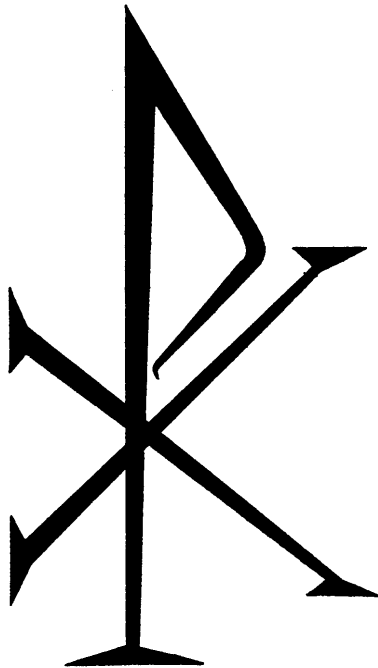


CREATION RESEARCH SOCIETY

1964 ANNUAL



Haec credimus:

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

Our Society of research scientists representing various fields of successful scientific accomplishment is 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. Beginning in 1964, we are publishing an annual yearbook of articles by various members of the Society and thereafter a quarterly review of scientific literature. Our eventual goal is the realignment of science based on theistic creation concepts and the publication of textbooks for high school and college use.

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 events 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.

Dues are \$5.00 per year and may be sent to Wilbert H. Rusch, Sr., Treasurer, 4090 Geddes Road, Ann Arbor, Michigan. Active membership at present is limited to scientists having an M.S. (or equivalent in experience), Ph. D., D.Sc., Ed.D., or M.D. Degrees. Sustaining non-voting membership is open to those who subscribe to the above statement of belief at \$5.00 per year and includes subscription to annual and quarterlies.

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INTRODUCTION

My own interest in the continuing dialogue between those scientists who believe in evolutionary concept and those who are creationists began about six years ago when my older daughter, Karen, brought home a high school textbook in which the statement was made that "all scientists now accept the fact of evolution as basic to their study of nature." When She asked me if this was true I told her that I certainly did not, and patiently explained to her a few of the many evidences which make the evolution theory invalid. About three years later my younger daughter, Camilla, showed me three high school textbooks making essentially the same statement.

By this time I began to wonder if perhaps I might be the sole remaining intellectual dinosaur surviving in an otherwise completely enlightened age of mammals. Inquiry at our local church revealed that not one of the five scientists holding responsible positions at the Lawrence Radiation Laboratory had any use for the theory; they all were creationists. Thus encouraged, I contacted a number of Fellows of the American Scientific Affiliation and soon found that several of them

such as William J. Tinkle, now retired but formerly Professor of Genetics at Anderson College, were still creationists.

We then set up a Creation Research Committee, or "team of ten" as Tinkle called it, for mutual exchange of ideas. By this time Henry M. Morris and John C. Whitcomb published their now famous book, *The Genesis Flood*. The many facts so well presented by them have re-established Biblical catastrophism as an intellectually sound alternative explanation of geological and geographical facts.

The two concepts of creation and catastrophism are so closely interwoven that our Creation Research Committee decided to start a Creation Research Society. The statement of belief to which we all subscribed was first drawn up. by our committee while attending a joint meeting of the Evangelical Theological Society and the American Scientific Affiliation at Asbury College in Wilmore, Kentucky. It was then amended at a meeting of the northern group in the home of John J. Grebe, physical research chemist, in Midland, Michigan.

Our active voting membership is limited to scientists having an M.S. (or equivalent in experience),

Ph. D., D.Sc., Ed.D. or M.D. degree. However, so much interest in our work has been shown by educators, pastors, theologians, and other (scientific) laymen, that the steering committee decided in January of 1964 to establish individual non-voting, sustaining memberships at \$5 per year.

Our aim is a rather audacious one, namely the complete re-evaluation of science from the theistic viewpoint. Actually Christian men of science have allowed themselves to be dominated by a certain code, i.e. all *legitimate* scientific inquiry must proceed on the basis of appealing only to processes and forces and reaction rates now in operation. This idea is all right as a way of stating either in words or mathematical symbols the natural processes and laws we observe or detect. As a result great progress has been made in such sciences as chemistry and physics and even biology, particularly genetics and medicine. The increasingly successful application of engineering principles has led successively to the exploitation of power from coal, oil, electricity and finally in a fantastic way nuclear energy. Equally startling is the resulting expense and danger to the taxpayer! However, many scientists have mistakenly come to the conclusion that these laws express the totality of nature. Accordingly the wonderful adaptations everywhere so clearly pointing to design are popularly credited vaguely to Nature and spoken of as being the result of evolution by natural selection. Rarely does one see the phrase "as we gaze at the beauty of this rose we marvel at the glory of God whose creation it is."

We would return again to the virtues of teleology. As pointed out by one of our contributors, John J. Moore of Michigan State University, our heritage of creation and catastrophism traces back through a long line of eminent scientists to Linnaeus, Newton and Copernicus. All of these men dedicated their work to the glory of God and the usefulness of man. There is little other excuse for science. His excellent bibliography will be published as a series bringing us from 1859 up to 1964.

We are fortunate in having as one of our members John W. Klotz who is ambivalent in that he is trained both as a theologian and a geneticist. Though wishing to avoid arguments based on theology, we believe his discussion of creation concepts will prove stimulating.

It is also encouraging to find a scientist versed in archeology who so clearly shows that we have every reason to believe the manuscripts which are the basis for our Bible are substantially unchanged. The article of R. Laird Harris is most helpful in this respect.

The remaining articles are primarily presentations of scientific evidence which leads us to reject the evolution theory.

It is our hope to publish from time to time *original* research. Though we have no hope of convincing our agnostic and atheistically-minded scientific colleagues of the barren and worn out nature of evolution concepts, we expect they will read our annual and quarterlies in order to get much needed *new* information published for the first time.

Our theistic evolutionary-minded friends may also see that their position is illogical. Our atheistic colleagues are at least logical in their basic assumptions, i.e. that the universe is eternal though ever changing and that *present* rates and kinds of *naturally* occurring processes are adequate to explain it. If so, what need is there of postulating the theory of a personal God?

Mainly, however, it is our hope that educators, pastors, theologians, and laymen may see that we can, with better logic, postulate a personal God who created this universe by the conversion of His energy (a part of it) into mass and therefrom very rapidly brought into being the marvelous order we see both in the inorganic and organic realms. The tasks involved in reorganizing the many fields of science in line with this concept are many. Creationists have too long been merely negative in their thrust, indicating the weaknesses of the evolution concepts, but offering little in its place. As will be clearly shown by Henry M. Morris this world shows such clear evidence of degeneration and catastrophe that one marvels how so many of our scientific colleagues have been blinded. To paraphrase the words of our great President, the late and beloved John F. Kennedy, we cannot hope in one lifetime to complete the structure of a truly theistic science, but let us begin.

This first annual of our Creation Research Society is then presented as a beginning of the task ahead.

Sincerely,
Waiter E. Lammerts
Chairman

THE HERITAGE OF CREATION CONCEPTS

Selected Bibliography Showing the Continuity of The Creationist Viewpoint

JOHN N. MOORE, Ed.D.

Michigan State University

East Lansing, Michigan

INTRODUCTION

As soon as Charles Darwin's *Origin of Species* was published in 1859, criticisms and modifications plus alternative hypotheses and theories were presented by contemporary scientists in many countries. "Opposing" formulations on Mendelism, mutation and saltation occurred later and have led periodically to controversies in this post-Darwinian century.

Today, many persons think there is general and broad acceptance of evolution among scientists working in many specialties. This impression of acceptance explains the purpose of this work, namely to show that a substantial segment of scientists over a long period of time tracing back to Linnaeus, Newton and Copernicus have taken issue, and continue to take issue, with evolutionary ideas in what has been called correctly "The Unresolved Conflict."

Thus, this present formulation does not inaugurate an argumentative position or initiate enumeration of pertinent objections by well-educated scientists, science teachers, or laboratory specialists. Efforts of members of the Creation Research Society are not spontaneous and isolated, but belong in continuity with, and are common extensions of, efforts of previous scholars in other decades.

Yes, objections to Darwin's ideas have been continuous for more than one hundred years. Consistently, eminent scientists have written extensively about weaknesses, limitations, deficiencies, qualifications and consequences of evolution.

Responses published, during the close of the 19th Century, are not readily accessible now. Yet, full mention of early opponents of Darwinism is given in such works as *History of the Conflict Between Religion and Science* by John W. Draper (1875), *A History of the Warfare of Science with Theology in Christendom* by Andrew D. White (1895), and *Landmarks in the Struggle Between Science and Religion* by James Y. Simpson (1924).

Therefore this bibliography, listing sources of qualifications, limitations, deficiencies and consequences of evolution, natural selection and some related topics, is selective and not offered as an exhaustive compilation. Admittedly, the compiler has not read or annotated the works of such scientists as L. Vialleton (1929), E. Guyenot (1930), A. Fleischmann (1931), L. Merston Davies (1935), Rendle Short (1935), J. Lefevre (1938), and W. Morley (1939).

And, as yet, literature search has covered neither known materials published by the Evolution Pro-

test Movement of England (past presidents of which have included Sir Ambrose Fleming, F. R. S. and Sir Charles Marston, F. S. A.); nor the provocative *Doorway Papers* of Dr. Arthur C. Custance, F. R. A. I. (Box 1283, Station B, Ottawa, Canada).

Likewise unexamined are many excellent papers in the *Journal of Transactions of the Victoria Institute*, England, such as the following:

- R. E. D. Clark, "Present Position with Regard to of Species," Vol. 68, pp. 172-179, 1936.
- "Evolution and Entropy," Vol. 75, pp. 49-63 1943.
- , "Modern Science and the Nature of Life," Vol. 77, pp. 60-70, 1945.
- , "Spheres of Revelation and Science—What Are Their Limitations in Relation to Each Other?," Vol. 79, pp. 138-163, 1947.
- L. M. Davies, "Evolution," Vol. 58, pp. 214-236 1926.
- , "Scientific Discoveries — Bearing on Noachian Deluge," Vol. 62, 1930.
- D. Dewar, "Limitations of Organic Evolution," Vol. 64, pp. 122-132, 1932.
- , "Critical Examination of Supposed Fossil Links between Man and Lower Animals," Vol. 67, pp. 157-170, 1935.
- "What the Animal Fossils Tell Us," Vol. 74, pp. 34-52, 1942.
- , "Current Theories of Special Creation," Vol. 76, pp. 53-75, 1944.
- , "Earliest Known Animals," Vol. 80, pp. 12-29, 1948.
- "Genetics and Evolution," Vol. 82, pp. 151-173, 1950.
- A. Fleming, "Creation and Modern Cosmology," Vol. 62, pp. 266-283, 1930.
- , "Some Philosophical Conceptions of Modern Physical Science and Relation to Religious Thought," Vol. 68, pp. 230-247, 1936.
- , "On Some Methods of Determining Age of the Earth and Their Assumptions," Vol. 69, pp. 15-30, 1937.
- , "Influence on Human Conduct and Belief of Certain Scientific Hypotheses," Vol. 72, pp. 1-11, 1940.
- , "Some Arguments Against Hypothesis of Human Evolution from Any Animal Species," Vol. 74, pp. 212-215, 1942.
- G. M. Price, "Geology and Its Relation to Scripture Revelation," Vol. 56, pp. 97-114, 1924.
- , "Revelation and Evolution: Can They Be Harmonized?," Vol. 57, pp. 167-182, 1925.

There are arguments against evolutionary theories, which are applied, totally, today in such a degree of certainty as to give the general public and students no clear awareness of possible debate. In fact debate is kept out of public communication media and very generally out of high school, college, and university classrooms.

However, though space limitations prevent detailed review of all the basic arguments raised by authors whose works are annotated, typical points included are, as follows:

- 1) Theories of organic evolution do not explain adequately the recognizable gap between in-organization and organic organization.
- 2) Theories of organic evolution do not explain adequately gaps between major groups of organisms, where intermediate forms are missing; or explain gaps between absence and presence of organs, where nascent organs are unknown.
- 3) Theories of organic evolution do not explain adequately gaps between animal and human behavior wherein the latter form alone knows, studies and reasons about itself and all the universe.
- 4) Theories of organic evolution are built upon fragile networks of assumptions and hypotheses characterized by circular reasoning by which taxonomists refer to palaeontologists, who refer to geologists, who refer to taxonomists for supposed verification of each other's positions of argument. (As has been said: Uniformitarianism simply has been assumed, not proved; catastrophism simply has been denied, not refuted.)
- 5) Theories of organic evolution are founded on the illogical ground of equivocation of the terms "evolution" and "variation." By classical definition, evolution can only mean change from one animal form into another animal form, or change from one plant form into another plant form. Variation, then, is restricted to change *within* animal form or *within* plant form.

Since it can be shown that students in the classroom and adults through the public press, *do not hear or see* criticisms of theories of evolution, one can assert that they do not know what material is available to them. Thus, need exists for a Selected Bibliography such as constitutes the main body of this paper. The references are presented in chronological order.

However, so that the reader might be reminded of standard references to the modern neo-Darwinian, modern synthesis theory of evolution, the following list is provided:

- T. Dobzhansky, (geneticist), *Genetics, and the Origin of Species*, Third Edition-Revised, Columbia University Press, 1951.
- *Evolution, Genetics, and Man*, John Wiley and Sons, N. Y., 1955.

B. Glass, (editor), *Forerunners of Darwin: 1745-1859*, The Johns Hopkins Press, Baltimore, Md., 1959.

J. Huxley, (biologist), *Evolution, The Modern Synthesis*, Harper and Brothers Publisher, New York, 1943.

— *Evolution in Action*, Harper and Brothers, N. Y., 1953.

A. O. Lovejoy, (science historian), *The Great Chain of Being*, Harvard University Press, Cambridge, Mass., 1961.

G. G. Simpson, (paleontologist), *The Meaning of Evolution*, Yale University Press, New Haven, 1950.

— *Major Features of Evolution*, Columbia University Press, New York, 1953.

S. Tax, (editor), *Evolution After Darwin*, Vol. I, II, and III, The University of Chicago Press, Chicago, Illinois, 1960.

1860-1899

L. Agassiz, (zoologist), "Prof. Agassiz on the Origin of Species," *American Journal of Science*, Second Series, Vol. 30, November, 1860, pp. 142-154.

Devoted to pointing out Darwin's confusion and lack of facts, fallacies of reasoning, and ignoring of constancy of types. He closed by saying, "I shall therefore consider the transmutation theory as a scientific mistake, untrue in its facts, unscientific in its method, and mischievous in its tendency."

L. Agassiz, "Evolution and Permanence of Type," *The Atlantic Monthly*, Vol. 33, January, 1874, pp. 92-101.

This was the last published work by a great, world-renowned naturalist in opposition to what he called the Transmutation Theory. He touches upon each of Darwin's works as he denies the conjectural theory of the *Origin of Species*.

L. Agassiz, *Methods of Study in Natural History*, James R. Osgood and Company, Boston, 1874.

Author states in Preface that this is a more popular presentation of his views in his *Essay on Classification*, and an opportunity to protest against transmutation (evolution) theory.

C. R. Bree, (physician), *Fallacies in the Hypothesis of Mr. Darwin*, Longmans, Green and Co., London, 1872.

Discussion of physico-psychical, variation and natural selection, and teleological arguments. Mivart's theory of evolution shown to be untenable. Chapters on eye and ear included to present difficulties of Darwin's theory.

J. W. Dawson, (geologist), *Modern Ideas of Evolution as Related to Revelation and Science*, The Religious Tract Society, London, 1890.

Discusses the apparition of species in geological time, monistic evolution, agnostic evolution, and theistic evolution. — 200 pgs.

1900-1919

W. Bateson, (geneticist), "Inaugural Address be-

fore Australian Meeting of the British Association," *Nature*, Vol. 93, August 20, 1914, pp. 635-642.

In talking about individual variation he discusses natural selection as only one factor delimiting species, misconception about "blood" descent, illusion of contemporary variability, and further stresses narrow limits of knowledge and need for caution in applying the theory of evolution.

F. Bettex, (scientist), *Science and Christianity*, Jennings and Pye, Cincinnati, Ohio, 1901.

In five scholarly chapters on "Progress," "Evolution and Modern Science," "Christians and Science," "Science," and "Materialism," a fine Christian gentleman expounds upon conditions at the turn of the century.

L. Burbank, (biologist), *Luther Burbank: His Methods and Discoveries and Their Practical Application*, Vol. 1, Luther Burbank Press, New York, 1914.

This is part of a 10-volume series on the practical work of this avowed evolutionist. Nevertheless all his research did not dissuade him from the statement in this volume that purposes in nature exist: 1) to produce endless combinations, and 2) to prevent combination of things out of kind. His work could be related to Dr. Frank Marsh's bar-min kinds.

D. Dewar, (ornithologist) and F. Finn (zoologist), *The Making of Species*, John Lane Company, New York, 1909.

Two scientists endeavor to demonstrate weaknesses of pure Lamarckism, pure Wallaceism, and the theory of DeVries. They attacked Neo-Darwinism and show that the theory of natural selection is not sufficient to explain origins of variations.

V. L. Kellogg, (zoologist), *Darwinism Today*, H. Holt and Company, New York, 1907.

An excellent, dispassionate review of attacks and defenses of Darwinism and the theory of natural selection in that day. Names and quotations of opposing botanists, zoologists and palaeontologists are given in thorough appendices with notes at the close of each of twelve chapters. Author stresses that natural selection is not a sufficient explanation of species-forming.

J. P. Lotsy, (biologist), *Evolution, By Means of Hybridization*, M. Nijhoff, The Hague, Holland, 1916.

Contains extensive discussion of his work in producing "new species" from crosses of existing species. Lotsy felt that new classes and phyla have occurred *suddenly* from recombination of factors brought together in crosses (see pp. 119, 135, 147). He expressed skepticism of the existence of mu-

1920-1929

W. Bateson, (geneticist), "Evolutionary Faith and Modern Doubts," *Science*, Vol. 55, January 20, 1922, pp. 55-61.

Famous address before AAAS which was cautious

and intellectually honest regarding problems of fitting genetics with Darwin's theory. He presented reasons for being "agnostic as to the actual mode and processes of evolution." Correspondence about this talk appeared in *Science* on February 22, April 7, and April 14 of 1922.

A. S. Berg, (biologist), *Nomogenesis, or Evolution Determined by Law* (with Introduction by d'Arcy Thompson), Constable and Co., Ltd., London, 1926.

Outspoken critic of Darwinism still writes about evolution (as if equated to variation within limits), but involving polyphyletic origin of similar forms. Conclusion chapter contains interesting schematic abstract of ten points to contrast evolution conceived by Darwin and evolution on the basis of Nomogenesis (origin from tens of thousands of primary forms, i. e. polyphyletically).

F. Bettex, (scientist), *The Six Days of Creation in the Light of Modern Science*, The Lutheran Literary Board, Burlington, Iowa, 1924.

This 64-page booklet contains a compact yet thorough expression of belief in creation with consideration of Darwinism, the phrase "After Its Kind," and creation of man.

L. T. More, (physicist), *The Dogma of Evolution*. Princeton University Press, Princeton, 1925.

Opening with a succinct chapter on "Evolution as Science and Faith," the author examines Greek and medieval attitudes toward science so reader properly understands different uses of the word "change." There follows a discourse on paleontology and geology and chapters on the theories of Lamarck and Darwin. He traces the effects of the theory of evolution when applied to the broader fields of social life and religion where evolution clashes with the spiritual life of man.

