, and his intelligence would immediately be condemned did he admit his inability to see

* * *

Evolutionists, in many scholarly disciplines, have represented themselves to the general public as skilled scientists, who are capable of fashioning a complete, **supposedly factual**, explanation of the origins of the universe, the earth, life, man, and man's culture. Yet, at a monstrous price in scientific methodological accuracy, evolutionists have used only *imagined* phenomena, such as chance, favorable mutations and supposed transmutations by natural selection, as a consequence of their acceptance exclusively of a naturalistic-materialistic world-view of reality.

Of course, evolutionists have *never observed* the change of one animal kind (i.e., starfish-kind, snake-kind, bird-kind, dog-kind, or man-kind) into another animal kind (or change of one plant kind, i.e., moss-kind, fern-kind, rose-kind, grass-kind, or corn-kind, into another plant kind), neither through their study of the fossil record, nor by means of any breeding experiments for over 100 years.

Nevertheless, evolutionists have attempted to make convincingly persuasive their explanation of origins by use of so-called circumstantial "evidence" involving study of (a) vestigial or rudimentary organs, (b) biochemical blood analyses, (c) comparative studies of external characteristics of organisms, (d) comparative studies of embryological stages of development, (e) imagined "reconstructions" of fossil remains, and (f) extensive extrapolations of so-called radio-

these magical garments. After a lengthy period, during which the spurious tailors enthusiastically **swindled** the emperor, a royal procession was held to exhibit the magnificent new clothes,

The common people, dutifully watching the pageant, were startled by the near-nudity of the undraped ruler, but, like the uppercrust of nobles, fearing that expressions of doubt concerning these wondrous garments would expose them to ridicule, they cheered the king and admired his nonexistent raiment.

The **fraud** was exposed only when a small urchin, unknowing of human vanity and conceit, cried out in a clear voice, "Why, he isn't wearing anything at all." (Emphases added)

-From Introduction in "The Emperor's New Clothes or Prius Dementat" by Professor Harry J. Fuller, *The Scientific Monthly*, 72:32ff. January, 1951.

* * *

logical dating methods as acceptable substitutes for direct observation and controlled experimentation.

But these circumstantial "evidences" involving degrees of similarity or likeness, *even when advanced with great honesty and scientific fervor*, **cannot** be considered as conclusive documentation of any **genetic** connections between any animal kinds, or plant kinds, either those mentioned above, or other kinds.

And, further, among evolutionists, there have been those so persuaded by their own patterns of thought, and evidently because of their deep devotion and conviction in support of the persuasive evolutionary explanations of origins, that **some** have been quite willing to perpetrate deliberate *fraud* and *hoax* for the benefit of the unlearned. This has been shown conclusively, for example,

(1) in studies of comparative stages of embryological development as found in the nineteenth century work of Ernst Haeckel, who *falsified* drawings to make embryos of dog and human being look alike; and,

(2) in imagined "reconstructions" offered for part of the supposed lineage of human beings by twentieth century researchers studying Piltdown "man," where clear *fraud* has been established.

It is true that many anthropologists, in the early 1900's, had questioned openly the validity of the Piltdown "find"; and *scientists* did finally expose the so-called evidence, but only after some 40 years of "fooling" the general public. Therefore, the unlearned might well be very

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reluctant to pay attention to evolutionists, today, because their claims of interpretations of data of blood analyses, radiological dating, and effects of gene mutations are under serious challenge in the 1970's.

Admittedly, leading evolutionists have been persuasive in presentation of their total evolutionary explanations of origins. So persuasive in fact that they have even intimidated, or "stampeded," many proponents of a theistic world-view of reality into accommodation. Some theists have attempted compromise of their logically consistent alternative explanation of origin of the universe, the earth, life, man, and man's culture involving the Creator God, in the persons of the Father, the Son, and the Holy Spirit.

Evolutionists have been so persuasive that some God-believing men have tried to reach compromise through the conceptual scheme of "theistic evolution". Some "theistic evolutionists" *imagine* even that the Creator God used death, disease, and expedient competitive survival of the "strong" over the "weak" as means for origin of diverse kinds of life and of man.

This high price of accommodation and compromise, to ideas about events and changes never actually demonstrated observationally or experimentally by evolutionists, has been paid by some God-believing men because of a sense of fear. Evidently they feared that their stature in academic circles, their very intellectual veracity, their high position as learned scholars before other men would be condemned and neutralized.