G. B. O'Toole, (biologist), *The Case Against Evolution*, Macmillan Company, N. Y., 1925.

Dividing his work into two parts on evolution in general and the problem of origins, the author endeavors to show "that evolution has long since degenerated into a dogma, which is believed in spite of the facts, and not on account of them." A temperate and thorough treatment of the subject.

F. B. Sumner, (biologist), "Is Evolution a Continuous or a Discontinuous Process?", *Scientific Monthly*, Vol. 29, July, 1929, pp. 72-78.

Much of the paper reviews controversy between proponents of mutationism and Mendelism which were offered as alternatives to the natural selection principle as conceived by Darwin. He gives six "objections to the natural selection theory which were supposed to be avoided by the theory of mutation." Also, he lists six objections to the mutation view. Sumner disagrees with Goldschmidt, T. H. Morgan, and Lotsy.

To be continued

END

THE IMPORTANCE OF CREATION STUDY

JOHN W. KLOTZ, B. D., Ph.D.

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Fort Wayne, Indiana

Why is the doctrine of creation important? Isn't it true that the only really important doctrine is redemption? Isn't it true that the Bible's orientation is primarily spiritual, not physical? Why make so much of something that seems to be more in the realm of the scientist than in the realm of the theologian. Isn't it quite possible for an evolutionist to believe in Christ and be saved?

I. THE TEACHINGS OF SCRIPTURE FORM A UNIT

To the last of these three questions we shall answer "Yes." But we shall also insist that the doctrine of creation is important because what Scripture teaches is an organic whole and cannot be fragmented. It is like a wheel with spokes radiating out from the central doctrine of justification. Thus creation, the fall, redemption, eternal life are all linked together. The doctrine of Creation teaches us that man was created perfect, sinless. We need to know this in order that we do not blame God for our wickedness. We need to know that we were created perfect in order to appreciate God's love which not only redeemed us but redeemed us from a state into which our first parents had fallen from that original perfection. We need to know the doctrine of Creation in order to understand the perfection which God is preparing for us after this life. The teachings of the Scripture form a unit. An attack on one is an attack on all. Once we have begun to deny one doctrine we are tempted to deny the others. If we reject the story of creation in a state of perfection and believe instead that we have developed from the anthropoid, then redemption is something that God owes us, since our being in the state of sin is the result of bringing us up from the anthropoid. Then sin is His fault and not ours. Indeed we deserve commendation because we have risen so far above the jungle and the barnyard.

II. CREATION IS MENTIONED REPEATEDLY IN SCRIPTURE

The doctrine of Creation is not an obscure doctrine, nor is it one which "is hard to understand which they that are unlearned and unstable wrest unto their own destruction," II Peter 3:16. There are over 65 passages in the Old and New Testaments which refer to this doctrine. Many of these, it is true, speak of God as the Creator without referring in detail to the method of creation, and theistic evolutionists are want to say that they can be interpreted in the light of theistic evolution as well as in the light of special creation. Yet all of these are written against the background of Genesis 1 and 2 and presuppose it. They take for granted the details mentioned there. Our Savior refers to

the Genesis account: St. Paul builds New Testament doctrine on it. The repeated references to creation in the Scriptures show us how important the Holy Spirit thought it to be.

III. MAN'S RELATIONSHIP TO GOD DEPENDS ON THE DOCTRINE OF THE CREATION

Repeatedly Scripture emphasizes the Creator-Creature relationship. We owe God honor and worship because He created us. More than that, we owe God obedience for that same reason. Christianity is an authoritarian religion. When God speaks, man is to obey. He isn't to argue with God, he isn't to question His wisdom, he isn't to suggest some alternative, but he is to obey. The Ten Commandments are binding on all men not because they are the socially acceptable way of living but because they are the commandments of the Creator. When God says, "Thou shalt not steal," I am to obey Him. I am not to question His authority or His motives. I am not to suggest that He is an ally of the propertied classes, permitting Himself to be used in promoting their ends. I am not to argue that in a purely socialistic society this sort of commandment will no longer be needed. God the Creator has spoken and I the creature must obey.

Similarly, when God says: "Thou shalt not commit adultery," I must obey. I cannot argue that this commandment is given only to protect the home and society and that when these are not harmed it may be broken. I cannot argue that adultery is wrong only when there is danger of pregnancy and that the development of modern contraceptives has made premarital and postmarital faithfulness unnecessary. God, the Creator, has spoken and I must obey.

IV. THE DOCTRINE OF CREATION IS INTIMATELY RELATED TO SUPER- NATURALISM

The Bible assumes the existence of the supernatural, and the doctrine of Creation is an important part of this assumption. The Bible is not materialistic and mechanistic in its orientation. It proclaims an all-powerful God who has created every material thing and who has established all the natural laws which govern the universe. This God is both immanent and transcendent. He is in the world, for in Him we live and move and have our being, Acts 17:28. But He is not a part of the world. He is a personal God, separate from these things which he has fashioned and made.

The scientist does not deal with the supernatural. It is outside the realm of those things with which he concerns himself. He has deliberately limited himself to those things which can be touched and

felt and handled. He seeks explanations which are in keeping with the natural laws which God has set up. While some scientists have denied the reality of those things which cannot be measured, science itself does not. The scientist has found this approach fruitful. By limiting himself to a study of the natural laws which God has set up, he has gained a considerable measure of control over the universe which God has created. But we should recognize that he does limit himself to a study of the laws which God has set up without attempting to study the God who set them up.

It is interesting to note that one of the earliest clashes between religion and science did not deal with the doctrine of Creation but rather with the doctrine of Preservation. The man who is responsible for much of the mechanism and materialism of science today was Isaac Newton, one of the greatest scientific geniuses of all times. Living in the 17th century, one of the greatest scientific centuries of all times, he was a contemporary of Boyle, Hooke, Wren, and the founders of the Royal Society. All of these men were devout, pious, and deeply religious. Indeed many 20th century historians of science find it difficult to accept their religious orientation at face value and suggest it was a cover-up, that they did not really accept God and Christ but because of the nature of the times had to pay lip service to Christianity. Reading the writings of such men as Boyle and Newton leaves no doubt as to their sincerity. They were indeed deeply religious men.

At the same time we ought to recognize that Newton's system whereby the universe became a machine and his denials of the role of God as preserver laid the foundation for much of the mechanism and materialism which characterizes modern science. Newton believed that the age of miracles was past. He accepted the Old and New Testament accounts of miracles, but he believed they no longer occurred. He believed that God now worked through the natural laws which He had established. Newton's God was a watchmaker God, a God who had fitted all the wheels together and had started it running but who had now withdrawn completely. In other words, God had now abdicated in His role as Preserver. God was transcendent, but no longer immanent.

It was an extension of Newton's ideas that led to causal determinism and led to ideas such as those of LaPlace who believed that if there were a supernatural being capable of knowing all cause and effect relationships and capable of analyzing all of them, he could with confidence reconstruct every event even of the remote past and predict every event of the future. LaPlace talked about a Supernatural Being. However, it was not long until others came along and applied Occam's razor to the system. Since God was not needed in the system — it functioned by the natural laws He had estab-

lished, He could be eliminated. This was the strict causal determinism which prevailed until the beginning of the 20th century.

At the turn of the century, causal determinism received a death blow from which it never recovered. This was the principle of indeterminism introduced by Heisenberg. Heisenberg's principle applies only on the subatomic level. He learned that it is impossible to predict both the position and the velocity of an electron. This meant that strict causal determinism would not work on the subatomic level. It was Heisenberg's position that the universe is indeterministic and his position was shared by Eddington. Others, such as Einstein, insisted that the universe is deterministic but we simply cannot demonstrate it.

While it is true that indeterminism can be demonstrated only on the subatomic level, certainly it is fair to suggest that from a philosophical standpoint it may apply on other levels as well. This, once more, leaves room for God. If things are not so exactly predetermined by cause and effect relationships, perhaps there is a role for God after all. Thus supernaturalism may not be so outmoded after all. It is interesting to note that while strict causal determinism has been abandoned in physics, a sort of determinism and a dependence on strict cause and effect relationships is still the basis of much of the reasoning in biology. Indeed it is this mechanistic determinism that is the basis for evolution. Living things develop through natural laws, by cause and effect relationships. Theistic evolutionists claim that God is behind the process, but to most of them He is the watchmaker God of Newton who is transcendent but no longer immanent.

Cause and effect is also widespread in the social sciences. Man is both the product of and the victim of his environment. He is the helpless pawn of forces outside himself. This does away with human responsibility in the moral realm. Man cannot be responsible if his actions are the consequences of environmental stimuli.

Strict causal determinism in any area is a gloomy philosophy. Man is helpless. He cannot alter his environment and he cannot control his actions. He is a complete automaton.

V. THE DOCTRINE OF CREATION POSTULATES AN ABSOLUTE GOD

One of the most significant developments of 20th century physics is the theory of relativity developed by Einstein. While indeterminism has probably been favorable philosophically to organized religion, relativity has not. Einstein believed that the only constant or absolute is the speed of light. Everything else is relative. Time is relative. As the speed of an object increases and approaches the speed of light, time slows down for that object. Its length decreases and its mass increases. Thus

his theory is considered to have destroyed the concept of absolutes. Actually, you and I are committed to the idea of absolutes. The God whom we worship is the Absolute. He is not relatively holy, He is absolutely holy. He is not relatively wise, He is omniscient. He is not relatively powerful: He is omnipotent. It is of His omnipotence that the doctrine of Creation speaks. Why shouldn't God cause the earth to appear as the Genesis account reports? He is all powerful. He doesn't need time to accomplish something. He doesn't need a process of development. He doesn't need to make things in steps. Our God is an absolute God. He speaks and it is done. It is because He is the absolute God that we owe Him respect and homage.

VI. THE NEW TESTAMENT ACCEPTS THE GENESIS ACCOUNT LITERALLY AND BUILDS ON IT

Our Savior quotes Genesis and quotes it in such a way that He obviously accepts it literally. You will recall our Savior's clash with the Pharisees regarding divorce as it is recorded in Matthew 19 and Mark 10. The Pharisees thought that they could trap Him by asking Him about divorce. Their divorce practices were very loose: they took advantage of Moses' regulations regarding a bill of divorcement which at the Savior's time was available on the slightest pretext. They knew that the Savior did not approve of their divorce practices. By asking Him about divorce they thought they would trap Him into approving something of which He did not approve or criticizing a regulation of Moses. Instead the Savior in support of His position quoted Genesis 1:27 and 2:24. He takes these as literal, not as allegorical. He accepts this account in Genesis 1 and 2 as historical and not as myth or saga.

Even more significant is St. Paul's use of the creation account. He accepts the historicity of Adam and Eve, something which few theistic or atheistic evolutionists accept. To the evolutionist, Adam and Eve cannot be individuals: they must represent an evolutionary population. It is unthinkable that only one male and one female developed to the status of *Homo sapiens*. Rather a group, perhaps a hundred or five hundred, achieved this biological status, and it must be these that are referred to as Adam and Eve.

We must recognize that Adam is sometimes used in the Old Testament as a generalized term for man. This is in keeping with the Hebrew practice of economizing on vowels, of making one word do the work of several. Yet it is very clear that Moses is talking about one man and one woman. St. Paul understands Moses in this way. In Chapter 5 of His epistle to the Romans, he repeatedly compares the one Adam with the one Christ. He says, for instance in v. 12 "By one man sin entered into the world and death by sin." He tells us, v. 15, that by

the offence of one man, many died and that by the grace of God which is by one man many are made alive. He goes on to say, v. 18, "By the offence of one judgment came upon all men to condemnation; even so by the righteousness of one the free gift came upon all men unto justification of life" and then he continues in v. 19, "For as by one man's disobedience many were made sinners, so by the obedience of one shall many be made righteous." St. Paul uses a similar parallel in I Corinthians 15. There he says, v. 22, "For as in Adam all die, even so in Christ shall all be made alive."

These parallels of St. Paul make no sense unless one accepts the historicity of Adam. If Adam is not an individual but rather represents an evolutionary population, what of Christ? Is He an individual or does He perhaps represent a suffering population? St. Paul's reference to Adam and Eve in I Timothy is also interesting. In Chapter 2, he tells us that women are not to teach nor to usurp authority over the man and he gives as his reason, "For Adam was first formed, then Eve." This reference makes sense only if Adam and Eve are individuals. To suggest that they represent evolutionary populations, involves biological nonsense. It suggests that first there was a race of males only and that after some time a race of females developed.

Even more interesting is St. Paul's reference to our first parents in I Corinthians 11. Here again he is dealing with the relationship of men and women and he gives as his reason in v. 8 "For the man is not of the woman; but the woman of the man." The Greek preposition used here means "out of," and is a clear reference to the creation of woman as it is recorded in Genesis 2:21.

There are some theistic evolutionists who recognize this New Testament problem and suggest that only one male and one female were picked out of the evolutionary population to be the parents of the human race. Thus a group of beings had evolved to the biological status of *Homo sapiens*. God interfered directly and picked out one male, Adam, and one female, Eve. To these He gave a soul and they became the ancestors of the human race. If this is the case, we might well ask, "What became of the other anthropoids whom God did not choose to become our parents? Are there people who are biologically *Homo sapiens* but who do not have a soul and are therefore not truly human? Is it possible that some of our radical racists are correct in insisting that not all the races of man are truly human?"

VII. THE PHILOSOPHY OF EVOLUTION RUNS COUNTER TO CHRISTIANITY

Modern evolution is Darwinian: the generally accepted theory today is said to be neo-Darwinian. By this modern evolutionists mean Darwinism modified by modern genetics. Accordingly there is

still the struggle for existence, the survival of the fittest, nature red in tooth and claw. True, these concepts are no longer used in the same sense in which early evolutionists used them. The struggle for existence is no longer regarded as a struggle for food, only rarely does death result from battle and with bloodshed, fitness does not necessarily imply the long survival of the individual. The emphasis is on the race or population rather than on the individual. Yet there is still definitely a struggle and a survival of those best fit to survive. There is no place for the weakling and therefore no place for Christian love. Indeed there are many who believe that man is making a serious mistake by keeping alive the physically weak and the helpless and in that way keeping their defective genes in the gene pool of the species. Mortimer Adler believes that if evolution is correct then the Nazi point of view with its racism and its murder of the unfit is also correct.

The Christian ethic depends on love — love to God and love to the fellowman. It is the ethic of the Good Samaritan who at the risk of his own life attempted to save the life of the man, who because he was a Jew did not deserve to live. There is no such Christian love in any scheme of the survival of the fittest. Evolution is a dog eat dog struggle. If evolution is correct, this attitude is not only permissible but even proper.

There is no question but that Hitler through Nietzsche was greatly influenced by Darwin. The Nazi system was definitely Darwinian in its orientation. This cannot be said of Communism. Communism is influenced instead by the outmoded concepts of Lamarck. Its whole philosophy is that of inheritance of acquired characteristics rather than a survival of the fittest.

There is something else that ought to be noted.

Christianity emphasizes the importance of the individual. You and I count in the eyes of the God of the Bible. He knows each one of us. His Son died for us and He has written our names on the palms of His hands. To the modern evolutionist the individual is unimportant. His survival does not count. Instead the important thing is the proportion of his genes in the gene pool of future generations. Whether his life is a long one or a short one isn't important, whether he is happy or oppressed doesn't really count. The important thing is the number of his offspring and therefore the frequency of his genes in the gene pool of the next generation. Thus a disorder such as cancer may actually be favorable from an evolutionary point of view. It is essentially a disorder of older people. It removes the individual from the scene after he has made his contribution to the gene pool of the next generation. He has served his evolutionary function and- if he lives beyond this point he will only be draining the resources which might better be used by those who still have their evolutionary contribution to make.

Evolution necessarily implies that society is more important than the individuals which make it up. The welfare of the group is more important than that of the individual. If the rights of the individual interfere with the rights of society, his rights must yield. Christianity emphasizes the rights of both, and so does our American democracy. The individual does count. He is important: he is more than a small cog in a vast machine.

Thus we see that evolution does have implications for our faith. There are deep and basic philosophical differences and differences in approach. Evolution is important. It is more than just a scientific theory. It has implications not only for the material and physical realm but also for the spiritual realm.

DEAD SEA SCROLLS

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The amazing story of the discovery of the Dead Sea Scrolls is too well known to be repeated except in outline. In 1947 a shepherd boy was wandering with his sheep and goats near the northwest end of the Dead Sea. He idly threw a stone in one of the many caves of the limestone cliffs which rise to the mountains of Judah on the west. He heard something breaking and on investigation found he had broken a pottery jar containing old leather scrolls. He and some companions took seven scrolls from this cave and sold them on the black market in Bethlehem. They found their way to Jerusalem just as the Jewish-Arab war was breaking out. Jewish scholars purchased three and Arab Christians bought the other four. At length the Israeli government purchased all seven and they have been adequately published.

Meanwhile more fragments turned up for sale and in 1952 archaeologists organized an expedition to investigate the whole area for similar caves and more fragments. About eleven caves were found in this area having significant pieces of manuscripts and more have been found further south. These fragments have been intensively studied and many have been fitted together in work on the biggest jigsaw puzzle in history.

Of crucial importance is the date of these manuscripts. Handwriting experts dated them as from the two centuries before Christ. The ones from the caves further south in the area called Murabbaat come from the second century A.D. Some are even dated manuscripts. The question of dating is allied to the question of who wrote these scrolls. It was soon noted that near the northern caves was a ruined town or group of buildings called Qumran. This ruin was excavated in 1951-56 and was clearly shown to be the place where the scrolls were written. Even their benches and tables and ink wells were found! Qumran was apparently not an ordinary town but a sort of Jewish monastery and it was occupied, as was shown by coins and pottery, from about 125 B.C. to 70 A.D. when the Romans invaded and destroyed Jerusalem. Interestingly, the Jewish "monks" had left the city a short time during the days of Herod the Great. We are reminded of Herod's slaughter of the innocents of Bethlehem and the flight of Mary and Joseph and Jesus. Herod was one to be feared by those who loved the Scripture.

The inhabitants of Qumran have been identified with fair certainty as Essenes (pronounced Essen) who were a sect of Jews living side by side with the Pharisees and Sadducees. Their chief characteristic in which we are interested is their regard for the O. T. and their opposition to the sinfulness of

the Jerusalem priesthood. They themselves state that they had withdrawn into the wilderness to "prepare the way of the Lord."

The Dead Sea Scrolls consist of two main types of documents — Biblical Scrolls and scrolls related to Essene belief or practice. There are no purely secular compositions. These writings teach us many things about the O. T.; about the backgrounds of Christianity and about Essene belief. The writer's conviction is that their greatest usefulness is in study of the text and canon of the Old Testament.