That is, many have feared loss of academic status if they explicated weaknesses, deficiencies, and inadequacies of the persuasive evolutionary explanation of origins; if they exposed evolutionists as most unsuccessful in their "study" of the cosmic past, when compared to physical scientists in their study of the cosmic present (i.e., mathematical, quantifiable work under the nuclear-atomic-molecular explanation of matter and changes associated thereto).

After a period of over 100 years since Charles Darwin made the evolutionary explanation of origins persuasively acceptable to the great majority of modern intelligentsia (during which time proponents of socialism, communism, existentialism, nihilism, humanism, and God-is-dead movements have vied for the minds of men and women of all ages), centennial celebrations in nation after nation have been held. Before great assemblies, spokesmen for the persuasive total evolutionary explanation of origins have assured their supporters that incontestable factual status can be given to evolution—from stellar and physical to biological and societal stages.

And the common people, the unlearned laymen, are presently recipients of consequences of

the ignominious compromises made by proponents of a theistic world-view of reality. The common people have dutifully watched the pageantry of meetings, watched television programs, read books, and listened to radio programs sponsored by evolutionists. Consequentially, children of the unlearned (and children of the learned as well) are accepting the belief that they are no more than animals, that is, matter in motion—and parents of these children are startled to see the lengths of sensuousness, licentiousness, and lasciviousness to which their offspring seem led by the "pied-piper" ideas taught in classrooms all over the world.

But the common people, like their intellectually learned peers, fear ridicule. Fearful that they have only limited capacity for veracity and understanding of the Word of God (from which many heard of and learned about the Creator God and His unchanging answers regarding origin of the universe, the earth, life, man, and man's culture), the common people have "cheered" the evolutionists. And most seem to accept unquestionably an imagined animal origin, and even admire the "beautiful" pictures in books, and on television, of actually nonexistent ancestors, and nonobservable changes between kinds of plants and kinds of animals.

Belatedly, the *fraud* of the persuasive total evolutionary explanation of origins is being exposed by a small remnant of scientists. They are true to inherent limitations of sound scientific methodology, *and* are kept firm in their acceptance of a theistic world-view of reality, which they heard of and learned about from the Holy Bible. The Holy Spirit has taught them, and Jesus Christ has redeemed them from condemnation for their sins.

These scientists, in spite of human vanity and conceit, are crying out to all who will hear, "Why the evolutionary explanation is totally without factual foundation." These remnant scientists are crying out boldly that the total evolutionary explanation is essentially a *fraudulently* perpetrated *hoax*, when presented as factual by those who follow, consciously or unconsciously, such men as Teilhard de Chardin and Sir Julian Huxley.

This is so because de Chardin and Huxley are just those men who have declared consciously *their desire* to persuade the learned and the unlearned into acceptance of their counterfeit, evolutionary humanistic substitute for the Word of God. (See Mark 13:5; II Tim. 4:3, 4; Col. 2:8; Rom. 1:25; and Eph. 4:14.) Yet, it is the Holy Bible, as the Word of God, that contains the only unchanging explanation for men of all centuries of the origin of the universe, the earth, life, man, and man's culture.

BOOK REVIEWS

Mimicry in plants and animals by Wolfgang Wickler. 1968. World University Library, McGraw-Hill Book Company, New York, Toronto. \$4.95.

Reviewed by Walter E. Lammerts.*

Here is a "must have" book for all biologists in our group who wish to get a detailed knowledge of the remarkable adaptations and complex correlations found in plants and animals. In his third chapter Wickler makes a categorical statement which denies our creationist position:

It is of course nonsensical to assume a gap exists in scientific thought and explanations and that this gap is proof of the existence of supernatural forces. In other words the teleologists—those who regard the strikingly refined adaptations of living organisms as proof of the existence of a purposive Creator—made a logical error; one can never prove or disprove the existence of a Creator in this way. (page 38)

Actually Wickler mistakes our case for it is not the "gaps" which convince us of a purposive Creator but the whole amazing universe from the intricacy of atomic physics on up to the relationships of the stars above us. Yet he confesses later regarding Müllerian mimicry:

All members of a defensive or inedible species should bear the same warning coloration. If, for example, some hornets were ringed in black and yellow, while others were in white and blue tartan, and yet others covered in silver spots, the predator would have to learn all three color patterns. The hornets would then have to sacrifice three times as many individuals as when all look alike and where the predator has to learn only one (coloration) pattern. If differences in warning coloration are senseless when different species are concerned, then it would be even more senseless within one and the same species. But just this ridiculous situation arises in the case of the polymorphic inedible butterflies of the genus *Heliconius* mentioned previously, (page 85)

Wickler presents in detail many remarkable examples of Batesian mimicry, i.e., edible animals looking very similar to an unpalatable or repulsive one. Such an edible animal has a false warning pattern or "acts a part," so is a mime. The first examples he illustrates are the harmless Diptera or flies which are mimics of wasps, bees, and bumble bees.

Polymorphism in butterflies provide many examples such as the beautiful *Papilio dardanus* in which many of the female morphs mimic various inedible butterflies in the genus *Danaus* and the Amauris group. The genetics of these remarkable morphs was worked out by C. A. Clarke and P. M. Sheppard. They found that the coloration patterns, whether mimetic or not, are genetically determined.

Furthermore, externally similar morphs can be developed in different ways genetically; that is by different combinations of genes. Modifier genes exist which *can alter their functional level* so as to *improve* the correspondence of mimic with the model. However, the effect of these modifier genes in one race is not carried over into crosses with another race. This means says Wickler, and I agree, that these genes were probably developed *simultaneously* in each gene complex.

Wickler makes an attempt to show how these remarkable mimics might have originated by natural selection by to appealing to mimetic weeds such as the gold-of-pleasure (*Camelina sativa linicola*), a Crucifer, which resembles the flax (*Linum usitatissimum*) in the family Linaceae.

But he starts out with a plant *already* superficially similar to flax as he admits, "and the gold-of-pleasure gradually developed this character (long stems), which is also occasionally present where it grows in isolation." (page 41) The really remarkable feature is the close resemblance of the seeds, such that a winnowing machine throws each kind of seed the same distance and so weed seed ends up with flax seed. Genetically the mimetic characters of the weed seeds are controlled by a complex of genes.

Does Wickler wish us to believe that this gene complex originated as a result of man's harvesting flax seed by a winnowing machine? I would be inclined to say that the gene variability potential already existed, and use of the machine merely acted as the agent to make this particular strain of gold-of-pleasure relatively homozygous for this special combination of genes allowing the seed to be thrown in with the flax seed.

Though selection is at work here as Wickler claims, *it by no means originated* the gene complexity making the selection possible. This is precisely the fault creationists find with natural selection generally—it cannot *originate* the *variation potential* making possible the presumed selection!

He also maintains that rye and oats were developed into useful grains by their mimicry of wheat. This is contrary to the rather detailed actual history of these grains.

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Under the heading, "Camouflage," he discusses a whole range of remarkable adaptations such as that of the mantid (*Hymenopus coronatus*) which looks so much like the pink flowers of a Malaysian orchid, that bees in search of nectar light on the mantid instead of the orchid, and so lose their lives.

Backward posturing is a favorite trick used by insects to avoid being caught by enemies. The Siamese lantern fly (*Ancyra annamensis*), shown on the cover of this issue, is a most striking example of this type of camouflage.

We are indebted to Mr. Edward S. Ross for this illustration. He is the photographer for the Academy of Science, in Golden Gate Park, San Francisco, California, and has many remarkable photographs of most unusual insects and other animals. Though Mr. Ross believes this animal developed as result of evolution by natural selection, he was most interested to know that a minority group of scientists no longer felt this explanation was adequate.

Another species which uses backward posturing most effectively is the hair streak (*Thecla linus*), which always squats on vertical surfaces with its head pointing downward, and the tail looking remarkably like a head, even to the point of moving the false antennae.

The whole book is most fascinating and it is amazing that men like Wickler cannot see that, as our Lord said,

Consider the lilies of the field, how they grow; they toil not, neither do they spin: And yet I say unto you, that even Solomon in all his glory was not arrayed like one of these. Wherefore, if God so clothe the grass of the field, which today is, and tomorrow is cast in the oven, shall he not much more clothe you, O ye of little faith? (Matthew 6:28-31).

In other words God is not some remote control being, but "in him we (and all creation) move and have our being." His original creation, with all its remarkable adaptation, has a built in potential for variation adequate to take care of most changing circumstances, except those of calamitous nature. God is constantly at work caring for and maintaining His creation, even though the world is no longer perfect.

He is not a God of the "gaps" as Wickler implies. The marvelous creation we see around us is an expression of God constantly at work maintaining and providing for his creatures. There is evidence for a counter force of evil of great power attempting to corrupt and destroy all that was once perfect and still is by and large mighty good.