THE SCROLLS AND THE OLD TESTAMENT TEXT

To help us appreciate the witness of the Scrolls for the O. T. text let us consider our previous O. T. copies and then the Biblical Manuscripts from the caves. It was the practice of the Jews through the middle ages to copy their Hebrew manuscripts with great care, then decently to dispose of the worn out copies. Because of these practices we only had late (9th century A. D.) O. T. manuscripts though we had reason to believe that these were in quite close agreement with the text of about the 2nd century A.D. But we had no early manuscripts. Just in 1947 a prominent textual scholar wrote that we never would have any early manuscripts! We did have some old translations from the Hebrew — the Latin Vulgate of about 400 A. D.; some portions of Greek translations made about 200 A. D.; the Syrian translations and the Aramaic Targums of uncertain dates; and the Greek Septuagint, which was dated at about 200 B.C. by orthodox scholars and somewhat later by critics. Most of these translations were post Christian. The Septuagint departed more widely than the others did from the Hebrew. In short we could trace our present Hebrew text pretty well back to about 100 A.D. but before that our evidence was uncertain. Did the origin of Christianity cause much change in the O. T.? How about the glorious but bitter wars of independence waged by the Maccabees around 165 B.C. ? Were the copies before those days of the same type as after those days?

These and other questions can now be answered very satisfactorily. The Dead Sea caves have yielded Biblical manuscripts and fragments of every O.T. book except Esther. One complete copy of Isaiah from 150 B.C. and another partial copy and a dozen fragmentary copies are found. A commentary bearing nearly the complete text of Habakkuk 1 and 2 come from perhaps the 1st century B.C. Another manuscript preserves in fragmentary form most of the chapters of the Books of Samuel. A more recently purchased piece has about a third of the book of Psalms. Some books have left very

small fragments, like the six lines of Chronicles. Others have left respectable pieces like several portions of Daniel from around 110 B. C., parts of Ecclesiastes from 150 B.C. There is a very old portion of Jeremiah and another of Job from 200 B.C. The oldest scraps seem to be part of Samuel from 225 B.C. though some have dated fragments of Exodus and Leviticus even earlier. We thus have numerous specimens of various O.T. books copied before the Christian era and even before the persecution of the Maccabean days. What are they like?

The answer to this question is that they are exceedingly close to the Hebrew manuscripts that we have always possessed. They serve to substantiate our present Bibles and carry back the evidence for our text to around 200 B.C. This is within two hundred years of the close of the Old Testament period. For instance in the four lines of I Samuel 23:9-12 preserved in a fragment from 225 B. C., every letter (of the fifty-plus preserved) is equal to those in our Hebrew Bibles. To be precise, one vowel letter differs, being replaced by an equivalent vowel letter. The complete scroll of Isaiah likewise is quite close to our Bibles. An accurate description of it would involve some knowledge of Hebrew. It is perhaps enough to say that this manuscript uses more extra vowel letters than our Hebrew Bibles do, but these make no difference at all in the meaning. It is only a matter of spelling. A comparison of the great 53rd chapter might be of value. After we make appropriate allowances for these differences in spelling we find that the scroll adds two words to the present Hebrew text and uses more freely the single letter *Waw* as a conjunction between the clauses. The two added words are no improvement in our text but in any case do not change the sense. Actually we may fairly conclude that the new scrolls only confirm what we had. It is interesting to note that the Isaiah scroll, though valuable because of its early date, is clearly not as carefully written a copy nor as pure a text as our later manuscripts. Thus the scrolls confirm, but hardly improve upon our existing texts.

The scrolls do allow us to re-examine certain old problems and suggest some answers. In three or four cases, the scrolls confirm the Septuagint text in places where it was quoted in the New Testament and in doing so justify the New Testament's use of that verse. Thus in Hebrews 1:6 there is a quotation from the Septuagint of Dt. 32:43 which is not found in the King James translation. The Hebrew does not have this line. But a Dead Sea fragment shows that in early times that line was in the Hebrew text as well as in the Septuagint.

THE SCROLLS AND THE CANON

We are often asked, "Do the scrolls say anything in favor of or against the Higher criticism?" The answer is that the scrolls are not early enough to

speak directly on this subject, but they have some implications that question such views. Critics have not only said that Moses did not write the Pentateuch and Isaiah has two or three parts and the Psalms were late, etc. Critics also dated some books extremely late and had developed a special theory of the growth of the canon of the Old Testament.

Job was dated as late as 200 B.C. Now we have fragments of a 200 B.C. copy! Ecclesiastes was placed by some extremists as late as the days of Herod the Great. Now we have a copy from 150 B.C. Several Psalms were called Maccabean. That view is now impossible. Chronicles was placed at about 200 B.C. The argument is now given that it was nearer 400 B.C. Daniel is still placed at 165 B.C. in spite of the fact that it was used as Scripture and copied in several copies in Qumran at about 110 B.C. It strains credulity to think that Daniel was written as a pious fraud and was as quickly and completely and widely accepted as Scripture. No other case is parallel. It is true that in the New Testament we have a portion of John written within 30 years of the author's death — but that was not a hoax, as abundant testimony shows. So some of the positions of criticism are seriously challenged.

Furthermore, critics have held an elaborate theory that the Pentateuch was not held to be sacred and canonical until 400 B. C., the Prophets not until 200 B.C. and the Writings (the 3rd division of our Hebrew Bible) not until 90 A.D. Surely this view is contradicted by the scrolls. Note that of the most popular books in Qumran, one is from the Pentateuch — Deuteronomy; one is from the Prophets — Isaiah; and one is from the Writing — Psalms. A copy of a book of the writings, Job, is practically as early as any of the copies of the prophets — 200 B.C. Ecclesiastes in 150 was clearly canonical. Proverbs is quoted as Scripture. The Psalms were supplied with commentaries like the other portions of the Bible. There is considerable evidence that all the Writings (Esther only is not found) were considered as canonical at least by the first century B.C. and some were clearly considered canonical as early as evidence exists for the prophets. The elaborate critical theories simply break down in the face of these facts.

There is an additional significant point. The Scrolls do not use a three-fold division of books as does the later Talmud and medieval copies of the Hebrew Bible. The Scrolls speak only of the Law and the Prophets. In this they agree with the New Testament which also uses a two-fold division. Now in view of the evidence that all the Old Testament was canonized, we cannot say that the third division was not yet formed. Rather we must say that at this early time, just as later in the New Testament, all the books were recognized and classified under two categories — the Law of Moses and the Prophets. With this evidence, the old critical three-fold development theory of the critics is seen

to be contrary to the facts. The way is open now to appreciate the testimony of Old Testament books themselves that they were written by the prophets of old and accepted promptly by the faithful in Israel.

THE SCROLLS AND THE NEW TESTAMENT

Although the Qumran community existed until about 68 A. D., the bulk of our writings came in the pre-Christian period and therefore there was little chance of direct reference in them to Christianity. At least no such reference is found. There are, however, numerous parallels to the New Testament in ideas, in expressions, and in organization of the Qumran community. What can we learn from these parallels?

A variety of answers has been given. Some have said that the Scrolls show us a pre-Christian Christianity and a Messiah before Jesus. Some say John the Baptist was an Essene and Christianity can now be explained away. More positively and cautiously other scholars say we now can fill in the history of early thoughts and properly place Christianity against its background.

We can dismiss at once the headlines. The Scrolls present no rival to Christ or challenge to Christianity. The Qumran Essenes had a leader whom they called the "Teacher of Righteousness" or "Right Teacher." He did not claim inspiration or miracles or superhuman prerogatives. His death is not recorded and his resurrection was not expected or claimed. Some feel that the office was perpetual and there were several such teachers.

A sober estimate of these things is given in a book by T. H. Gaster, *The Dead Sea Scriptures* (New York, Doubleday Anchor, 1956). Dr. Gaster, himself Jewish, argues that even an extreme estimate of the right-teacher "would be poles apart from the Christian belief that the crucified Master was God incarnate Who by His passion removed a sinfulness inherent in man through a pristine fall from grace. Of this basic doctrine of Christianity there is not a shred or trace in the Dead Sea Scrolls," (p.19). Gaster's book translates all the Dead Sea literature in helpful compact form with capable annotations.

The Dead Sea Scrolls do, however, illuminate the background of the New Testament. They show, as we have seen, how immersed in the Scriptures were the Jews of that day. They illustrate also the Messianic expectation of Israel, although the Essenes looked apparently for two Messiahs, a kingly and priestly one. Certain parallels as the contrast of light and darkness, the concept of sons of light, the idea of saints as the temple of God, these show a background of Christian expression in contemporary Judaism.

This is as it should be. We do not seek for the origin of the New Testament. It came by revelation from God. And it came to Jews who knew their Old Testament and used the expressions common to contemporary Judaism. This is all that the parallels with the Dead Sea Scrolls imply.

Here again, however, the Scrolls have confounded critical thought. It has been said by some that parts of the New Testament were late and dependent on the heresy called Gnosticism which claimed a special secret knowledge of heavenly things and mixed Christian ideas with Greek philosophy in curious ways. The Scrolls and also certain discoveries of Gnostic books in Egypt now show us that critics had the cart and horse reversed. Instead of the New Testament being late and dependent on Gnosticism, Gnosticism is late and dependent on the New Testament. The parallels of John's Gospel, for instance are closer with the pre-Christian Scrolls than with second century Gnosticism. It is this development that has led some scholars to say that John could have been written as early as in the 40's. This is a far cry from the date of 170 A.D. assigned by German Scholarship of a century ago! With this early dating of John there falls away the idea that the fourth Gospel is untrustworthy. And thus is established the view that the New Testament picture of the supernatural and risen Christ was the view of the earliest Church.

In many details surely the Scrolls can help in New Testament study. They do not overturn a single point of orthodox belief concerning the New Testament. They rather confirm what orthodox students have said and have made impossible some of the older critical views. The main value of the Scrolls it appears to the writer is in the field of Old Testament studies. But their illumination of the history of the earliest church is a welcome contribution as well. The Scrolls deserve widespread attention and should have our closest study.

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THE SPONTANEOUS GENERATION OF LIFE

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Man has an insatiable curiosity concerning his origin. This urge to know more about his beginning has provided a powerful stimulus for scientific investigation concerning the origin of "life." from non-living material. In late years advances in biochemistry, microbiology, and allied sciences have provided powerful new tools for such inquiry.

In an age dominated by materialistic philosophy one finds infrequent reference to the possibility of life having been initially created by God. It is usually asserted that "chance," operating over a long period of time, provides all the creative force that is needed. Gaffron states, "It is the general climate of thought which has created an unshakable belief among biochemists that evolution of life from the inanimate is a matter of course."¹

It is, of course, true that evolutionary theory, to be successful, needs to account for the origin of life. Darwin himself prior to 1871 in one of his letters spoke of the spontaneous generation of life. He speculated concerning the chance formation of a protein compound in "some warm little pond with all sorts of ammonia and phosphoric acid salts, light, heat, and electricity."²

The search for the answer to the origin of life proceeds along several lines. One is the attempt to synthesize living material today. A second approach is to use modern scientific knowledge to reconstruct how life might have evolved from inorganic chemicals. Another is to attempt to find evidence of life forms in extra-terrestrial sources.

Newspapers and popular magazines often carry misleading headlines. It is not uncommon to read "Life Created in Test Tube" and then go on to discover that the accomplishment has been considerably less significant. So much depends on the definition of life.

What is living material? Actually it is difficult, if not impossible, to offer a definition satisfactory to all. Certainly life involves far more than the mere ability to reduplicate one molecule from the pattern of another. Inorganic crystals have this ability in a suitable medium. Life as an organized process calls for much more. Mora recently listed four characteristics of living material which provide a more comprehensive approach to a definition. (1) A living organism must be autonomous, similar to others of its kind, but not an exact duplicate. (2) It must be self-maintaining, i.e., able to repair itself and to duplicate itself. (3) A living organism must be able to adjust to changing environmental conditions to survive. (4) Finally it must have what Mora calls an "urge" or drive toward "self-

fulfillment."³ Certainly it is not too much to say that any theory seeking to account for the origin of life must start with the obviously inorganic and go at least as far as a functioning cell. Viruses, often regarded as a primordial type of life, do not meet the requirements of this definition. Essentially they consist of a shell of protein enclosing a core of nucleic acid. They multiply themselves only by invading cells of another organism and using its chemistry to produce virus particles. Thus they depend entirely on other life and may be regarded as parasitic.

The theory must first reasonably account for the origin of the macro-chemicals which play such vital roles in the machinery of the cell. Most vital are the highly complex giant molecules called proteins. They are found in every form of life and involved in every basic function of living organisms. Closely allied in the complex are the various deoxyribonucleic acids (DNA) and ribonucleic acids (RNA). These remarkable molecules represent the genetic material of living organisms and are the materials which direct protein synthesis. They almost infallibly pass down to succeeding generations the pattern of each and every living organism. Life without these complex molecules is unimaginable.

Virtually all scientists agree that spontaneous generation is impossible today under existing conditions. The environmental conditions obtaining in our world render organic molecules of the required complexity much too unstable. Oxygen in the air and existing organisms would quickly kill any such new product of spontaneous generation before it had taken its first toddling step. It is universally agreed that such complex molecules as make up living material need the indispensable protection of living systems. They cannot live outside this protective environment.

Thus man is led to attempt a simulation of conditions which he theorizes might have obtained in the early days on the earth. It must be recognized at the outset that this type of scientific activity amounts to speculation. It may rest upon biochemical laws and be judged with reference to them. But it cannot be said to reproduce actual conditions. The Dutch geologist, Rutten, states, "The time elapsed is so enormous that it is difficult to prove anything at all, because the record is not only incomplete in the extreme, but is also often changed beyond recognition by younger events."⁴

Mora agrees. He writes, "This question is not within the scientific domain, at least if we consider

probability as an essential part of a scientific statement.”⁵ Fuller and Tippe give as their judgment. “The evidence of those who would explain life’s origin on the basis of the accidental combination of suitable chemical elements is no more tangible than that of those people who place their faith in Divine Creation as the explanation of the development of life. Obviously the latter have as much justification for their belief as do the former.”⁶

The difficulty of accounting for the evolution of life by spontaneous generation (sometimes called “biopoesis”) is of the highest order. It amounts to cloaking “chance” with all the attributes of deity. In this writer’s opinion it requires a greater act of faith to embrace spontaneous generation than it does to believe in a divine creative act.

The difficult of explaining the evolution of life from the non-living lies in the amazing complexity of the chemistry of the living cell. Even in 1964 biochemists and microbiologists do not profess to understand the intricacies of cell chemistry. Nor do they yet claim confidence in the ability to duplicate its wizardry. To then postulate that the cell, with its rich panoply of chemicals, developed from a few simple inorganic compounds, is to face odds which stagger a statistician and would scare off any gambler. Moreover such an assumption runs contrary to the consistent experience of the chemist who knows the careful controls he must impose when he synthesizes far less complex molecules in his laboratory.

Despite the strong evolutionary dogma against teleology, design is evident in living organisms. Twenty amino acids are commonly found in proteins. The total number, including those discovered by chromatographic techniques, is considerably larger. Only four organic bases occur in the nucleic acids. Yet these few components are linked and coded in such a marvelous way as to spell out the chemistry of life in all its glorious variety. The amino acids in proteins are built chain-like into an architecture of molecules with weights ranging from 12,700 to 760,000. DNA and RNA molecules range as high as two million molecular weight units. These molecules are so structured as to provide coded information for the cell that enables the cell to develop, to maintain itself, to preserve its identity, and to produce off-spring with the characteristics of the living organism. The development of the various systems of the organism as well as the metabolic processes by which they function are governed by this coding. All structure and all activity of living organisms is made possible by the complicated symphonic action and reaction of miraculous molecules in a vast number of cell systems. All are coded and directed by the master chemicals!

Synge has calculated that for one typical protein with a molecular weight of 34,000, containing 288

units selected from 12 amino acids it is possible to obtain 10^{300} isomers or distinctly different protein structures.⁷ If only one molecule of each of these possible proteins existed, the weight of the earth from organic material alone would be 10^{280} grams. Contrast this with the actual weight of 10^{27} grams. How then were the correct codes selected for living material in view of the vast possible number of “nonsense” codes that the continuous rolling of the dice of biochemical chance would produce?

But far more is necessary than merely to be assured of the production of the right molecules. They must be organized in the right systems. Furthermore, they must be protected against degradation so that they might multiply. Living systems are extremely sensitive. Almost all soluble proteins denature upon heating. They are extremely unstable in this regard. Most of the enzymes that catalyze reactions in the cell are damaged irreversibly if exposed to temperatures as high as 40-50 degrees centigrade. Only a few are able to survive above 60 degrees.

Furthermore, peptides decompose readily by hydrolysis to revert to amino acids. The thermodynamic equilibrium for this reaction strongly favors the decomposition. Thus the reaction causes peptides, the precursors of proteins, to degrade to amino acids, rather than to build more complex protein molecules. The amino acids must be activated by the complex ATP (Adenosine triphosphate) before it can pass the energy barrier and be linked in a peptide chain.

Reactions in the living cell call for an exquisite symphony of cooperation. For instance, the oxidative decarboxylation of amino acids requires the cooperation of no fewer than five complex co-factors, each of which is essential. What are the odds that such exquisite and vital balance, such well coordinated chemical syntheses, such intricate coding of living material arose by chance? It is begging the question to say that originally life proceeded by simpler and unknown pathways.

Despite the staggering odds against spontaneous generation many scientists prefer this hypothesis to the creation hypothesis. They have performed experiments with ammonia, hydrogen, water, and other simple chemicals in an effort to simulate a “primordial” atmosphere. Electricity, ultraviolet light, high speed electrons, etc., have been used to induce these simple compounds to combine into more complex molecules. The results have been interesting.

As long as half a century ago Emil Fischer linked amino acids in smaller peptide chains. In more recent years Calvin used radiation from the Berkeley cyclotron to bombard carbon dioxide and hydrogen. He obtained formic acid and formalde-

hyde. Three years later (1953) Urey and Miller used a mixture of methane, water, hydrogen, and ammonia. This mixture was subjected to discharges of high-voltage electricity. Several amino acids were found in the mixture after bombardment. In 1960 Wilson succeeded in producing larger polymers forming sheet-like solids.

Another more recent approach is that of Fox who heated mixtures of amino acids in molten glutamic acid. He felt this simulated conditions which might have existed alongside some primordial volcano. This process produced polypeptides resembling proteins in many respects. Molecular weights ranged from 3000 - 9000.⁸ More recently adenine, one of the organic bases occurring in the structure of DNA was produced by the bombardment of a "primitive earth environment" with beams from a 4.5 million electron volt linear accelerator.⁹

From these and similar experiments it has been concluded that bombardment by cosmic rays, ultraviolet, radioactive materials, and lightning can produce fairly complex molecules. It is then postulated that beginning with these molecules, more and more complicated interrelationships developed until finally "life" had arrived. Indeed a strong spirit of optimism usually accompanies reports of research in this area. Is this optimism justified?

One may begin a critical appraisal by noting that these experiments have been characterized by some scientists as exercises in chemistry and nothing more. Consider the formation of amino acids in Miller's experiment. The results might well have been predicted from the thermodynamic properties of these compounds. They are quite stable, possessing an inner salt structure (zwitterionic). Those who seek to explain the origin of life must start with an explanation of why these compounds have these characteristics? Why do atoms form bonds as they do? For that matter, how do we account for the origin of matter? One may push back the ultimate question; but it cannot be eliminated.

Bombardment of chemical compounds by high energy particles *also* very understandably tears atoms apart, opens active linkages, and gives rise to more complex chemicals. But far more than that is required. Useful chemicals, formed along with a host of useless compounds in the reaction mass would have to be able to function and fight off degradation back to more simple chemicals. They would have to organize themselves into a highly structured system capable of producing the catalysis necessary to pass difficult energy barriers and to ultimately accomplish their own reduplication.