The marvelous adaptations so interestingly described by Wickler help us to see the amazing

intricacy of God's mind. They also show that much of what we see in nature was created simply for the sake of variety, beauty, and may I be so bold as to say whimsical humor!

* * *

Biology: A Search for Order in Complexity. Prepared by the Textbook Committee of Creation Research Society. Edited by John N. Moore and Harold S. Slusher. Zondervan Publishing House, Grand Rapids, Michigan, 1970. \$7.95.

Reviewed by John N. Moore.*

This is the type of book sought by Science Consultant Richard Bliss of the Unified School District #1, Racine, Wisconsin 53404, who has stated, "What do I propose as far as curriculum in Biology and the Life Sciences is concerned? If I could carry enough influence, I would like to see a text that deals, not in the centrality of evolution, but rather in the centrality of universal order and the diversity of all living things." (before a session on "The Teaching of Evolution," First National Biological Congress in Detroit, November 8, 1970).

This book is a scientifically accurate alternate to currently available high school biology texts that contain heavy emphasis on biochemical and physical science principles of abstract explanation of matter and energy. In this book teachers will find a more customary observational and descriptive approach to foster student understanding of biology.

Also the more familiar biological systems approach, accompanied by the more usual treatment of plant and animal classification divisions, will seem distinct advantages of this book. Teachers will be more confident that students will learn biology as biology through use of this book.

Most unique is the entire Unit 9 on "Theories of Biological Change." In this Unit, a careful evaluation of organic evolutionary thinking is provided in the five chapters of "Weaknesses of Geologic Evidence," "Evidences from Similarities," "Early Man," "Problems for Evolutionists," and "Limited Variation Versus Unlimited Change."

The indisputable fact of careful writing to avoid bias is evident to the reader in the Preface, and in the very balanced writing about evolutionists and creationists in pages 147 and 149; 154; 201; 236; 241, 242 and 243; 320 and 321; 394; 398; 429ff; 434; and 458ff. In addition the Index

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affords multiple references to evolutionary theory and creation theory.

In the sense of the discussion of "origins" in the Preface, the above pages provide ample basis for maintaining that the Bible is the *only* unchanging "textbook" on origins of life, of plants, of animals, and of man. The authors have shown clearly that modern scientific knowledge can best be fitted to the rational explanation of origins found in the Biblical account of Genesis kinds, rather than the interpretation of evolutionary thinkers like Sir Julian Huxley.

Since the contents of this book may well be considered as satisfying requirements for textbook writing established by the California State Board of Education, an author's comment in a national scientific journal is apropos. After reference to the Scopes trial of about 50 years ago, the editor wrote, "However, a new dimension was added in the 1970 version (the California School Board hearing) — *scientist versus scientist*." (Editor Walter G. Peter III, *Bioscience*, October 1, 1970, page 1067). Of equal relevance is the closing statement by Dr. Duane T. Gish in another national scientific journal,

What we are pleading for is a *balanced* presentation in our schools, with a full disclosure of the evidence, regardless of which theory it favors. The dogmatic fashion in

which evolution is usually taught in our schools and universities amounts to indoctrination and is as much the teaching of religion as if the theory of origins were restricted to the Book of Genesis. (*The American Biology Teacher*, November, 1970, page 497)

Commenting on this new high school biology textbook, Professor W. R. Thompson, F. R. S., has written, "This is certainly a splendidly produced work with an exposition so reasonable that only the most extreme evolutionists can oppose it." Dr. Thompson was formerly Director of the Commonwealth Institute of Biological Control, Ottawa, Ontario, Canada.

And two articles containing references to possible educational impact of this biology textbook were published at the beginning of the year, namely, "Creationism" in *Scientific American*, 224(1):46 and 47, January, 1971; and "Darwin Shares with Eve and Adam" in the British journal *Nature*, 229:6 and 7, January 1, 1971.

As the publisher's circular concludes, "An exciting breakthrough for biological study in the classroom in the 70's." Or, as Dr. Thomas Barnes wrote in the "Acknowledgements," "Because of this cooperative effort, *Biology: A Search for Order in Complexity* is a distinctive contribution to the textbook field as a service to academic freedom in American education."

ERRATUM

Clifford L. Burdick has written the editors that he inserted the wrong quotation for James Van Allen in his paper, "The Structure and Fabric of Geology," *Creation Research Society Quarterly* 7(3):146 (December, 1970). Instead of the quotation beginning "The postulated environment . . ." the following quotation should have appeared:

At higher altitudes . . . up to the points at which the counter jammed, it showed counting rates more than 1000 times the theoretical expectation for cosmic rays. From the rate of the increase and the length of the periods of jamming, we judged that the maximum count probably went to several times this level.

(Continued from Page 54)

those who have studied the Old Testament in the "light" of modern scholarship. He seems not to realize that *all* modern science and scholarship is bedeviled by blindness at the fact of the Flood, so that they misinterpret *all* the phenomena—whether in geology, archaeology, or anthropology.

When quotes II Peter 3 (page 132) he actually omits verses 5 and 6 which state so clearly that the whole globe was inundated; and he makes no attempt to answer the other six Biblical arguments for a universal Flood as given in Chapter 1 of *The Genesis Flood*. This is not to deny that Filby's book has some value, but the strength of a chain is its weakest link. He traces the Flood story through many lands and many

peoples; but, because he never challenges the basic presuppositions of Darwinism, he gives no solid grounds for accepting the story as fact.

Taken as a whole, Dr. Filby's book shows how untenable is a middle position on the Flood: we must *either* accept Genesis 7-9 at its face value or agree with the critics that it is pure legend. Any other view is "mixing more or less Science with more or less of Scripture, to produce a result more or less absurd."

Yours sincerely,
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CUMULATIVE KWIC SUBJECT INDEX FOR THE CREATION RESEARCH SOCIETY QUARTERLY, VOLUMES 1—7

NIGEL MCMURRAY*

Construction of the KWIC (Key Word in Context) Index

Significant words in the titles of all articles (excluding review articles and editorials) are noted:

e.g. "Streamlining STRATIGRAPHY"

e.g. "On the ORIGIN of the UNIVERSE."

These key words are regarded as representing the contents of the articles. They are capitalized and arranged centrally and alphabetically in the context of the title of which they are part. Bibliographical details follow the title.

How to Use the KWIC Index

Think of descriptive words that are generally used in the literature of the subject in question. These can be general (e.g. PLANT) or specific (e.g. POTASSIUM-ARGON DATING METHODS). Locate these words in the capitalized alphabetical sequence in the Index, which will reveal articles that have appeared in issues of the *Creation Research Society Quarterly*. Title of the article should give a reasonable idea as to the depth of treatment of the subject that is given.

If no entries are found, or those that are found are of little interest, then think of near synonyms (e.g. there are no entries under the FLOOD-try CATASTROPHISM), or think of terms that are more general and/or more specific (e.g. articles on GENETICS could also be traced under BIO-CHEMISTRY and DNA).

Points to Note

Titles have often been abbreviated or modified because of space limitations. Bibliographical details are given as follows: volume, part (in parentheses) and page number, e.g. 2 (3):36. *N.B.* The first issue was not given a part number, and is denoted in this Index as: (a).

Since all articles are on CREATION and EVOLUTION, these key words have only been incorporated in the Index when the article is of a very general nature, or the title did not contain any other significant terms.

A

- Fossil man: ancestor or descendent of ADAM?, 6 (4):172.
- Remarkable ADAPTATIONS, 2 (1):14.
- More extraordinary ADAPTATIONS, 2 (3):11.
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*This Cumulative Index, covering Volumes 1-6, was prepared by Mr. Nigel McMurray, who is currently employed at the National Lending Library for Science and Technology in Yorkshire, England. He has the B.Sc. degree in Biology and has studied in librarianship. Entries for Volume 7 were added by Managing Editor John N. Moore.

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LETTERS TO THE EDITOR

Enclosed is a copy of the resolution as passed by the Columbus Board of Education. We plan to suggest to other school systems that they adopt a similar resolution.

Very truly yours,
 PAUL R. LANGDON, Member
 Columbus Board of Education
 Columbus City School District
 270 E. State Street
 Columbus, Ohio 43215

COLUMBUS PUBLIC SCHOOLS
 MARCH 16, 1971

TO THE BOARD OF EDUCATION:

WHEREAS, an objective of education is to provide students with the known facts associated with subjects taught as part of our education curriculum;

WHEREAS, students are encouraged to develop the freedom of inquiry in forming their conclusions in regard to fact and theory;

WHEREAS, students should be helped to understand that a theory, in itself, is an idea that is based upon tangible evidence, and that theories are changed or modified as new information becomes available, and as such cannot be assimilated as scientific fact;