In evaluation of this point Mora judges, "These polymerizations are only exercises in synthetic organic chemistry. They use similar monomers, but they do not really resemble a self-perpetuating, coordinated process, and they do not lead to the

synthesis of a living unit with the characteristic urge. They do not even produce functional polymers with a specific structure." ¹⁰ In effect it is as though a number of meaningful words have been produced by chance rolling of children's alphabet blocks. But what is required is that of the meaningful wisdom and complexity of the Encyclopedia Americana. What are the odds against this having been produced by the rolling of wooden alphabet blocks?

A survey of the literature easily reveals a long list of special environmental conditions which must be provided for life to have been formed of its own accord by spontaneous generation. Unless these special conditions are assumed the theories fall flat. The problems faced by the hypothesis of spontaneous generation are truly challenging.

Most scientists agree that the original environment must have been free of oxygen. Oxygen in the atmosphere would effectively oxidize any early organic molecules and prevent the development of life. It would also by the formation of ozone effectively shield the earth's surface from the high energy ultraviolet radiation required by the theories. On the other hand, ultraviolet light has a lethal effect on living organisms. If it were not filtered out by the atmosphere, no life could exist on earth today. It thus seems a most unlikely source upon which to depend for starting life. The problem is for the theory to account for a manner in which plants would form oxygen quickly enough to prevent ultraviolet rays from sterilizing any living matter that had developed. Since our present supply of green plants would require 5,000 years to double our present oxygen supply, it is most doubtful that the necessary oxygen could have been provided quickly enough by primordial life forms.¹¹

Even the transition from an oxygen-free atmosphere to an oxygen containing environment would be most traumatic for anaerobic organisms. Ehrensverd is of the opinion that the increasing oxygen concentration would have represented a "catastrophe, a brutal intervention in their metabolism." ¹² He believes there must have been "wholesale eradication" of organic life with only a few survivors. We regard the survival of any organisms under the stipulated conditions as most unlikely and question the "escape clause" that some must have quickly and resourcefully developed specialized enzyme systems.

Moreover the possibility of the synthesis of macro-molecules having been carried out by ultraviolet rays has been challenged. Calvin has pointed out that ultraviolet is most abundant in the wave length range from 2000 to 2500 Angstroms. However, these wave lengths are not absorbed by methane, hydrogen, or water. Hence he feels this source of energy may not have played the major role assigned to it by some theories. He turns instead to radiation from potassium-40.¹³

This, however, seems an unlikely prospect in view of the comparatively weak radiation provided by this isotope, unless we postulate a rate of radioactivity far higher than that which we observe today.

A realistic view of any chemical process will consider the concentrations of reactants. Most theorists seem to assume a convenient meeting of chemicals in just the right concentrations. This, however, is a most unlikely assumption. Ehrensverd calculates that the concentration of non-carbonate carbon in the forms of organic compounds in the seas could not have amounted to more than 0.00001 percent.¹⁴ It is not plausible to assume that increasingly complicated reactions would take place in such a thin primeval soup. This objection is usually met by assuming concentration processes in inland lagoons. The weakness of this reply is implicit in the additional assumption required, namely that the prerequisite concentrations were held more or less constant over vast periods of time.

An additional restriction is imposed by the solubility of phosphorus compounds. Phosphorus is essential for life processes. Today available phosphorus is quite limited because it is present in the oxidized form. Calcium ions tend to precipitate calcium phosphate and thus reduce the amount in solution. It is thus unlikely that sufficient phosphorus would have been available in the primordial seas to make it possible to form the requisite compounds. Gulick seeks to overcome this objection by suggesting that originally phosphorus was present in the more soluble hypophosphite form. However, this form tends to oxidize extremely easily to the insoluble phosphate. This means that no oxygen can be tolerated in the early atmosphere. Here again very special conditions and delicate balance and transition are called for to such a degree as to strain the limits of credulity.¹⁵

Spontaneous generation must also account for the origin of the enzymes which speed up the life processes, many of which otherwise proceed with great slowness. Indeed, any satisfactory theory must account for the development of the cell which governs life processes and makes them possible today. It is not enough for Oparin to postulate the concentration of chemicals in little droplets (coacervates). The cell is vastly more than a little sac. The old idea of the protoplasm as a colloidal system has been replaced by the knowledge that the cell is a chemical factory with many different compartments. Under the electron microscope the cell is seen to consist of a three dimensional network of tubules and globules with a diameter of 100-150 millimicrons. Inside this network proceed all chemical processes. They operate under the control of the cell for the service of the living unit. Not only have investigators thus far failed to account for the chance development of such a highly specialized organization; they freely admit we still

have much to learn of what goes on in this area of biochemistry.

It is often overlooked that the concept of a delicately balanced, ordered functioning organism developing from simple inorganic molecules runs counter to the second law of thermodynamics. Disorder comes naturally in nature. Or, to be more exact, an increase in entropy is to be expected. Only in the living cell do we find today entropy decreasing. This is true of the growing state. However, at death the chemicals immediately revert to an increase in entropy, that is to decay and degradation. No one has shown how material originally dead could have reversed this universal principle of nature.

Calvin has observed that the same forces which tore apart the primitive inorganic molecules would start tearing apart the more complex ones formed from the simple.¹⁶ He and others call upon "natural selection" to promote the cause of the more complex compounds by giving them somehow more survival value. However, selection at the molecular level is a far different thing than selection among living plants and animals. Experience with the latter cannot be appealed to in support of the former. Selection at the molecular level is selection only in the passive, physiochemical sense. Under such conditions our knowledge of chemistry indicates we should expect indiscriminate mixing of the chemicals with dispersion and degradation. To say it is not so is to beg the question. Certainly the least that can be expected in support of the theory would be well-worked-out models, taking into full account the questions of mixing and degradation.

Invariably probability is invoked as proof that selection would be successful at the molecular level. It is argued that given enough time and opportunity it is certain that very complex arrangements of the right compounds would come into the proper relationship. Some of these "right" compounds and systems would somehow escape destruction and be given an opportunity to take the next step up the organizational ladder. They would function in such a way that finally a pattern, a pathway would be established and preserved. "Given enough time the improbable becomes the inevitable." This is the creed.

This line of reasoning must be recognized as wishful thinking. The very fact that very long times are invariably involved for these developments in itself is an admission of the improbability of such development. Mora says of this line of thought: "Using such logic we can prove anything . . . When in statistical processes the probability is so low that for practical purposes indefinite time must elapse for the occurrence of an event statistical explanation is not helpful."¹⁷

What we know of chemical processes indicates that such items as the stability of certain configurations of molecules, e.g., the helix, are limited

processes. They resemble crystallization, stopping at the next level without any tendency in the non-living state to go on and on to higher organizational levels. To invoke probability and infinite time to overcome this observed difficulty is to operate on the level of faith.

Living forms have certain peculiarities which any theory of spontaneous generation must take into account. One of these is the optical activity of amino acids. Peptide chains are formed universally of natural amino acids of the levo-configuration. This is most unexpected, since ordinary chemical processes produce racemic mixtures of D and L isomers. Living cells, however, have special mechanisms to hinder racemization and insure the production of the levo-isomers. Gause, Russian expert on optical activity, indicates this as proof that all life on this planet arose from a single source.¹⁸ It should be noted, however, that dextro-series amino acids occur in nature to a very small extent, e.g. in the proteins of certain bacteria.

It is simple to account for optical activity if life was created. However, if it evolved, then the question arises, how did this peculiarity of living material arise? It is most strange since it does not exist in the inorganic world. Several explanations have been offered. One is that the first synthesis took place on an optically active quartz crystal. However, in nature there are as many dextro surfaces of quartz grains as levo surfaces. It is also pointed out by some that sunlight, having passed through the atmosphere, has a slight right circular polarization which might have selectively destroyed dextro forms of early organic compounds. But this presumes a selective destruction not justified by the amount of rotation. It is more likely that all such early unprotected organisms would have been destroyed. Thus optical activity remains as one more indication of created life, as opposed to spontaneous generation.

Finally it is important to note two trends. One is a seeming lessening of interest in the theory that life came from another planet. Some feel that life forms have been found in meteorites, but this has not yet been demonstrated beyond question. It has been pointed out that explaining that life drifted in from another planet only transfers the locale of the problem. Moreover, there is little chance that the spore of any living organism would survive years of drifting through space and enduring fierce radiation. Then, too, the hope of life on Venus has been exploded since it was learned that its surface temperature is about that of molten lead. Mars remains a possible, though unlikely, candidate as a source of life. Certainly it is far less hospitable than the planet earth. The next star system is many light years away. Thus accounting for life seems to be a local problem.

The other trend is a growing recognition that there is something to the idea that life has a design

and what inescapably seems to be a purpose. Waddington recently pointed out that it is inadequate to think of basic processes as being "non-finalistic." He stated, "The non-finalistic mechanisms interact with each other in such a way that they form a mechanism which has some quasi-finalistic properties, akin to those of a target-following gunsight."¹⁹

Mora suggests that science remove its mental block on teleology and consider the "purpose" shown by living things.²⁰

It may well be concluded that modern biochemical research has served to unravel much of the mystery of the chemistry of life. But in the unraveling of the vast complex of cell chemistry it has exposed still more the statistical improbability of spontaneous generation. It is an improbability so large as to be equated with "impossible." The facts point to the hand of God the Creator, who brought matter into being, who fashioned the solar system, who placed life on this planet by the word of His mouth. "For every house is builded by some one, but He that built all things is God." (Hebrews 3:4)

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THE POWER OF ENERGY

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This title may at first disturb the disciplined scientific mind because of its apparent dimensional inconsistency. As a matter of fact, for our present purposes, it might just as well be titled "The Energy of Power." The point to be made, in either case, is that *energy*, as a concept, is tremendously powerful, both in the solution of technical problems and in its implications with reference to the true understanding of nature and the universe. And this is true whether we are speaking technically of energy or its time-derivative, power. Neither is an actual physical substance, of course, but each is an extremely useful and significant concept, without which the great contributions of modern science could hardly have been possible. Dr. R. B. Lindsay, Director of the Ultrasonics Laboratory at Brown University and Dean of its Graduate School, says:

"Of all unifying concepts in the whole field of physical science, that of energy has proved to be the most significant and useful. Not only has it played a major role in the logical development of the structure of science, but, by common consent, it is the physical concept which has had and still has the widest influence on human life in all its aspects. Under the prevailing misnomer 'power,' it is the stock-in-trade of the engineer and that which makes the wheels of the world go round. . . . the interpretation of phenomena in terms of the transfer of energy between natural systems is the most powerful single tool in the understanding of the external world."¹

The power of the energy concept is implicit in the two great laws of thermodynamics, which are without question the two most basic and securely founded of all the laws of physical science. All real processes in the physical or biologic realms necessarily involve transformations of energy from one form into another. The first law of thermodynamics, that of energy conservation, expresses the quantitative equivalence of total energy before and after the transformations. The second law, that of energy deterioration, states that in the process some of the energy must be transformed into non-recoverable heat energy, — not destroyed, but rendered unavailable for use. In terms of "entropy," which is merely a measure of the non-availability of the energy of a system, any natural process or transformation of energy in a closed mechanical system, necessarily involves an increase in the entropy of the system. According to the great Harvard physicist, P. W. Bridgman:

"The two laws of thermodynamics are, I suppose, accepted by physicists as perhaps the most secure generalizations from experience that we have. The physicist does not hesitate to apply the two laws to any concrete physical situation in the confidence that nature will not let him down."²

The universal validity of the first law, that of energy conservation, is also indicated by Gerald Feinberg and Maurice Goldhaber:

"The physicist's confidence in the conservation principles rests on long and thoroughgoing experience. The conservation of energy, of momentum, and of electric charge have been found to hold, within the limits of accuracy of measurement, in every case that has been studied. An elaborate structure of physical theory has been built on these fundamental concepts, and its predictions have been confirmed without fail."³

With respect to the second law, the following evaluation by A. R. Ubbelohde is typical:

"In its most modern forms, the Second Law is considered to have an extremely wide range of validity. It is a remarkable illustration of the ranging power of the human intellect that a principle first detected in connection with the clumsy puffing of a steam engine should be found to apply to the whole world, and possibly even to the whole cosmic universe."⁴

It would be difficult to point to any of our basic methods or formulas in any branch of mechanics or engineering which are not intimately related to these energy requirements. Though the working scientist or engineer may be inclined to overlook them, being engrossed in a tangle of technical details and specific procedures, he will find that both his techniques and basic insights will be greatly strengthened if he maintains a continual awareness of the fundamental energy relationships to which his designs and decisions must conform.

It is not too surprising, then, to find that these relationships and the very concept of energy itself lead to tremendous inferences far beyond the realm of mechanics and thermodynamics to which they were first applied. The basic nature of "energy" or "power" is still enveloped in mystery. Energy can appear in many quantitatively interchangeable forms, — electrical energy, chemical energy, sound, heat, light, pressure, magnetic energy, mechanical energy, etc. And one of man's greatest scientific discoveries has been that of the identification of matter itself as merely one form of energy, so that the law of mass conservation becomes only a special

case of the law of energy conservation, and matter becomes under the proper conditions interconvertible with other energy forms.

Since all the physical universe, including matter, is ultimately energy, and since energy can be neither created nor destroyed, according to the conservation principle, the inference is that the totality of energy in the universe has never changed since its origination. Either the universe has always existed in its present state (and this is contradicted by the second law of thermodynamics), or it was at some time in the past brought into its present state, necessarily by means of laws or principles not now operative in the universe. Once these latter laws were superseded by the present conservation-deterioration laws, there could have been no additional creation or destruction of the physical stuff of the universe.

This fact is not obvious from a superficial examination of nature, which exhibits numerous cases of *apparent* causeless origins and *apparent* increases of order, reflected in the many crude notions of spontaneous generation and evolution held by ancient philosophers. The conservation law has only been accepted within the past 120 years, after much scientific labor and against much opposition. It is remarkable, therefore, that in the first chapter of Genesis, following the familiar Biblical account of creation, appears the following:

"Thus the heavens and the earth *were finished*, and all the host of them. And on the seventh day God *ended his work which he had made*; and he *rested* on the seventh day *from all his work which he had made*" (Genesis 2:1, 2).

With reference to the energy balance of the earth, which of course depends almost wholly upon the influx of solar radiant energy, the further significant statement is made that the function of the sun, relative to the earth, was:

"— to give light unto the earth" (Gen. 1 :17).

Whether or not the writer understood the significance of this assertion, the fact remains that the sun's "light," or radiant energy, provides all the earth's usable energy except that of its own rotation and the nuclear energy of its atomic structure. The sun's light maintains the physical and biologic life of the earth. It has been calculated ⁵ that all of the stored-up energy sources of the earth, — its coal, oil and gas reserves, its peat and timber, even its fissionable uranium, would only suffice to keep the earth going for about three days if the sun's energy were to be cut off!

The energy of light, in fact, may be considered as the most basic of all the forms of energy. It includes all radiant energy, from the X rays and cosmic rays and other short-wave-length radiation at one extreme, through visible light, heat, and the electro-magnetic rays at the opposite end of the spectrum. The energy of matter is basically

light energy, with matter and energy related by the Einstein equation through the fundamental and universal constant of the velocity of light. The first creative command of God, according to the Genesis record, is thus very significantly said to have been:

"- Let there be light: and there was light" (Genesis 1:3)

The energy conservation law is occasionally said not to have proved universally successful when applied to phenomena on the sub-atomic scale. Quite possibly this is because of the still very incompletely understood nature of these phenomena, and in fact the somewhat still mysterious relation between matter and energy. Of course, this area of investigation is so complex and specialized and so rapidly changing that no one but a very up-to-date nuclear physicist should hazard any definite statement about the basic significance of nuclear phenomena.

However, within the accuracy of all pertinent experimental evidence, it is true that the energy conservation principle has been demonstrated true on the sub-nuclear scale no less than on the scale of ordinary experience. As Feinberg and Goldhaber have recently pointed out:

"Thousands of laboratory experiments, performed in different ways and measuring all the quantities involved, have confirmed that the laws of conservation of energy and momentum do hold true in the domain of elementary particles... It is clear that the laws of conservation of energy and momentum, introduced . . . to describe collisions between macroscopic bodies, also apply with remarkable accuracy to the collisions and interactions of sub-atomic particles." ⁶

One thing is certain, and that is that the energies associated with the various nuclear particles are tremendous and, when partially converted into other forms of energy through nuclear fission or thermonuclear fusion processes, the physical effects can be cataclysmic. The source and nature of the binding energy that normally maintain the integrity of the atomic structure against the powerful electrical forces tending to disintegrate it are yet quite uncertain, although many of its characteristics have been determined.

As the physicist R. E. Peierls says:

"The next fundamental problem that arises is that of the nature of the forces which hold the neutrons and protons in a nucleus together . . . the attractive energy that holds any one particle in the nucleus is, in general, of the order of 6 to 8 million volts . . . to obtain the precise laws of the nuclear forces is one of the central problems of nuclear physics, which is not, as yet, completely solved." ⁷

And the problem today seems as far from solution as ever. As modern research has thrown more and more light on the nature of the nucleus, with its

various sub-nuclear particles, the more complex does its nature seem to be. Even if its physical character is eventually completely understood, its basic origin and source would still be at best a matter of pure speculation. Peierls admits:

"Even if one day we find our knowledge of the basic laws concerning inanimate nature to be complete, this would not mean that we had 'explained' all of inanimate nature. All we should have done is to show that all the complex phenomena of our experience are derived from some simple basic laws. But how to explain the laws themselves?"⁸

Another quite remarkable assertion of the Scriptures is pertinent here. The writer of the Epistle to the Hebrews mentions that, having first made the worlds, God (through His Son) now is continually "upholding all things by the word of his power" (Hebrews 1:3). A legitimate paraphrase of the Greek original here would be that He is "maintaining the physical integrity of the matter of the universe by means of the continual efficacious outflow and outworking of His innate infinite reservoir of basic energy."

The same intimation of the maintenance of the integrity of matter by a certain basic and primal form of energy (and therefore of the essential equivalence of matter and energy) is suggested also by St. Paul, when he says:

"In him (i.e., Christ) all things hold together" (Colossians 1:17).

and by St. Peter, who says that:

"— the heavens and the earth which are now, by the same word are kept in store" (II Peter 3:7).

But the full import of the energy concept cannot be grasped until we consider also the second law of thermodynamics. In any closed system, in which energy transactions take place, the availability of the energy for the performance of useful work must always decrease. The total energy remains unchanged, but its usefulness has decreased.

This physical phenomenon is not at all obvious on the surface of things and had to overcome much opposition before it became generally accepted as scientific truth. It seemed to contradict the philosophy of progress and developmental evolution. Nevertheless, the brilliant theoretical and experimental researches of Carnot, Clausius and Lord Kelvin, followed by numerous others in more recent decades, have definitely proved this second law to be of essentially equal validity with the first. In recent times, it has even been possible to analyze and predict in some cases actual rates of energy dissipation (or entropy increase). This sort of study, of course, becomes of great practical importance in engineering design and analysis. Energy dissipation is often of paramount importance in the mechanics of the conversion process and its

efficiency, and therefore in its cost of operation. The second law of thermodynamics precludes the design of any process or machine 100% efficient, as well as any sort of perpetual motion device.