WHEREAS, theories concerning the origin of life or the universe entail implications relating to

personal beliefs under the establishment and free exercise provisions of the First Amendment;

NOW, THEREFORE, BE IT RESOLVED, that the Board of Education of City Schools of Columbus, Ohio, hereby encourage teachers in all fields when considering or teaching the origin of life or the universe, to present all major theories, including those of creation and evolution, that these be stressed as theories and not as established fact, and that they be accorded proper treatment in time, emphasis, and attitude, to protect the rights of all students,

BE IT FURTHER RESOLVED, that Columbus Public School Libraries provide an adequate amount of reference material that lends support to each theory and that teachers should supplement presently adopted texts with materials which attempt to provide unbiased information about the various theories of the "origin of life and the universe, and that the curriculum committee of the Columbus Board of Education consider textbooks for future adoptions in light of providing information in regard to the various theories of the origin of life and the universe.

THE CURRICULUM COMMITTEE

Mr. Paul R. Langdon moved, seconded by Mrs. Virginia E. Prentice, that the above resolution be approved. AYES: 6; NOES: 0.

* * *

Comments on "Stellar Evolution"

In the June, 1970 issue, George Mulfinger published a "Critique of Stellar Evolution." It is my opinion that Mulfinger has in several respects unfairly denigrated the large amount of evidence in favor of stellar evolution. The following detailed comments are confined to the single question of star formation, on which his objections were most specific.

I see two things wrong with Mulfinger's entropy calculation. First, he considers the contracting cloud to be an isolated system, which it is not. The surrounding interstellar medium will move into the space vacated, and its entropy will also change; this must be added in to find out whether the total entropy of the universe was changed. The first elementary calculation would appear to strengthen Mulfinger's argument, since the expanding surrounding gas is cooling and also loses entropy.

This all goes to show that an ideal gas with a fixed number of degrees of freedom perhaps should not be expected to undergo cloud formation—although I wouldn't bank on that conclusion because the role of energy and entropy carried away from the condensing cloud by radiation has not yet been properly considered.

My second objection is that, if upon cooling one or more degrees of freedom are frozen out, the total entropy *can* be increased by cloud formation. And this is precisely what is happening: the interstellar medium in general is highly ionized, but the clouds are largely neutral. Binding an electron and proton together into a hydrogen atom reduces the available degrees of freedom, and at the same time raises again the problem that the recombination radiation can carry entropy away from the scene of condensation. Until he has taken this radiative transfer into account, Mulfinger cannot claim to have shown that the total entropy is decreased.

Going on to his "calculation of outward push," I again object on two grounds. First, I think his idea of "total force" is meaningless—he gets it by adding forces which point in different directions as if they were scalars. He should be asking instead for force per unit *volume* on matter near the edge of the cloud. There will be gravitational force, Gmp/r^2 , inward and "pressure force" ($-dp/dr$) outward.

No matter how you look at it, he has miscalculated the latter. If he consistently followed his isolated-cloud model, he would have the pressure suddenly dropping from a finite value inside to zero outside, and the outermost layer would

have infinite acceleration—meaning that the boundary would quickly start moving out in shock-wave fashion at a speed on the order of sound.

On the other hand, if he would admit to a surrounding interstellar medium, there would need be no pressure gradient at all, except as it might arise dynamically during the compressions. That is, the gravitational force may just as well be quite *unopposed* in at least initiating collapse. Whether collapse then continues hinges on the previous arguments about entropy.

Sincerely,
DONALD HALL
Associate Professor of Physics
Walla Walla College
College Place, Washington 99324

A Reply to Donald Hall

Hall apparently feels that it would be more suitable to choose our thermodynamic system such that it would include at least part of the hot surrounding cloud. Let us pursue this idea, and in so doing demonstrate that we then have an even stronger case against star formation theory than is afforded by the entropy calculation for the condensing cloud alone.

We may choose our system to include as much of the surrounding material as is desired. We could place our boundaries several light-years out from the condensing cloud, or even, for that matter, in principle, take the entire galaxy or universe as our system.

Now, allegedly, what must happen, if star formation theory is at all valid, is this: As the outer cloud expands and gradually compresses the inner cloud, it functions as an entropy sink and removes entropy from the inner cloud. Entropy supposedly can "flow out" from the colder cloud to the hotter, such that the quantity ΔS for the inner cloud will be negative, while the ΔS for the outer cloud will be more than sufficiently positive to offset it. Superficially this might appear to be a workable scheme for evading the consequences of the Second Law, but upon closer scrutiny it is seen to be quite unrealistic.

Prigogine, a Belgian thermodynamicist, has analyzed just such a situation as this—a system consisting of two parts, the second surrounding and enclosing the first. (See I. Prigogine, *Introduction to Thermodynamics of Irreversible Processes*. Third Edition. Interscience Publishers, New York, 1967, pp. 16, 17. See also E. L. Williams, *The Resistance of Living Systems to the Second Law of Thermodynamics*.) Since irreversible processes can occur in either part of the

system, Prigogine states that it is not possible for one part to serve as an entropy sink for the other:

We can therefore say that "absorption" of entropy in one part compensated by a sufficient "production" in another part of the system is prohibited. This formulation implies that in every macroscopic region of the system the entropy production due to the irreversible processes is positive. The term "macroscopic region" refers to any region containing a number of molecules sufficiently large for microscopic fluctuations to be negligible. (Prigogine, *Loc. cit.*, p. 17.)

No one, surely, would question the fact that the inner cloud—roughly one light-year in diameter—is indeed macroscopic. The only permissible entropy decrease allowable within the inner cloud, then, would be in tiny localized regions involving only a relatively small number of molecules. And if such a limited ordering should occur at one point in a moment of time, the order would quickly give way to disorder again the very next moment!

Let us recall, however, from the entropy calculation in my paper that the *entire inner cloud* would have to be decreasing in entropy to the extent of at least 30 e.u. per mole! In what type of Alice-in-Wonderland universe might this be expected to happen? Surely not in the real universe in which we find ourselves.

Thus the thermodynamics of the situation is seen to militate decisively against the possibility of star formation. It is not without good reason that Burbidge has lamented, "If stars did not exist it would be easy to prove that this is what we expect." (L. H. Aller and D. B. McLaughlin, *Stellar Structure*. The University of Chicago Press, Chicago, Ill., 1965, p. 577.)

Hall's next suggestion (concerning the freezing out of one or more degrees of freedom) betrays either a lack of familiarity with Spitzer's star formation theory, or alternatively, an ill-advised desire to second-guess Spitzer. If the latter is in fact the case, his second objection is directed against Spitzer rather than myself. As Spitzer envisions it, the "freezing out" has already been accomplished *before* the condensation that he outlines begins, whereas we are considering the entropy change *during* the condensation. In setting up his initial conditions he specifies:

We further assume that within the sphere the temperature is approximately a hundred degrees, *with the hydrogen essentially neutral*. Outside the sphere the hydrogen is ionized and at a temperature of about 10,000°K. (Emphasis added; See R. Jastrow and A. G. W. Cameron, *Origin of the Solar System*. Academic Press, New York, 1963, p. 43.)

Obviously little or no recombination is possible in hydrogen that is already essentially neutral.

The question of whether entropy can be carried from one location to another by radiation is an interesting one. If such is indeed possible, the problems encountered by the condensing cloud will be still further aggravated by entropy radiating in on all sides from the hot cloud. Clearly, the radiation from the 10,000°K cloud will be far greater than that from the 100°K cloud.

Spitzer apparently attempts to head off this problem by specifying that initially the opacity of the inner cloud must be sufficiently low for radiation to pass through it. This state of affairs cannot be maintained indefinitely, however, since the density and opacity will increase during contraction.

In view of the strength of the thermodynamic argument, the force calculation is really quite superfluous. The basic argument stands whether one accepts or rejects the model that was used for the latter. I was somewhat astonished, however, at our critic's reaction to the standard classical approach I employed for total force on a sphere.

Let us recall the well-known Magdeburg hemisphere experiment in which the atmospheric pressure is, multiplied by the area of the sphere to find the total force inward. The situation at hand is quite analogous. In either case the vectors may be treated as scalars so long as there is no unbalanced force producing a translational motion on the sphere as a whole.

Unfortunately Hall caricatures my approach somewhat in that he suggests that I am envisioning a cloud sitting in the middle of a vacuum. A careful reading of the paper will reveal that I used Spitzer's formulation from the very outset, which is based on the model of a cloud within a cloud.

For a "miscalculation" the approach utilized on the outward and inward forces works rather well. When applied to the sun and other objects of stellar dimensions, using reasonable values for temperature and average molecular weight, we find that there is a good balance between the inner and outer forces, which, of course, must be the case for the object to be stable.