Because of the historical background, it has been customary to think of these two laws of thermodynamics as more or less interdependent. However, there does not seem to be any necessary connection between them. The fact that the totality of energy remains constant does not in itself imply at all that its availability should continually decrease. In fact, there now exists a considerable body of evidence that this so-called second law of thermodynamics is only a particular application of a much more general law which deals not only with the phenomena of physical energy but also with many other categories of phenomena in the physical, biological and perhaps even in the psychological and sociological realms. This broader law has been called, by the British physicist, Dr. R. E. D. Clarke, the "law of morpholysis,"⁹ a term derived from two Greek words, and meaning simply "loosing of structure."

This term seems admirably adapted to describe a very important and apparently universal phenomenon, namely that there always exists a tendency in nature towards disorder or disorganization. The law of morpholysis merely formalizes the everyday observation that any evidence of order or organization requires some sort of explanation to account for it, whereas anything exhibiting randomness or disorder or 'heterogeneity is *per se* "natural" and does not call for any explanation as to how it was thus arranged. The natural tendency is always from the state of maximum improbability to that of maximum probability, from the organized to the disorganized. Any sort of ordered arrangement requires some sort of external agency to bring it about. Harold F. Blum, Professor of Biology at Princeton, says:

"All real processes go with an increase in entropy. The entropy also measures the randomness or lack of orderliness of the system, the greater the randomness the greater the entropy; — the idea of a continual tendency toward greater randomness provides the most fundamental way of viewing the second law . . ."¹⁰

Even from an engineering viewpoint, this is now recognized as the real significance of the second law of thermodynamics. This concept of entropy explains energy deterioration in terms of decreased order of molecular or atomic structure. In discussing the entropy concept and some of its newer application, Dr. W. L. Everitt, Dean of Engineering at the University of Illinois and past president of the American Society for Engineering Education, points out that:

"— it may be inferred that entropy is a measure of randomness, confusion, or lack of organi-

zation. Such a term can be applied not only in a thermodynamic sense, but also to information problems.”¹¹

This tendency toward disorder is of course apparent in many realms beside that of energy dissipation. There is the phenomenon of aging and death in living creatures, for example, still very incompletely understood but apparently related to the breakdown of complex and unstable protein molecules into simpler and more stable ones, less able to transmit free energy for biologic processes.

Similarly, the primary mechanism of biologic evolution of species, that of mutation of genes in the germ cells, operates when some disorganizing medium such as short-wave-length radiation, certain powerful chemicals, etc., penetrate the germ cell and disturb its previously highly organized chemical structure. The reshuffling of genetic factors thus induced would nearly always decrease its degree of order and organization and therefore result in a less viable and efficient organism. This is why almost all, perhaps all, mutations are either lethal or harmful to the creatures experiencing them, in their struggle for existence. This is supported by no less an authority than Dr. H. J. Muller, perhaps the world's outstanding living geneticist and authority on mutational mechanics:

“It is entirely in line with the accidental nature of natural mutations that extensive tests have agreed in showing the vast majority of them to be detrimental to the organism in its job of surviving and reproducing, just as changes accidentally introduced into any artificial mechanism are predominantly harmful to its useful operation. According to the conception of evolution based on the studies of modern genetics, the whole organism has its basis in its genes. Of these there are thousands of different kinds, interacting with great nicety in the production and maintenance of the complicated mechanism of the given type of organism. Accordingly, by the mutation of one of these genes or another, any component structure or function, and in many cases combinations of these components, may become diversely altered. Yet in all except very rare cases the change will be disadvantageous, involving an impairment of function.”¹²

It is probable that such mutational deteriorations account for many phenomena of paleontology and morphology, such as vestigial organs and the fact that most modern creatures are represented in the fossil record by larger and more highly developed individuals than their modern counterparts. Mutation, isolation, inbreeding, etc., also may account for the historical deterioration of once virile sociological units of peoples and cultures, encountered so frequently in the study of history.

But it is the cosmological implication of morpholysis that is of greater significance. If the entropy

or disorder of any closed system must continually increase, and since the universe may be regarded as a very large, but finite, closed system, it follows that the universe as a whole is becoming progressively more disordered. Its reservoir of physical energy is continually degrading, tending ultimately to a state where all energy will have deteriorated to unavailable heat energy. The universe, in other words, is “running down”; it is growing old, wearing out.

It cannot, therefore, be infinitely old; if it were, it would already have attained this state of maximum entropy. It must have had a beginning. If it is growing old, it must once have been young; if it is wearing out, it must have once been new. A universe now running down must first have been “wound up.”

This is the inexorable conclusion of the second law, unless one is disposed to assert a continual evolution of fresh matter or energy out of nothing somewhere in space (according to the theory of Fred Hoyle and others) or to insist that the universe is pulsating, with the entropy as periodically reversed to permit its rewinding. Neither of these alternatives, of course, is supported by a shred of *direct physical evidence*, but only by assumptions as to what, in the judgment of their proponents, the nature of things *ought* to be.¹³ On the other hand, there is literally a tremendous mass of direct physical evidence supporting the entropy law.

However, these alternate hypotheses do point up one fact, namely that the morpholysis principle is not inherent in the basic nature of things. The very fact that men of intellect can conceive and support alternative theories proves this. This tendency toward disorder seems somehow, intuitively, to be an unwelcome intruder into the ideal nature of things, something that *ought not to be*, but which nevertheless *is*. Just *why* this deteriorative principle is an apparently universal law is seemingly beyond the reach of scientific discovery.

But here it is possible that the Scriptures, already seen to contain remarkable intimations about the fundamental nature of things, may again have something significant to say. The basically spiritual nature of energy has already been inferred, so that the principle of deterioration of energy may likewise involve spiritual overtones.

Thus, the Christian doctrine of the Fall of man and the resultant curse of God on His creation, as taught in Genesis,¹⁴ although often rejected as mythological by modern intellectuals, is able to provide at least a causal explanation for the universal phenomenon of morpholysis. At the same time, it refutes the hopelessly pessimistic future of the universe implied by the second law of thermodynamics by reminding us that He who established the creation and who later imposed upon it the

curse of corruptibility and decay, is yet Himself outside the creation and therefore not subject to its laws. For example, quoting again the author of Hebrews, who in turn is quoting Psalm 102:

“And, Thou, Lord, in the beginning hast laid the foundation of the earth; and the heavens are the works of thine hands: They shall perish; but thou remainest; and they all shall wax old as cloth a garment; And as a vesture shalt thou fold them up, and they shall be changed: but thou art the same, and thy years shall not fail.”¹⁵

A future time when the curse shall be removed from the earth and when, therefore, the law of morpholysis will presumably be “repealed” is often promised in Scripture. In the classic eighth chapter of Remans, said by Martin Luther to be the greatest chapter in the Bible, St. Paul says:

“For the creation was made subject to vanity, not willingly, but by reason of Him who hath subjected the same in hope, Because the creation also shall be delivered from the bondage of corruption (literally “decay”) into the glorious liberty of the children of God. For we know that the whole creation groaneth and travaileth in pain together until now.”¹⁶

But for the present we must continue to live with the entropy principle. The engineer must continue to design his machine or process with full allowance for the effects of energy dissipation. Great strides are being made in the broader application of these concepts of energy conservation and deterioration, in atomic energy, computers and automation, rocketry, inertial guidance, and even in such fields as information theory. A more incisive and inclusive understanding of the real character of the second law, especially, will undoubtedly result in still more remarkable technological advances, in probably every area of science.

But one cannot help but sense a danger, even perhaps a probability, that new scientific and technological break-throughs may, as has often been true in the past, only accelerate the sociological and moral morpholysis. Energy and entropy are, we repeat, basically non-material, even spiritual. in essence.

As to sources of strictly physical power, it appears that the so-called Christian West is rapidly being overwhelmed by the anti-Christian forces of the world. In manpower, it has long been obvious that the West is immensely inferior. In potential energy sources, considering the vast and largely untapped resources of Russia, Asia, and probably Africa, the reservoir of the East is again far larger than that of the West. Even in the non-material resources of intellectual and moral power, there is no little evidence today that the Eastern peoples are at least the equals of those in the free world.

In a day and age in which the balance of power in a technological sense has been superimposed upon the old concept of the balance of power in a military sense as determinative of the world's future, we have suddenly come to realize that our Western delusion of perpetual superiority may be tragically unrealistic. Evidences are multiplying that the true balance of power in the world henceforth may favor those forces that are being arrayed in opposition to us.

But there does remain one largely unused source of power, access to which is more to be valued than all others combined. The One who inhabits eternity, Who has created and Who “upholds all things by the word of his power,” is Himself the source of all physical, intellectual, moral and spiritual energy. Access to this spiritual power (and often even to physical and intellectual strength) is obtained through prayer and a Christ-centered faith, according to the testimony both of Biblical revelation and of millions of individual Christians across the centuries, including the writer of this paragraph. In the words of St. Paul:

“For I am not ashamed of the gospel of Christ, for it is the power of God unto salvation, to every-one that believeth —” (Remans 1 :16).

Therefore, for instruction in the matter of power sources for those who deal in science and technology, for insight into the universal significance of the concepts of energy and power, for encouragement to all who are disturbed over world conditions, and for personal exhortation to those individuals who would seek for roots in eternity, we close with the words of Him who, after dying in atonement for the sins of fallen man and then after winning the ultimate triumph over the universal rule of decay and death by His bodily resurrection from the tomb, could say with all assurance:

“- All power is given unto me in heaven and in earth. — And, lo, I am with you alway, even unto the end of the world. Amen” (Matthew 28:18,20).

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- ¹⁴Genesis 3:17-19. See also Remans 5:12, I Corinthians 15:21, 22.
- ¹⁵Hebrews 1:10-12. See also I Peter 1:24, 25; Matthew 24:35; Isaiah 51:6, etc.
- ¹⁶Romans 8:20-22. See also Revelation 21:1, 4; 22:3; Isaiah 66:22; II Peter 3:13.

PROPOSED RESEARCH ACTIVITY

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I am studying what is believed by uniformitarian geologists to be the "overthrusting" of large blocks of sedimentary strata on to other strata. "Overthrusting" (the uplift of a block of the earth to some height and then the thrusting of this block horizontally over lower lying strata; was invented by the uniformitarians when many cases of the sedimentary strata were found to be reversed or upside down from the order prescribed by the a priori theory of evolution. This matter was studied extensively by the late Professor George McCready Price. From Price's works and references in "The Genesis Flood" by Morris and Whitcomb, the evidence points strongly that overthrusting on the scale postulated by most geologists is impossible

physically. The recent hypothesis of Hubbert and Rubey that fluid pressure within the overthrust block can account for overthrusting certainly does not seem correct.

I plan to make field studies of some of the the so-called "overthrusting" using the principles and basic laws of physical mechanics. Among some of the prominent cases of supposed overthrust are the Alberta-Montana Rockies Overthrust, Bannock Overthrust, Heart Mountain Overthrust, Cumberland Mountain Overthrust, the Matterhorn and the Mythen Peaks. These areas have sedimentary strata in order completely nullifying the succession of life hypothesis of evolution.

HAROLD S. SLUSHER

PALEOBOTANICAL EVIDENCES FOR A PHILOSOPHY OF CREATIONISM

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The topic of origins is usually treated as if it lay exclusively in the domain of science. Such classification is unfortunate and erroneous when the limitations of the scientific method are evaluated. Science improperly equipped to cope with problems of "how" here and now. For example, such matters as: 'how chromosomes migrate in dividing cells,' "how water ascends in the trunks of trees," and "how sugars move in phloem tissue" fall clearly in the sphere of science. Yet none of these sample problems has been thoroughly and absolutely settled. If scientific methods as yet cannot completely solve contemporary problems, how can these same methods be expected to yield absolute answers about origins? This does not belittle the amazing achievements of experimental science, but throws the limitations of the method into full focus. To move from present to *primaeval* past moves from experimental science to speculative and philosophical science. As the late Harry Rimmer has said:

We may as well state at the very onset that it is crass nonsense to talk about a science of origin. In science we deal not with origin. That is rather the sphere of philosophy ¹(pp. 70 & 71).

Thus the study of origins is not entirely science but is rather a philosophical system built upon scientific data.

The most direct line of scientific evidence involved is the fossil record. At least six puzzling propositions become apparent from a study of fossil plants. It is presently maintained that these six premises are readily explained by the "group" or "kind" creation proposal of Genesis, but cannot be adequately interpreted by any evolutionary theory — be it theistic, deistic, or naturalistic evolution. Evolutionary explanations of these six theses have of course been devised, but only with considerable embarrassment and rationalization.

1. Complex forms frequently appear before the simpler ones with no hint of an evolutionary ancestry.

Most evolutionary schemes postulate the flagellate organisms as working models of a primitive ancestor for all subsequently appearing life. (Flagellates are one-celled green or nongreen organisms with a whip-like organ of motility.) Theodore Delevoryas states that there is little hint of *Chlamydomonas* spp. or any supposed flagellate ancestors in early fossil layers.² (p. 12) It is maintained by some evolutionists that one would not expect to find fossils of delicate cells such as the flagellates. However, equally delicate structures are recorded

in other instances. *Phacotus* (a flagellate-like form) is found in tertiary remains.³(p. 12) Delicate fungal hyphae have been found in Meso-Cenozoic sedimentary rocks,⁴ and on leaves from Eocene fossils.⁵ Fossils of soft-bodied creatures such as jellyfish are also known ⁶ (p. 26). Wesley reported that rhizoids, fungal hyphae, and blue-green algae are well preserved in chert ⁷(p. 11). Thus the absence of supposed flagellate organisms in early layers cannot be easily rationalized. Likewise, the various groups of algae enter the fossil record with no hint of an evolutionary ancestry ²(p. 16). In addition, the fungus groups manifest themselves without any previous phylogeny ²(p. 17).

The mosses and liverworts are discreet entities in whatever layer their fossils are found ³(pp. 398-402) ²(p. 18).

The "telome theory" is a popular theoretical plan for deriving the vascular plants (plants with food and water conducting systems) from simple ancestors. This theory suggests that branched leafless Silurian and Devonian plants such as *Rhynia Gwynne-Vaughani* serve as working models of vascular plant ancestors. Accordingly, the branches or "telomes" of the generalized leafless ancestor supposedly condensed and joined yielding the various plant organs (e.g. leaves) of later vascular plants.

Two distinct and perhaps insurmountable problems face the telome theory. First, although leafless and much-branched, *Rhynia* sp. (and other early psilophytes) are by no means "simple." When they appear in the fossil strata they are already complex in their tissue structure since they have been found to possess conducting cells, stomata, guard cells, spores, etc.³ (pp. 32-43) ²(pp. 25-31). These complex land plants manifest themselves in the fossil rocks with no previous lineage. Although evolutionists believe these plants have come from the green algae, there is no known ancestry for them. Secondly, leaves are supposed to have formed as branch systems (like those of *Rhynia* sp.) condensed and fused by evolution. In rocks of the same fossil layer (Devonian) plants with large ginkgo-like (fan-shaped) leaves are also present (*Platyphyllum*, *Cyclopteris*, *Ginkgophyllum*, *Psygmonophyllum*, *Germanophyton*, and *Enigmophyton*) ³ (pp. 54 & 55).⁸ *Aldanophyton antiquissimum* is a fossil plant specimen having shoots covered with small leaves about 9 mm long. This leafy plant occurs in Siberian Middle Cambrian rock and is thus supposedly older than *Rhynia* sp.³(p. 47). Thus the supposed telome ancestral prototype shows up at the same time as or even later than the supposed leaf-bearing descendants.

The groups of land plants in general are independent entities as far back as they are discovered in fossil rock. It is for this reason that some evolutionists feel obliged to accept a polyphyletic view of land plant origin² (p. 21). Although cast in a different philosophical framework, a polyphyletic ancestry is exactly what Biblical creationism proposes. Creationism solves the vexing problems encountered by evolutionists in evaluating the fossil series. Certain creationists believe that the entire fossil record is best interpreted as a layering of ecological zones during the progressive inundation of the earth at the time of the great flood. This flood-geological orientation has been ably defended by Clark⁹ and Morris and Whitcomb.¹⁰

There is no indication of an evolutionary history for the lycopsids of today are usually small, low-growing, evergreen perennials. Earliest lycopsids from Silurian (*Baragwanathia*) and Devonian rocks (*Drephanophycus*) are complex and specialized plants. Although they have been used as typical ancestors for other plants in certain evolutionary schemes, it appears that the Lycopsidea group produced no other plant groups² (p. 49).

In the study of Arthrophyta another puzzle presents itself. The modern arthrophytes are short plants with longitudinally ridged stems having whorls of branches at various regular intervals. A modern example is the "horsetail" or "scouring rush." Fossil spore-bearing structures of an arthrophyte *Cheirostrobos pettycurensis* have been found. These are complex twelve-membered whorls of two-parted sporangial-bearing appendages³ (pp. 284-286)² (pp. 63 & 64). Delevoryas calculates a total of 144 sporangia (spore sacs) at only one such node! A spore is a microscopic one-celled reproductive unit. The point is that this extremely complicated and advanced spore bearing organ appears in the fossil record in the Lower Carboniferous strata — which means according to stratigraphic theory that it existed before most of the simpler arthrophyte spore-bearing structures. The going evolutionary idea is therefore that sporangiate organs evolved from complex to simple. But even if the advanced and simpler types did evolve from complex forms such as *Cheirostrobos pettycurensis*, where did the early intricate forms come from?

A stratigraphic study of fern fossils poses a series of similar enigmas. In the first place, the simpler coenopterid appear mostly in the Carboniferous, after the more complex protopteridales which show up back in the Devonian² (p. 69). Some evolutionary theorists propose the coenopterid as ancestral to the modern ferns. Delevoryas rejects this idea² (p. 79) since some of the supposedly descendant forms of ferns lived contemporaneously with the coenopterid. Secondly, some ferns were homosporous (bore only one size of spores), while other fossil ferns were heterosporous — bearing two different types of spores, one usu-

ally larger than the other. Evolutionary theories generally suggest that the heterosporous plants were derived from the supposedly simpler homosporous forms. In the fossils of the genus *Stauropteris*, the heterosporous species *S. burntislandica* appears in the Lower Carboniferous, earlier than the simpler homosporous *S. oldhamia* of the Upper Carboniferous² (p. 72) ! Thirdly Delevoryas has stated on the basis of leaf form and arrangement that some of the most complex of the coenopterid petioles (Zygopteridaceae) appear early in the record — Devonian² (p. 76). (The petiole is the stalk-like basal portion of a leaf.) Fourthly, some fossil ferns produce additional woody tissue (secondary xylem) each year by a growth of cambial tissue as do our trees today. Other fossil ferns produced no new woody tissue once the stem had expanded — like our modern herbs. Some of the earliest ferns or fern-like plants (*Aneurophyton germanicum*) were huge plants that produced secondary xylem. The later and more modern ferns were herbaceous (produced no secondary wood.) Once again in the study of fossil ferns a complex arrangement shows up before the simpler counterpart³ (p. 68)² (pp. 69, 70, 93).⁵ Fifthly, another fern family (Marattiaceae) manifests itself in well-established fashion in Upper Carboniferous strata with little indication of its previous history³ (p. 94). Sixthly, the ferns of the family Gleicheniaceae appear suddenly in about the same stratum³ (p. 94). These six examples illustrate that the fossil history of ferns is the sudden appearance of discreet forms rather than the gradual evolution of groups from groups.

In the Arthrophyta, where complex forms appeared first, evolutionary theory suggests that plants changed from complex to simple. However, in a study of ferns and fern-like plants where successively higher strata show simple "pre-ferns" first and complex forms later, evolution is supposed to have gone from simple to complex. It looks as if evolutionary theory is of very little predictive value but is simply a rationalization or "afterthought" of whatever paleobotanical data appear!

In fossil botany the term "seed" designates a sac (megaspore) usually containing only one large spore (megaspore) and with a tissue or tissue system (integuments) covering the entire sac. In modern seed plants the seed frequently becomes detached from the main plant and an embryo producer within the seed can yield a new plant. Seeds or seed-like reproductive bodies are found attached to several different kinds of fossil plants. Although hypothetical schemes have been devised, no one knows how the seed came into existence in any of the seed-bearing plants² (p. 97).

Seeds were borne on some fossil plants with fern-like leaves (Pteridospermales or "seed ferns"). Some evolutionists believe that seed ferns arose from the true ferns (fern-like plants without seeds).

Some of the seed ferns (*Calatrospermum* spp.) are present earlier in the record than are the true ferns from which they supposedly evolved! For this reason some evolutionists believe ferns and seed ferns have had an entirely independent or "polyphyletic" origin³ (p. 159). There is no evidence that the pteridosperms originated from the true ferns. They simply appear in the Lower Carboniferous leaving no clues of any ancestral history² (p. 128). Once again a miraculous creation by non-evolutionary mechanisms finds ample supporting evidence from the fossil series.

Seed ferns varied in the way seeds were attached to the plant. Some bore their seeds on a truss with many branches (*Eurystoma angulare*). Others such as *Stannostoma huttonense* had a pair of more symmetrical trusses on each stalk.¹¹ Others had many seeds borne on stalks within one cupule (*Calathospermum* spp.) Some like *Gnetopsis elliptica* had only a few seeds within a cupule. Still others had only one seed in a much-reduced cupule (*Lagenospermum* spp., *Neuropteris tenuifolia*, and *Pecopteris pluckenetii*),^{12, 3} (pp. 157-159) (pp. 168-169). In a fascinating paper, Mary Hubbard and the late Wendell Camp have proposed a theoretical plan of seed fern cupule evolution. Andrews¹¹ likewise presents a plan of cupule evolution on the basis of such finds. The seed-bearing branches of a truss (as in *E. angulare*) supposedly fused to form a many-seeded cupule (as in *Calathospermum* spp.). Subsequent evolution supposedly reduced the number of seeds within the cupule to a stage like *Gnetopsis elliptica*, and finally to one seed in the cupule as in *Lagenospermum* spp. and others.¹² Considering the supposed stratigraphic dates, it is most interesting that the truss-like ancestor appears at about the same time (Lower Carboniferous) as do the supposedly descendant many-seeded cupule and the few-seeded cupule!^{12, 3} (pp. 154 & 155). For a known fossil to be the prototype of a supposed ancestor or link in an evolutionary series, it should appear at the appropriate geologic time level. It may be an interesting academic exercise to build evolutionary series from three fossils which first appear at about the same time, but such an endeavor can hardly be taken with any certainty. Forms which show up contemporaneously probably have not given rise to each other. When these fossil finds are viewed objectively — either in a catastrophic or uniformitarian framework of geology — there is no evidence for evolutionary descent since all these forms were contemporaries. Thus Andrews' and Camp and Hubbard's interesting scheme for cupule evolution is particularly speculative. Even if their theory were valid, the complex truss and cupule bearing seeds (ovules) with intricate pollen-trapping appendages (*Gnetopsis* spp.) or pollination droplets in others make their appearance in the record without clear ancestral information. In fact, Camp and Hubbard state that the ovules

on these early fossil forms are more advanced than the ovules or seeds of our modern flowering plants.¹² Andrews¹¹ presents a series of different fossil seeds as evidence for the evolution of the integument (a cylindrical covering of the seed) from an integument divided into a series of distinct filaments. However, both the "primitive" and "advanced" integument types appear in the same layer — Lower Carboniferous — with no evidence of a common ancestry.

Some fossil plants bore their seeds with no fruity covering and hence were naked-seeded or "gymnosperm" plants. Several distinct groups of gymnosperm make their appearance in the strata. Since some of the gymnosperm plants are found in the same levels as the seed ferns, evolutionists are not sure if the gymnosperm are directly related to the seed ferns² (p. 101). In fact, the cycadophytes (plants like the modern cycads) were already a well-defined set of groups when they first appeared at the Permian and Triassic layers³ (p. 312). There is no hint of an evolutionary descent. Henry Andrews believes that they had an origin independent of the seed ferns. He concludes that gymnosperm and seed fern plants may have arisen separately along two different lines from a very early state³ (p. 312). It appears reasonable to believe that the groups of cycadophytes were each created.

Some gymnosperm plants bear their seeds upon leafy scales of "cones" and are thus called "conifers" (cone-bearers). The conifers also are an evolutionary conundrum since they have been a definite and separate group as long as the seed ferns² (p. 149). Andrews believes that the Cordaites-conifer group has arisen independently of any other seed plant group³ (p. 315).

Another gymnosperm plant group is the Gnetales — an example of which is the present day Mormon Tea plant or *Ephedra* spp. Delevoryas indicates that little is known about the origin or evolution of the Gnetales group. *Ephedra*-like pollen is found as early as the Oklahoma Permian deposits. Andrews states that even in such early layers the pollen is clearly recognized as that of a gnetalean genus — *Ephedripites*³ (p. 460)² (p. 165).

The ginkgos (e. g. the modern Maidenhair tree with its fan-shaped leaves) and the Taxales (evergreen shrubs such as our "Yew" trees) are other groups of gymnosperm. Concerning these groups, Andrews quotes Florin as stating that as far back as fossil material is found, the conifers, ginkgos, and Taxales are distinct and clearly differentiated from one another³ (p. 315). Delevoryas cites evidence to demonstrate that the Taxales have been a distinct group since the Jurassic times² (p. 163). Wesley states that there is little likelihood that the single terminal seed of the Taxales is derived from the conifers⁷ (p. 49).

2. Supposedly "advanced" and "primitive" characteristics occur in the same fossil plant.

Only two examples of this second enigma will be considered, although others exist. The Upper Devonian fern-like plant *Racophyton zygopteroides* is primitive in many respects (e.g. no leaf blades present) but is quite advanced in that it presents an intricate three-dimensional system of branches (some bearing sporangia) ²(p. 92) ³(p. 64).

Before Charles Beck's work of 1960, *Archaeopteris* spp. (with its long, primitive, fern-like leaves) was thought to be quite distinct from *Callixylon* sp. which had the advanced woody anatomy of the gymnosperms. In Beck's work, however, *Archaeopteris* spp. leaves are reported as attached to a *Callixylon* sp. stem ⁸! In woody anatomy *Archaeopteris* spp. is therefore as "advanced" as most gymnosperm, yet its leaves are fernlike ^{8,12}. Although evolutionists plead that it is possible for part of a plant to evolve more quickly than another part, it is presently postulated that the discovery of primitive and advanced features in the same fossil specimen is more easily and more adequately explained from the standpoint of non-evolutionary creationism.

3. Modern forms frequently are identical or similar to remote fossil specimens.

Changes in the non-vascular plants (e.g. fungi and algae) throughout geologic strata have been only slight. Frequently extant algae are quite similar to the fossil types. Also in the mosses and liverworts extant forms are similar to the fossil entities. Any evolutionary descent for mosses or liverworts is a puzzle ³(p. 398, 406) ⁷(p. 5 & 6). The genus *Lycopodites* of the Paleozoic is like the *Lycopodium* or "ground pine" of today ²(p. 47). Plants with fan-shaped foliage like modern ginkgos have been found from the Upper Devonian to the present ^{8,3} (p. 54 & 55).

A persistent and perhaps unanswerable question that faces the "living fossil" concept is, "Why did certain plants stop evolving long ago?"

4. Where supposed phylogenies (family trees) are postulated, significant gaps occur.

The evidence for gaps in supposed ancestral trees is so well-recognized by both creationists and evolutionists that only two brief examples will be presented. For a review of literature pertaining to the gaps see Arthur Cushman ¹³ and Paul Zimmerman."

The arthropytes in higher layers such as the Calamites (tree-like plants resembling the "horsetail" of today) are supposed to have descended from a prototype something like *Protohynia janovii* of the Lower Devonian or *Calamophyton* spp. of the Middle Devonian. But Andrews believes there is a gap between these early supposedly ancestral

plants and the later arthropyte groups of the Carboniferous ³ (p. 285).

The cone of coniferous gymnosperm is supposed to have originated from earlier plants which bore seeds on short branched stalks. The supposed ancestral types such as *Cordaianthus* spp. bore their seeds on dwarf leafy branches. At the base or axis of each leaf on the dwarf branch, there arose a secondary dwarf branchlet. The dwarf branchlets were composed in turn of bracts (leaf-like structures) — some of which were sterile and some of which (the more terminal ones) bore seeds. The whole reproductive structure was thus a leafy branch with many branchlets, each branchlet bearing bracts and seeds. The branch is supposed to have lost bracts and seeds from the branchlets by evolution until only two seeds (and perhaps a bract) were left in the leaf axil — this then being a structure like the modern pine cone. Although Andrews himself believes such a series is clearly illustrated through the sequence of *Cordaianthus pseudofluitans* (many bracts and seeds on a branchlet) to *C. zeilleri* (many bract but only four seeds per branchlet) to *Lebachia* spp. (one seed, many bracts per branchlet) to other forms that seem to approach the structure of a pine cone, he admits that there are noticeable gaps between these supposed linking stages ³(p. 320-235).

The gaps which set apart certain fossil groups are so distinct that the groups cannot be easily classified in any of the known taxonomic categories! The Noeggerathiales have both large and small spores borne in delicately fringed cup-shaped sporophylls. Wesley admits that these fossil plants cannot be classified in any known taxonomic category ⁷(pp. 31-35). The system of gaps and distinct groups evident argues for the non-evolutionary- and miraculous creation of discreet functioning organisms.

5. Some of the anatomical characteristics thought to be earmarks of only one particular group or set of groups have been found distributed in other supposedly non-related groups.

Fern-like fronds (leaves) show up in several distinct groups. Such leaf structure is seen in the true ferns, seed ferns, and in the puzzling *Archeopteris*. ¹⁵

Stomata (with their associated guard cell apparatus) appear on most of the land plants. Many of these groups are supposed to have arisen from the algae independently of other groups. Even bryophytes such as the moss sporangial epidermi and hornwort sporophytes manifest stomata. (The epidermis is a tissue usually of one cell thickness and covering the surface of plants. The sporophyte is the generation which bears the spores.) According to evolutionary thought, this necessarily implies that the guard cell-stomata complex arose by chance many times in otherwise independent lines! The

same incredible idea must then apply to the other anatomical features which any of these polyphyletic groups may have in common such as tracheid cells.

Some plants bore their seeds completely enclosed by a fruity structure called a carpel. Although true carpels are evident in angiosperms only, carpel-like structures have been found in supposedly non-allied lines. On *Caytonia* sp. of the Mesozoic seed ferns, there are distinctly fruit-like bodies² (p. 126)³ (pp. 176-179). This must mean (according to recent evolutionary theories) that fruit-like structures arose at least twice by chance in independent lines! The distinct creation of identical components in different plants is a more adequate explanation of such phenomena.

The Pentoxylaceae are a fascinating group of gymnosperm plants which combine features that are characteristic of several other distinct groups. They have stomata like those of the Bennettiales, a vascular leaf anatomy somewhat like that of Cycads, and a branched ovule-bearing organ that is not quite like the Bennettiales or Cycads. Wesley concludes that these plants must stand apart as a distinct group combining characteristics of the Medullosaceae, Cycadales, and Bennettiales⁷ (pp. 49-52).

6. The entire problem of angiosperm ancestry has remained a complete mystery.

Cycadeoidea dacotensis has been suggested as an ancestral working model for angiosperms because it was thought to bear a structure somewhat like a *Magnolia* flower. There was an ascending series of whorls of reproductive parts on a short branchlet that gave botanists the idea that this bennettitalean plant could be somewhat like the ancestor of flowering plants. The flower-like structure in question has a lower whorl or whorls of sterile bracts — thought to correspond to the sepals and petals of modern angiosperms. Above these there was what was thought to be a whorl of compound microsporangiate stalks, which were believed to unfold during growth, forming something like a whorl of stamens in a flower. Finally, there was a central ovule-bearing axis that certainly reminds one of the seed-bearing portion of a *Magnolia* flower. Delevoryas, however, has shown that Wieland's earlier reconstruction of 1906 was in error concerning the supposedly branched and stamen-like pollen-bearing organs. According to Delevoryas' latest work, these were not branched and stamen-like but formed a massive compound synangium with a fleshy distal sterile mass of tissue. This whole fused item is supposed to have fallen from the stalk as a unit — something quite unlike the supposed Magnolian descendant¹⁶² (pp. 134, 171). So, what looked like a perfectly good ancestor for the *Magnolia* flower, (and is still portrayed as such in most recent textbooks) is now seen to have been something entirely different.

Delevoryas, who brought about this brilliant corrective research, suggests that the history of the flowering plant still remains a mystery. As far as the fossil record gives indication, angiosperms were always angiosperms. This demonstration that the Bennettiales were probably not ancestral to flowering plants rocks the whole foundation of angiosperm taxonomy under the famous and much-revered Besseyan plan — since this plan assumed that *Magnolia* was primitive due to its bennettitalian similarities and the willow was treated either as a much-reduced or advanced type!

A review of the evidence presented in these six propositions (and much other information) may be what led the famous botanist Heribert Nilsson to conclude after much research and study by saying:

My attempts to demonstrate Evolution by an experiment carried on for more than 40 years, have completely failed. At least, I should hardly be accused of having started from a preconceived anti-evolutionary standpoint

It may be firmly maintained that it is not even possible to make a caricature of an evolution out of paleo-biological facts. The fossil material is now so complete that it has been possible to construct new classes, and the lack of transitional series cannot be explained as being due to the scarcity of material. The deficiencies are real, they will never be filled. (As quoted in¹³ (p. 51.)

Those who propose Biblical creationism as a plan of fossil interpretation are sometimes said to worship a "God-of-gaps." This is not entirely true, however, since creationism recognizes God as the author of natural laws also. Creationism simply recognizes the possibility of "miracle" in the creation "toolchest" and asks for no "God-of-gaps" alone, but suggests that it was a "God-of-groups" who created "After their kind." The fossil evidence supports the miraculous creation of distinct types. Such creation appears to be special, rapid, and non-evolutionary.

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THE GENESIS KINDS IN THE MODERN WORLD

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In the first chapter of Genesis we read that the basic types of plants and animals appeared upon our earth through an act of special fiat creation. These basic types are described as not only being formed each after its specific morphological pattern, but in the case of the plants, also with a reproductive mechanism which caused each type to produce new individuals like itself.

The briefness of this Genesis account of origins gives opportunity for the development of at least two schools of interpretation with regard to the degree of fixity in nature indicated by this terse record. During the Middle Ages or medieval period of history, from about 400 A.D. to 1400 A. D., the opinion prevailed among scientists that the statements of Genesis declared that in reproduction the new individuals of a kind were as like as pennies from a mint. With regard to origins, the general premise was always the assertion of extreme fixity. In certain theological centers this idea resisted the changes of the Renaissance and the shift to the inductive method of reasoning, and was still taught as dogma to the students of theology at Cambridge when Charles Darwin was graduated from the department of theology in that university in 1831.

At Cambridge, Darwin was also taught that all modern forms of plants and animals had been created and set down in the very pattern of geographical distribution in which we find them today. Actually there is no Scriptural ground for this latter teaching. However, these two bits of dogma were presented to the students in theology at Cambridge as the only orthodox understanding of Christians on these points. Accoutered with these extreme views of special creation, Darwin went forth on his five-year circumnavigation of the globe as a sincere creationist naturalist.

During the progress of that voyage he carefully observed the abundant evidences that species varied considerably usually in proportion to the degree of isolation from their relatives. He became more and more troubled about the concept of fixity of the kinds which he had been told was the teaching of Genesis. We wish that Charles Darwin had studied Genesis for himself and seen the actual harmony between the Bible and nature. After pondering over the problem for years; he finally reached the tragic decision, to abandon the idea of the fiat creation of basic types of organisms.

This decision was reached in the year 1844. At that time, in a letter to his lifelong friend, the botanist Joseph Dalton Hooker, he said:

I had read heaps of agricultural and horticultural

books and have never ceased collecting facts. At last gleams of light have come, and I am almost convinced (quite contrary to the opinion I started with) that species are not (it is like confessing a murder) immutable.¹

A second school of interpretation with regard to the degree of fixity within the kinds indicated by the statement of Genesis is based upon the opinion that the book of nature and the Written Word shed light upon each other. Correctly interpreted these two sources of truth *do* agree. They have the same Author. The Bible itself directs us to go to nature for confirmation of profound verities. In Job 12: 7-11 we read:

But ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee: or speak to the earth, and it shall teach them: and the fishes of the sea shall declare unto thee. Who knoweth not in all these that the hand of the Lord hath wrought this? In whose hand is the soul of every living thing, and the breath of all mankind.

Therefore, the members of this school of interpretation go first to the Scriptures and learn that the statements of Genesis neither exclude the possibilities of variation within the kinds, nor do they assert that plants and animals were created in their present details and set down in the areas where we find them today. Then turning to nature these students find that Darwin was entirely correct in his observation of migration over the earth accompanied with variation. What Darwin failed to observe was that variation is not without bounds, and is definitely limited in each case to the locus of its basic type or Genesis kind. All individuals of even abundantly variable forms, such as men and dogs, are unquestionably in every instance *bona fide* members of their respective basic types.

Because of his outstanding ability and because of his great contributions to the basic science of taxonomy, believers in special creation are always glad to recall that the Swedish botanist Carolus Linnaeus, 1707-1778, was a creationist. Interestingly it is not unusual even in our day to find people who are of the opinion that he was specially endowed by heaven in his ability to point out the created units or Genesis kinds among living forms. However, an endeavor to learn just what classification groups in nature were considered by Linnaeus to be the Genesis kinds is likely to end in some confusion because during his life he published at least two points of view on the loci of the basic created units. During the most active period of his life we find in the first eleven editions of his *Systema*

Naturae, beginning in 1735, the following assertion:

"We count as many species as have been created from the beginning; the individual creatures are reproduced from eggs, and each egg produces a progeny in all respects like the parents."

Linnaeus realized the difficulty of determining natural affinities and did, in my opinion, make mistakes in his endeavor to distinguish the created kinds in nature. Illustrations here would be his assignment of different species names to the American Bison and the European Bison, and to Spring Wheat and Winter Wheat.

In his later life, after a great deal of observation of the bordering of some species on one another, and particularly as a result of his own experiments in hybridization, he changed his opinion of the created unit. From his twelfth and last edition of *Systema Naturae*, 1768, he omitted the statement, "No new species arise." Then in his *Systema Vegetabilium*, published in 1774, four years before his death, we read the following interesting opinion regarding the original created units:

"Let us suppose that the Divine Being in the beginning progressed from the simpler to the complex; from few to many; similarly that He in the beginning of the plant kingdom created as many plants as there were natural orders. These plant orders He Himself, therefrom producing, mixed among themselves until from them originated those plants which today exist as genera.