In summary, then, it would seem that a generous measure of faith is needed for a person to accept any such theory of spontaneous star formation. I, for one, am not possessed of that type of faith—natural phenomena have been observed too consistently proceeding in exactly the opposite direction.

GEORGE MULFINGER, JR.
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POOR BILL'S ALMANAC?

WILBERT H. RUSCH, SR.*

Some centuries ago, a famous American put together a collection of sayings, wise and/or serious, which were published as *Poor Richard's Almanac*. Thru the last decade I have been gathering various relatively little known laws of science, whose basic origins are unknown, but whose wry truths have been observed by many of us in our work in the classroom and laboratory, as well as in the general home life. So as a change of pace, may I present: *Handbuch für Uplausen das Laboratorie Werke und übercovern das Grosse Goofups*.

Compendium of Ground Rules for Laboratory Workers and Cover-up of Large Goofups:

- a. When you don't know what you are doing, do it *neatly*.
- b. Experiments must always be reproducible. They should all fail the same way.
- c. First draw your curves, then plot your data.
- d. Experience is directly proportional to the equipment ruined.
- e. A record of data is essential. It indicates you have been working.
- f. To study a subject best, understand it thoroughly before you start.
- g. In case of doubt, make it sound convincing.
- h. Do not believe in miracles, rely on them.
- i. Teamwork is essential in the laboratory; it allows you to blame someone else.

Handy Guide to Modern Science:

If it is green and wiggles, it is BIOLOGY.

If it stinks, it is CHEMISTRY.

If it doesn't work, it is PHYSICS.

The Wisdom of Finagle.

Finagle's Creed: Science is truth; don't be misled by facts.

Finagle's Motto: Smile! Tomorrow will be worse.

Finagle's Constant: That quantity which, when added to, subtracted from, multiplied by, or divided into the answer you got, gives the answer you should have gotten.

Finagle's Laws:

First Law: If anything can go wrong with an experiment, it will. (This has also been generalized as—if something can go wrong, it will.)

Second Law: No matter what result is anticipated, there is always someone willing to fake it.

Third Law: No matter what occurs, there is always someone who believes it happened according to his pet theory.

Fourth Law: No matter what the result, there is always someone eager to misinterpret it.

The Wisdom of Giants of Science Distilled for Your Improvement

Patrick's Theorem: If an experiment works, you must be using the wrong equipment.

Allen's Axiom: When all else fails, read the instructions.

The Compensation Corollary: An experiment may be considered successful if no more than half the data must be discarded to obtain concordance with your theory.

Carson's Consolation: No experiment is ever a complete failure; it can always be used as a bad example.

The Peter Principle: In every hierarchy, each employee tends to rise to his level of incompetence.

Parkinson's First Law: Work expands to fill the time available for its completion.

Weiler's Law: Nothing is impossible for the man who doesn't have to do it himself.

Rudin's Law: In a crisis that forces a choice to be made among alternative courses of action, most people choose the worst one possible.

Unknown Variant: If there is a wrong way to do something, most people will do it every time.

Albrecht's Law: Social innovations tend towards the level of minimum tolerable well-being.

Murphy's Law: Once a job is fouled up, anything done to improve it makes it worse.

Anonymous Law: If it happens, it must be possible..

Kneitel's Law: If the blasted thing works, leave it alone.

Clarke's Third Law: Any sufficiently advanced technology is indistinguishable from magic.

Gumperson's Law: The outcome of a given desired probability will be inverse to the degree of desirability.

The above is also known as the Law of Perverse Opposites. This law was the result of several years reflection on the fact that the forecasting record of the Weather Bureau, in spite of the possession of the most sophisticated and expensive equipment as well as

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personnel has always been inferior to that of the FARMER'S ALMANAC.

Some Spin-Offs of Gumperson's Law have been noted as follows:

- a. After a salary raise, you will have less money at the end of the month than you had before.
- b. Children have more energy after a hard day's play just before bedtime than after a good night's sleep.

- c. Good parking places are always on the other side of the street.

Clark's Law: The junk you have will always expand to fill the available space (of all the laws given, my wife, after a survey of our garage and basement, considers this the mostest).

The above should go far to dispel the canard that scientists, particularly those of a creationist persuasion, have no sense of humor.

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 1300 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 \$7.00 (Foreign, \$8.00 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 \$7.00 (Foreign, \$8.00 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: \$10.00 (Foreign, \$11.00 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.

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