"Nature then mixed up these plant genera among themselves through generations of double origin (hybrids) and multiplied them into existing species, as many as possible (whereby the flower structures were not changed) excluding from the number of species the almost sterile hybrids, which are produced by the same mode of origin".*

* This translation of Linnaeus' Latin text was published by Clausen in 1951.²

Because Linnaeus used a purely artificial system of classification and recognized only the four taxonomic categories. Class, Order, Genus, and Species, it is not easy from the above statement to secure a clear picture of what was his mature conception of the created unit. It may be helpful, in an effort to understand his mature opinion here, to select his order *Gymnospermia* as an example. Today our taxonomists use the name *Gymnospermae* for a class of plants made up of cycads, ginkgo, and conifers. However, Linnaeus' *Gymnospermia* consisted largely of the mints and snapdragons.

Thus in Linnaeus' opinion God spoke into being parent forms of such groups as the mints and snapdragons and then by His own controlled hybridization developed among these additional plant groups which we call biological species, groups which, to continue with our example, are illustrated

by such plants as skull-cap, catnip, motherwort, sage, horsemint, mullein, toadflax, and painted cup. It is possible that not all special creationists of today would be willing to concede that plants as varied as mullein and foxglove had evolved naturally from a single created unit. However, we would stress the fact that we believe Linnaeus was certainly on the right track when he judged that any forms which would hybridize had sprung from a common ancestor. This would be a limited form of change, but certainly not evolution of new basic types. Possibly it would be more accurate to designate such change as mere variation within the original basic units.

The expressions "after his kind," "after their kinds," appear ten times in Genesis 1. A survey of the thirty-two Bible commentaries in the James White Memorial Library of Andrews University regarding the significance of these expressions in Genesis 1 showed that six made no comment on them, four were evolutionist, and the remaining twenty-two were agreed that these expressions indicate that in the beginning God created the basic types of plants and animals at all levels of complexity. Some commentators in this group even state that the expressions mean that on the third, fifth, and sixth days by divine command not only all the basic units appeared but also subordinate groups within the kinds.

With regard to Gen. 1:12, ". . . plants yielding seed according to their own kinds" (RSV), sixteen of the twenty-two definitely went on to express the opinion that reference was here made to reproductive behavior, e.g., "received power to propagate and multiply their own kind" (Keil and Delitzsch); "the race should be perpetuated from generation to generation" (Cook); "the growth will always be the same kind as the seed" (Excell); "Determinate propagation of plants" (Lange); and so on.

It is obvious from the wording in Genesis that the expression "after his kind," includes both morphological and physiological characteristics. That is to say, when the plants and animals appeared upon the earth the individuals of each basic type were distinctly different in the details of their form, structure, and internal chemistry from the individuals of all other basic types. To express it mildly, in the light of Gen. 1:12 it is difficult to understand how a basic type could transmute into a new basic type or could give rise to a new basic type if its reproductive performance was such as to bring forth additional individuals of the same kind as their parents.

Today when we see so many varieties among our domesticated plants and animals we wonder how the schoolmen could insist upon believing that the creation described in Genesis demanded *no variation* within the created kinds. This was the extreme interpretation of Genesis which the theolog-

ians at Cambridge gave to Charles Darwin before his graduation.

Because John Milton, 1608-1674, had been largely responsible for swinging the Christian in England from the Aristotelian philosophy of a derivative type of origins to acceptance of the literal account of Genesis, he is blamed by some evolutionists for the extreme view actually developed later by the university schoolmen. Thomas Huxley's statement that the new theory of evolution found itself in conflict with the Miltonic, rather than the Mosaic "cosmology" (it is actually a cosmogony) is an interesting one although inaccurate.³ It is true that the natural facts of variation emphasized by Darwin were in conflict with the extreme "no variation" interpretation developed by the schoolmen after Milton pointed the way back to a literal Genesis, but it is not true that this new evolution was in harmony with the Mosaic cosmogony. This new evolution demanded extended periods of time for the assumed gradual development of more complex and specialized types from simpler types, while the Mosaic account clearly states that the multiplicity of basic types was spoken into existence from the raw materials within the limits of one solar week.

When a number of the self-styled "higher literary critics of the Bible" had been persuaded by scientists that living things had originated by a process of evolution, they went back to Genesis and pondered how to interpret the simple historical account of an origin by special creation of basic types, in such a way as to bring it into harmony with the doctrine of evolution. Finally considerable agreement was reached among them that Genesis should be understood to be not prose, but *poetry*, and that this poem set forth but one basic fact only, the fact that living things had come into being through the activity of a Creator. According to this new turn, the author's use of descriptions of days and of instantaneous appearances of plants and animals from the earth was merely an employment of poetic license to give body to the poem but to add nothing in the way of actual facts. However, that the creation account is prose *not* poetry is authoritatively attested by the body of translators of the recent and generally more accurate version of the Bible, the Revised Standard Version, who in this translation set the creation account before us as *prose* not poetry, a prose which at times indeed has the scope, majesty, and beauty of exalted poetry. Albeit, even if the Genesis account were in poetic form it still could state the literal truth, and possibly even state that truth more effectively than in prose.

What does the literal, inspired historical account of beginnings tell us about the origin of living things? Gen. 1:11-13, 20-28, 31 clearly portrays that on days Three, Five, and Six of Creation Week the Creator populated the earth with all the basic kinds of plants and animals. At His spoken command

these organisms came into being from the raw materials of the earth. There was no blood relationship between the basic types, merely a pattern of unity within diversity resulting from one omniscient Creator with a master plan. The fact that the Creator did have an overall plan for plants and animals is indicated in the oft repeated expression, "after his (their) kind." Plants appeared in all their forms from the most lowly to the giants of the forest. Animals swarmed in the sea, crept and walked upon dry ground, and flew through the air. The account makes it very clear that by the close of Creation Week the earth, at the word and voice of one Creator, had its full complement of basic kinds of plants and animals. That this creation of basic types was not to continue beyond Creation Week is made clear in Gen. 2:1,2 where we read that on the seventh day "God finished his work (declared His work on which He was engaged, finished)." This declaration is repeated in Commandment IV, "For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested the seventh day." Ex. 20:11. What is written? "It is written" that all basic kinds of plants and animals miraculously appeared upon the earth within one literal, 24-hour-day week, at the command of the Creator.

The schoolmen were correct in their understanding of the origin of the living kinds. But they were incorrect in their teaching regarding the reproductive behavior of these kinds. They asserted that Genesis declared that the created kinds brought forth after their kinds, and that this increase in number was like the coinage of dimes, no variation. It is true that Gen. 1:12, RSV, describes "plants yielding seed according to their own kinds." This is a description of reproductive behavior, but no assertion in just so many words is made regarding the reproductive behavior of animals. Certainly there is no justification in Genesis for the extreme "no-variation-among-individuals-of-a-kind" interpretation of the schoolmen.

Nevertheless, Genesis, in its assertion that plants and animals were created in all their kinds, *does* teach a fixity in the living world. However, many scores of years of careful biological research has shown that this fixity is higher than the individual level, i.e. at the level of the basic kind, best illustrated by our own species (mankind). In all their wishful endeavors in scientific study, even evolutionists will admit that not one instance of basic type, like a cat, producing a new basic type, like a dog, is known. We have kinds of cats, but the fixity of Genesis is at the higher level of the cat kind and not at the lower level of kinds of cats. Variation does occur abundantly within kinds, but no coercive, compulsive evidence can be produced to show the production of even one new basic kind. The very most that Darwin could discover was that new varieties of tortoises had apparently developed on

the various islands of the Galapagos group^{4 5} and apparently new varieties and even new "species" of finches⁶, but he failed to recognize the tremendously important fact that the tortoises were still tortoises and the finches still finches, field evidence which helps us to understand the true fixity that exists in the world of living things. In his demonstration of variation within well-marked limits of the kind, Darwin, instead of disproving Genesis as he thought, actually witnessed to its veracity.

One basic kind is unlike all other basic kinds because of its own peculiar internal chemistry, the DNA of its genes. If different kinds are present we know these different chemistries are present also and effectively isolate one kind from another by bridgeless chemical abysses.

Such is the letter of the written record. The creationist of today believes that the Bible and nature are complementary, each helping to explain the other. Therefore, we turn to nature to discover the degree of fixity indicated by Genesis. In speaking of this situation in nature, Theodosius Dobzansky, Professor of Zoology, Columbia University, says:

Organic diversity is an observational fact more or less familiar to everyone . . .

"If we assemble as many individuals living at a given time as we can, we notice at once that the observed variation does not form any kind of continuous distribution. Instead, a multitude of separate, discrete distributions are found. The living world is not a single array of individuals in which any two variants are connected by unbroken series of intergrades, but an array of more or less distinctly separate arrays, intermediates between which are absent or at least rare."⁸

This discontinuity is one of the most familiar characteristics of the living world as we recognize men, horses, cows, dogs, and cats, roses, petunias, marigolds, zinnias, and water-lilies. This same discontinuity is also one of the most striking features of the fossil world.

This very real existence of gaps between the basic types of organisms is one of the great problems of the evolutionist. If all modern forms have evolved from one or a few primeval protoplasmic blobs why should both the fossils and the living world present us with this striking discontinuity just as if the different kinds had originated as Genesis declares they did?

This problem was one of the topics in a series of letter discussions which I had with one of the old guard of neo-Darwinian evolution a few years ago. This zoologist is today one of the leading American disciples of the theory of evolution. In our discussion I pressed him to give me just one instance in our living world where evolution of a new basic type is *known* to have occurred. His reply was as follows:

"When one says that evolution is established beyond reasonable doubt one obviously does not mean that one can see evolution happen and reproduce it in a test tube, but this is the evidence which you escape by your device of saying that it is all change within a 'kind.' What you are after is evidently evidence for the thing which is called by this rather unfortunate term 'macro-evolution.' Now, this is a process taking place in geological time, hence it, as any other historical process (human or natural), can be proven or disproved only by inference from the available evidence."

This authority's admission of the impossibility to demonstrate the evolution of new basic types among living forms is typical of the testimony of all evolutionists who are really conversant with the pertinent facts. After having admitted that evolution of new basic types cannot be demonstrated among living forms, this zoologist passed the burden of demonstration over to the paleontologists who, in his opinion, could demonstrate that evolution of new basic types had occurred during geological time. He referred me to the then new work of George Gaylord Simpson, widely known paleontologist of the American Museum of Natural History, and Professor of Paleontology, Columbia University, which book had just come from the mess.⁹ Of this book my correspondent remarked, "To me at least this is a most lucid explanation of paleontological evidence."

I secured a copy of Simpson's book and among much interesting material found the following assertions:

"On still higher levels, those of what is here called 'mega evolution,' the inferences might still apply, but caution is enjoined, because here essentially continuous transitional sequences are not merely rare, but are virtually absent. These large discontinuities are less numerous, so that paleontological examples of their origin should also be less numerous; but their absence is so nearly universal that it cannot, offhand, be imputed entirely to chance and does require some attempt at special explanation, as has been felt by most paleontologists."¹⁰

"The facts are that many species and genera, indeed the majority, do appear suddenly in the record, differing sharply and in many ways from any earlier group, and that this appearance of discontinuity becomes more common the higher the level, until it is virtually universal as regards order and all higher steps in the taxonomic hierarchy."

"The face of the record thus does really suggest normal discontinuity at all levels, most particularly at high levels, and some paleontologists (e.g., Spath and Schindewolf) insist on taking the record at this face value. Others (e.g., Matthew

and Osborn) discount this evidence completely and maintain that the breaks neither prove nor suggest that there is any normal mode of evolution other than that seen in continuously evolving and abundantly recorded groups. This essentially paleontological problem is also of crucial interest for all other biologists, and, since there is such a conflict of opinion, non-paleontologists may choose either to believe the authority who agrees with their prejudices or to discard the evidence as worthless.”¹¹

Naturally after reading such assertions as these by so high a paleontological authority as Simpson, I could not refrain from again writing my friend and asking him, in the face of these declarations that the same discontinuity which occurred among living forms and made a demonstration of evolution among them impossible also existed among the fossils, how he could say that Simpson had made a lucid presentation of the origin of new basic types during geological time. A number of years have gone by since I put that question, and several letters have passed between us, but for some reason reference to the topic of paleontological evidence for evolution has been omitted.

In 1953 Simpson again, in the following words, asserted that discontinuity is a fact among the fossils:

“In spite of these examples, it remains true, as every paleontologist knows, that *most* new species, genera, and families, and that nearly all new categories above the level of families, appear in the record suddenly and are not led up to by known, gradual, completely continuous transitional sequences.”¹²

On this same point of gaps between the various types of fossil forms, D. Dwight Davis, Curator Division of Vertebrate Anatomy, Chicago Natural History Museum, remarks:

“The sudden emergence of major adaptive types, as seen in the abrupt appearance in the fossil record of families and orders, continued to give trouble. The phenomenon lay in the genetical no man’s land beyond the limits of experimentation. A few paleontologists even today cling to the idea that these gaps will be closed by further collecting, i.e., that they are accidents of sampling; but most regard the observed discontinuity as real and have sought an explanation for them.”¹³

“But the facts of paleontology conform equally well with other interpretations that have been discredited by neobiological work, e.g., divine creation, etc., and paleontology by itself can neither prove nor refute such ideas.”¹⁴

With regard to the persistence of these gaps in the fossil record in spite of the great amount of work being done in the exploration of this record, Norman D. Newell, Curator of Historical Geology

and Fossil Invertebrates, American Museum of Natural History, and Professor of Geology, Columbia University, has recently written:

“From time to time discoveries are made of connecting links that provide clues to the relationships*, as between fishes and amphibians, amphibians and reptiles, and reptiles and mammals. These isolated discoveries, of course, stimulate hope that more complete records will be found and other gaps closed. These finds are, however, rare; and experience shows that the gaps which separate the highest categories may never be bridged in the fossil record. Many of the discontinuities tend to be more and more emphasized with increased collecting.”¹⁵

*These discoveries “provide clues” only provided the student already believes in organic evolution. To the creationist they merely illustrate further the complexity of creation, and in some instances, the degree of variation which had occurred before the organisms were buried.

We will agree with Davis, second quotation above, that it is correct that divine creation of basic types cannot be demonstrated by the fossil record, but we cannot refrain from saying that the distinctness of the basic types in the fossil record with absence of inter-grading forms is completely in harmony with the creation of plants and animals after their kinds as portrayed in Genesis. The fossil record constitutes the only natural record we have of what occurred before the dawn of secular history. In the light of the fossil record, the theory of evolution which asserts that all modern types have evolved gradually from one or more simple blobs of protoplasm requires more faith for its acceptance than does the theory of special creation which asserts that God created the basic types instantaneously in all their characteristic morphological differences. We hear every now and then of “the missing link.” Actually among both fossil and living forms great chains of links are everywhere absent between the basic types.

A study of the fossil record reveals to us that groups of organisms have maintained their individuality all the way down to our time. Austin H. Clark, who was with the United States National Museum many years, referred to this fact in the following words:

“Since all the fossils are determinable as members of their respective groups by the application of definitions of those groups drawn up from and based entirely on living types, and since none of these definitions of the phyla or major groups of animals need be in any way altered or expanded to include the fossils, it naturally follows that throughout the fossil record these major groups have remained essentially unchanged. This means that the inter-relationships between them likewise have remained unchanged.

"Strange as it may seem, the animals of the very earliest fauna of which our knowledge is sufficient to enable us to speak with confidence, the fauna of the Cambrian period, were singularly similar to the animals of the present day. In the Cambrian crustaceans were crustaceans, echinoderms were echinoderms, arrow worms were arrow worms, and mollusks were mollusks just as unmistakably as they are now." ¹⁶

Here is the sort of fixity referred to in Genesis, and behold nature shows us that the fixity is that of group characters and not a fixity of all individual characters. Each individual bears the distinguishing marks of his kind but is not necessarily identical with other individuals of his kind. Clark referred to this fact in the following statement:

"In the details of their structure these fossils are not necessarily like the crustaceans, starfishes, brachiopods, annelids, or other creatures living in the present seas. Nevertheless, if they are sufficiently well-preserved we have no difficulty in recognizing at once the group to which each and every fossil animal belongs." ¹⁷

The testimony of *living* nature with regard to the extent of fixity indicated in Genesis is all about us in most intriguing forms. The processes of variation furnish us with many interesting breeds of plants and animals. Individuals often vary considerably within some groups. We have over 500 varieties of the sweetly scented sweet pea, and over two hundred breeds of dogs. One author has divided human beings into as many as 160 breeds.¹⁸ Evolutionists love to call our attention to all this variation that is going on, and to insist that here is evolution before our very eyes. We all observe that variation *does* occur, but evolutionists fail to perceive that after all the processes of variation can accomplish has been accomplished we unquestionably still have sweet peas, dogs, and men. The sort of change that the theory of evolution requires is the natural development of *new basic types*. But every additional case of variation that is studied, be it among the fossils or living forms, merely brings additional evidence that there is a law in nature which declares that every organism can produce only individuals which are unquestionably of the same basic type as the parents.

The evolutionist makes a creator out of Father Time by affirming that if we will only assume enough duration then processes of variation will produce new basic types. The plea that time will do it is no more reasonable here than it would be should we invoke it in trying to lift ourselves. If we see a lad trying to lift himself by his bootstraps, we would be incorrect if we were to say to him, "Just keep trying long enough, sonny, and finally you will be able to do it!" Such a feat can *never* be accomplished because there is a law in nature which says that just as hard as you pull up that hard you push down. In the same way, time cannot

accomplish the appearance of new basic types because there are no mechanisms in existence which can accomplish changes of sufficient magnitude to produce one new basic type. Every additional case of variation studied adds one more bit of evidence further to clarify this principle.

Interestingly there is an international quarterly journal, now in its eighteenth volume, whose pages contain data which purport to demonstrate that organic evolution is a fact. I was privileged to be a charter member of the Society for the Study of Evolution of which this journal is the official organ, and each number delights me, a creationist, because every case of change in organisms presented is further substantiation of the natural fact that all processes of change can do no more than accomplish mere variation within already established basic types.

Not infrequently the creationistic biologist is asked, "In our present system of classification of plants and animals is there any category which is an equivalent of the Genesis kind or created unit?" Depending upon one's point of view, the answer to this question can be "no." At the time of creation the kinds or basic types were each created after a distinguishing pattern in form and structure, and we are told specifically that the plants were able to produce other individuals like themselves. The descriptions of kinds in Genesis 1 give us ground for hypothesizing that the individuals of any particular Genesis kind would have chemistries sufficiently alike to make them fertile *inter se*, but sufficiently different to make them incompatible with individuals of every other kind. If this hypothesis is valid then ability to cross would demonstrate membership in the same basic type.

With this hypothesis in mind, as we look into nature today we find that man, *Homo sapiens*, can cross with no other animal. So in his case the species could be the created unit. In other instances we find that the dog, *Canis familiaris*, will cross with the gray wolf, *Canis nubilus*, and the horse, *Equus caballus*, will cross with the ass, *Equus asinus*. Here the genus could be the created unit. Again the common goat, genus *Capra*, will cross with the common sheep, genus *Ovis*, to the extent of at least producing fetuses which will live until just before the time for birth. A more successful generic hybrid is the case of the Indian Gayal, genus *Bibos*, which will cross with the Brahma Cow, genus *Bos*, possibly here making the family the created unit ¹⁹, ²⁰, ²¹. Yet again the domestic hen, family *Phasianidae*, has been crossed with the turkey, family *Meleagrididae*, and also with the guineafowl, family *Numididae* ²². In these cases the order could be the created unit.

In the modern classification of plants we find the same lack of harmony with the Genesis kind. Very commonly species of the same genus will cross, as the Bur Oak with the Swamp White Oak. Genera

not infrequently cross, for example, rye with wheat, and field corn with Teosinte and gama grass. One of the most interesting crosses in plants probably is that of radish with cabbage, both representing genera of the Mustard family. To my knowledge, among plants, members of two different families have not been crossed.

It thus becomes obvious that if our hypothesis is correct and crossability among the members is a characteristic of any given Genesis kind, then there is no single category in modern taxonomy which is in all cases equivalent to the created kind. Because many new modern "biological species" appear through time as products of variation, neither can this presently popular category always qualify as to taxomic equivalent of the created unit.

It is not to be expected that any harmony could exist between Genesis kinds and our present-day classification lists. The reasonableness of this opinion becomes apparent as we recall that plants and animals have been assigned to classification categories in part by natural criteria and in other cases by purely arbitrary criteria; some are the work of lumpers and some that of splitters.

Another difficulty the creationist encounters here is the fact of the undependability of many of our lists of plant crosses and animal crosses. To illustrate, S. G. Morton, in a perfectly sober paper read before the Academy of Natural Sciences of Philadelphia in 1846 reported a cross between a bull and a sheep.²³ In modern times a less spectacular but equally unverified report is that by Annie P. Gray in England of a cross between a domestic hen and a domestic duck. However, she warns us on page x of her book that "the listing of a particular cross does not necessarily mean that it has occurred."²⁴ The difficulty of preparation of a list of *bona fide* hybrids can be realized only by the one who has tried to draw up such a list. Not infrequently the Muscovy Duck gets into the newspapers as a valid duck x turkey hybrid. The reporter is always sure of the parentage because the red caruncles on the face of this duck look much like those of the turkey. Nevertheless the Muscovy Duck is pure duck, and just about 99% of newspaper reports of hybrids is pure imagination. In all the confused picture of course it must be borne in mind that sexual cohabitation is *not* hybridization.

A prominent evolutionist once said to me, "If you insist that all basic types were created in the same beginning, and that no changes have occurred since then which were sufficient to produce new kinds, then you should today point out to us these Genesis kinds, or keep still about them!" I thought his statement was entirely reasonable, in fact, I was already prepared to suggest a test which I believed would do the very thing he demanded. As early as 1941,²⁵ I had suggested a fertility test which might be used to trace out the modern loci of the

original kinds. In 1944 (revised in 1947),²⁶ because of, as pointed out above, the apparent inability of any modern taxonomic category to qualify as equivalent to the Genesis kind, I suggested that the new word *baramin* (plural *baramins*), built from the Hebrew words *bara*, "created," and *rein*, "kind," be used to designate the created types (page 174). This name would have the advantage, in the biologists mind, of separating the Genesis kind from all taxonomic categories now being used. In 1950 the baramin hypothesis was further elucidated.²⁷

In 1957 this fertility hypothesis for discovery of the created kinds was sharpened still more by the suggestion that only in cases of *true fertilization* would membership in the same Genesis kind be indicated.²⁸ In true fertilization both reduced parental sets of chromosomes join and participate in the first division of the fertilized egg or zygote. This would rule out membership in the same baramin of those individuals whose sperm would enter the egg and instigate embryonic development but whole male chromosomes would later be cast out and take no part in the heredity of the new individual. Loeb once reported that all marine teleost fishes would hybridize.²⁹ However, it was later found that this was a situation where the sperms instigated embryonic development but were later thrown out of the early embryo, thus having no part in inheritance. These foreign sperms actually acted only in an artificially parthenogenetic manner.

My reasonably-demanding evolutionist friend at first was loathe to accept such an hypothesis because he affirmed it was not sufficiently concrete to be practical. It was only after I showed him that the fertility test was just as concrete as practical for the baramin as it was for the biological species which he and several of his evolutionist colleagues were pushing at that time, that he grudgingly admitted that it could constitute a valid test.

Deductively, of course the idea of the baramin springs from Gen. 1:12, where we are told that the plants not only were made after their kinds, but also brought forth after their kinds. The animals likewise were created after their kinds (Gen. 1:21, 24, 25), and the genetical physiologist knows that in animals as well as in plants the different chemistries which cause different form and structure also make crossing of kinds impossible. Because the Creator was careful enough to create all the different basic kinds, it is reasonable to suppose He furnished them with physiological mechanisms which would enable the different basic types to continue to exist through successive generations. Why form all the minutiae of different types if only immediately to lose them in the confusion of hybridization?

Inductively, in every known instance in living nature where true fertilization can occur, the parents are sufficiently similar morphologically to be con-

sidered members of a single kind, such as the man kind, the dog kind, the cow kind, the oak kind, the corn kind, the apple kind, and so on.

It is sometimes objected that the baramin concept is weak in that many of the crosses obtained have occurred in captivity and probably would not take place in undisturbed nature. Actually animal psychology does not enter into the baramin concept. Rather it is a physiological, that is, chemical, test, and still applies whether occurring naturally in the aisles of the forest, on the paths of the prairie, or artificially in vitro in the laboratory. The essential assumption is that the chemistry of the D.N.A. molecules of the Genesis kind is identical enough to cause them to produce germ cells which will be compatible and capable of union in true fertilization. Artificial pollination and artificial insemination would be the best tools for the discovery of the limits of the baramin.

We realize that the processes of variation, principally mutation, recombination, and chromosomal aberration, have been working in these basic kinds since Creation, and have produced physiological incompatibilities within the Genesis kinds, so we may assume that ability to interbreed with complete fertility may not now exist among all members of the baramin. In such instances morphological characters will have to be used to determine membership. An illustration here would be the two groups of the fruit fly, *Drosophila pseudo-obscura*, which were formerly called Race A and Race B of this insect. Because hybrid males resulting from a cross between these races were completely sterile, Dobzhansky and Epling assigned to Race B the new species name, *D. persimilis*.³⁰ The individuals of *D. pseudoobscura* and *D. persimilis* appear identical in external characters but may be completely sterile when mated. In such cases the morphological similarity of adults is sufficient to show that they belong to the same baramin.

Sometimes the question is asked, "Is the modern widely accepted biological species identical with the Genesis kind?" I would answer that such may occasionally be the case. An example would be the biological species *man* which is also a Genesis kind. To be true members of the same biological species the individuals must be fertile *interse*. If within a biological species a group arises whose members are sterile when mated with others of the group, a new biological species would have arisen. The fruit fly mentioned above probably illustrates such a case. *D. persimilis* would be a new biological species arising within the older biological species *D. pseudoobscura*. Thus obviously all modern biological species are not originally created units. The growing popularity of the biological species concept among evolutionists is evidenced by the fact that, except for one, all eight contributors to a recent symposium on the species problem accept the biological species and are rather enthusiastic about

it.³¹ Mayr's new book, *Animal Species and Evolution*,³² might be described as a testimonial to the advantages of the biological species concept. In recognizing the biological species as a natural unit, biologists are becoming less artificial in their classification, and are making progress in the discovery of the Genesis kinds in nature.

Of course there are many forms in nature where the fertility test cannot be applied to determine either the biological species or the baramin. This situation would exist where new individuals are produced by such asexual processes as simple fission, budding, formation of spores, and even by the sexual process of hermaphroditism. The fertilization of their own eggs is quite common in higher plants and in a few animals. However, in these forms it is clearly evident that each is following closely the law of Genesis which says that basic types bring forth after their kinds.

As to the practicability of the baramin concept as a classification unit, interestingly the following recent comment by Mayr on the biological species, in my opinion very accurately describes the situation with regard to the Genesis kind if it is assumed generally to be determinable by the possibility or impossibility of true fertilization:

"Is the biological species concept invalidated by the difficulties in its application that have been listed?

"One can confidently answer this question: 'No!' Almost any concept is occasionally difficult to apply, without thereby being invalidated. The advantages of the biological species are far greater than its shortcomings. Difficulties are rather infrequent in most groups of animals and are well circumscribed when they do occur. Such difficulties are least frequent in nondimensional situations where (except in paleontology) most species studies are done. Indeed the biological species concept, even where it has to be based on inference, nearly always permits the delimitation of a sounder taxonomic species than does the morphological concepts."³³

The scientist reads in Genesis of the fiat creation and instantaneous appearance in the beginning, of basic types of plants and animals which were made and which reproduced according to a certain fixity. The book of nature, through its fossil record and in the world of living things, reveals that an actual fixity has ever existed and still does exist among these forms. The fixity is not one which produced identical individuals, but rather is one which produces physiologically isolated groups which enjoy considerable variation within their boundaries. These original groups demonstrate that they have no power to produce any new basic types. In this complete verification in nature of the assertions of Genesis, the Christian man of science receives added assurance that the Bible is indeed a book breathed by the God of Truth.

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NATURAL SELECTION A LIMITED ROLE

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Genetics has made trouble in the biology family. Let us discuss it.

In every realm of thought, certain words are used in a special sense. *Selection* is such a word in biology, and is used to mean the choosing of a limited number of individuals of a population to become the parents of the entire following generation. Animals of a certain type are chosen or seeds from a certain type of plant, and these are allowed to reproduce to the exclusion of the ones not so chosen. This process, when carried on by man, is called *artificial* selection; when the forces of nature produce a similar result it is called *natural* selection.

Selection is expected to make the forthcoming generation of plants or animals somewhat different from their ancestral generations, in that they will resemble the individuals which were selected. For instance in a field where ears of corn average eight inches in length, a farmer gathers ears for seed averaging twelve inches. If the crop raised from this seed averages more than eight inches, other conditions being equal, his selection is *effective*. If he chooses the biggest potatoes for planting and the crop of the following year consists of potatoes having no increased size, the selection is *ineffective*. His selection could be very methodical and thorough and yet ineffective, as will appear below.

Since natural selection is supposed to bring about evolution it is necessary to define evolution. Proponents and opponents agree that it is the theory that all kinds of plants, animals, and man have descended from very simple types: roses from algae, peacocks from Amoeba, and so on. It involves changes which are capable of forming more complex organs, and which can continue in a progressive series until notable progress in structure is accomplished.

For the sake of clear thinking we should stop with this definition since it suits both friends and foes. But some naturalists add any and all changes, great and small, temporary and permanent, and lump all of them together as the theory of evolution. To follow the true definition, any change which does not contribute toward the changing of simple organisms to different and more complex organisms is not a part of evolution but should be called *variation* to avoid confusion. Much variation is temporary, alternative, or not a part of a series which add up to transformation.

While the theory of evolution is not new, it was believed in by only a few people until Charles Darwin secured its acceptance by expanding the idea of natural selection. With the amount of genetic

information available in the middle of the Nineteenth Century it seemed that great changes might be made by the vicissitudes of nature such as weather and competition of other organisms. (Gregor Mendel's research was not yet known.) At that time, when the significance of chromosomes was a mystery and vague influences were mentioned instead of genes, natural selection did seem to be a powerful tool for building complex organisms, given enough time.

It was postulated that animals and plants change in every possible direction, and that these changes are heritable. Through predation, competition, and unfavorable food or shelter, many of these organisms lose their lives without leaving offspring. On the whole, it was postulated, the organisms which survive do so because they are superior, have better functioning organs or more complex structure, and if these traits are hereditary their offspring also will be superior. This process repeated a million times transforms a species into a larger and more complex species.

This process of natural selection, viewed from an armchair, looks so logical that a mere statement of it is a polemic in its support. But let us see how it has fared in the laboratory and breeding plot.

It is apparent that if the *genes* are changing *gradually* and in *all* directions, and if there is no limit to the degree of change, selection can be expected to change the species. But if the variation does not affect the genes, in other words is only somatic and not germinal, then the selection will be ineffective and the progeny will be the same, no matter which individual is selected to be the parent.

Johannsen, a Danish botanist, tried to illustrate evolution in a variety of bean called Princess. He chose beans of different size, weighed them, planted them, then harvested and weighed the beans which they produced. He found that large beans tended to produce large beans: that the progeny of large beans were larger on the average than the progeny of small beans, just as one might expect.

But after this generation the result was different. Johannsen kept the progeny of the different original beans separate and planted them in separate plots. In this way establishing nineteen groups which he called pure lines. Then within a pure line he chose large beans and small ones, planted them, and found that the average size of the progeny was about the same. His selection was *ineffective*! For instance, in pure line A, a bean weighing 70 centigrams produced seeds weighing 55.5 cg. on the average, while

one weighing 40 cg. produced seeds weighing about the same, 57.2 cg. on the average.*

When I first read this report a number of years ago it seemed incredible to me for I had been taught that the more a breeder selects, the more progress he will make. This would be true if genes changed continually and without limit. In beans, being normally self pollinated, the limit was reached after one generation of selection. *Within a pure line*, all the *genes* for seed size are *alike*. The seeds themselves are not of the same size because some have a more favorable location in the pod than others but this is an environmental condition and not inherited.

Shun and East, working independently, established similar pure lines in corn, *Zea mays*, in which selection is ineffective. But while it takes but one generation to establish pure lines in beans it takes seven in corn, pollinating each stalk with its own pollen. Beans do their own self pollinating while corn is normally cross pollinated, and this accounts for the slower progress in attaining uniformity.

It had been known for a long time that when corn is self pollinated there is a loss of vigor and various latent defects appear, and some thought this process would revert the corn to its wild ancestor. But Shull and East found that there is no further loss of vigor after seven generations, during which time various pure lines or inbred strains appear, in which selection is ineffective.* Crossing of two pure lines restores the vigor, but no amount of this breeding of corn would transform it into another species. The end result of selection is not a transformation but a pure line; a purified essence of the species one started with.

In sugar beets also, the limit of effective selection has been reached. A start was made about 1800 with table beets testing six per cent of sugar. Large numbers of beets were tested each year and the sweetest were used to produce seed for the next crop. In 1878 the average per cent of sugar had risen from six to seventeen per cent. No doubt people were saying, "See how nature changes! The improvements made by man show that nature can make almost any change if given enough time." But forty years later it was reported that there was

no further increase in sugar, even though the same type of selection has been continued.**

Lest these examples seem strange to you (as they did to me at first) imagine that you have a bushel basket full of marbles of various sizes. In sorting out the various sizes it may take you some time to find the biggest one, but once you have found it, it is quite evident that the search is completed. It is just as futile to expect a gene to develop a more advanced character as to expect a marble to grow bigger.

Once in a while a mutation might occur but only once in thousands of generations. The mutant gene would be like a cracked marble, and one which causes the death of the plant or animal, as a majority of them do,* is like a marble broken so badly that it falls apart.

While these principles were being established by the geneticists in the first two decades of the Twentieth Century, other biologists still held the evolutionary views of the former century. Bateson of England spoke out plainly about the discrepancies, although he maintained that he did not care to break with the main idea of evolution. His facts, however, spoke for themselves and had great weight. This criticism, augmented by the wave of idealism following victory in World War I, started a protest in the United States which reached proportions hard to appreciate by people who do not remember it. The protest finally was assuaged by a number of prominent men signing a statement that they believed in God and also in evolution; which can be done of course, but with a warped idea of God because of disagreeing with the Bible. Thus the facts were obscured under a coat of whitewash.

When the biologists reached a synthesis of their ideas they still depended upon natural selection to bring about evolution, basing it upon mutations. One can see that if mutations were of such a nature that they contributed new and useful organs, if these additions made the organs coordinate better, if added vigor is conferred, and if these improvements are conferred in one generation to escape an awkward transition period, then mutations might contribute toward evolution. (Remember the definition, that evolution is the process of transforming simple protoplasm into modern plants and animals.) Very few, if any, mutations have been observed which meet all these requirements.

H. J. Muller, who won the Nobel prize for his work in mutations, in Washington, 1946, was cornered by a group of newspaper men who asked him to discuss the outlook for improving the human race. He answered, "Most mutations are bad. In fact, good ones are so rare that we can consider them all as bad."* Dr. Muller and many other scientists are fearful that atomic explosions will cause mutations in the human race, and none of them hopes for benefits in those events.

*L. H. Snyder and P. R. David, Prin. of Heredity, Heath, 1957, p. 223 f.

*D. S. Falconer, Quantitative Genetics, Ronald, 1960, p. 276.

*D. F. Jones, Genetics in Plant and Animal Improvement, Wiley, 1924, p. 414.

**Furthermore, Muller reasoned that if he were to search for mutations following treatment with irradiation, lethal mutations would be the kind to look for, since in nature they are by far the most frequent." L. H. Snyder and P. R. David, Prin. of Heredity, Heath, 1957, p. 354.

*Time Magazine, Nov. 11, 1946, p. 96

There are mutations in plants and animals which are helpful *to man*, such as hornless cattle and seedless oranges, but it is hard to see how such changed forms would become established in nature if there is much competition. Hypothetical mutations sometimes are mentioned and are made to look very successful. In a biology textbook for high school, it is postulated that if a rabbit underwent a mutation which enabled it to run faster than dogs, and at the same time, another mutation which made it aware of attacks by birds, it would have added ability to survive. * True, indeed! But who ever *observed* such a rabbit? My indignation is aroused when children who have no recourse to the facts are exposed to such propaganda in the name of science.

Another weakness of natural selection as a theory to explain how animals became large and complex is the large number which remained tiny and relatively simple, yet survive very well. Some scientists say they are fitted to live in their environment and this is true, but in some cases their environment is the same as that of the more complex species.

Charles Darwin saw the problem and said that these little creatures did not need to become complex: "For what would it profit an Infusorial animalcule, for instance, or an intestinal worm, to become highly organized?"* Darwin gave the correct answer but weakened his theory, for the theory is based on the assumption that greater complexity is an advantage to an animal; that the ones which

happen to become a little more complex have an advantage thereby and become more complex. This assumption, although seldom stated, is the necessary foundation of the theory.

It is easy to observe that it is not always the more highly organized plant or animal that survives. Hydra, that two-layered sac with tentacles, devours Daphnia which has a heart, intestine, gills, and even big, black eyes. A pine tree may shade and kill a daisy but it is classified as a lower plant because it does not have complex flowers. And certainly bacteria are not becoming extinct because of their simple structure.

In this paper we have pointed out the *limitations* of natural selection; necessarily so because at a time when genetic knowledge was limited it was credited with doing too much. But now let us look at the true function.

The Salton Sea is a body of water in southern California which was suddenly formed by the Colorado River spilling over into a large depressed area. "The first few broods (of fish) had an abundance of food and practically no predation, so they increased rapidly in numbers. The number of deformed fish in these early broods was high; but in subsequent years they disappeared as competition became more intense."*

This story of elimination of defective has been repeated many times. In the complex development of a plant or animal there is sometimes a slip, an omission, a deformation, and an individual is formed which is unable to live a normal life. Natural selection takes these unfit ones out of the way. But so far from starting an advanced species, it only maintains a lower limit.

*Ella Thea Smith, *Exploring Biology*, p. 546.

**Charles Darwin, *Variations*, 1859, p. 8.

*D. Robertson and J. Sinclair, in *Evolution and Christian Thought Today*, R. Mixter ed., Erdmans, 1959, p. 79.

STREAMLINING STRATIGRAPHY

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Many problems of stratigraphy could more easily be resolved if we returned to concepts of catastrophism. Until about 1800 geologists believed that all the stratified or water deposited rocks of the earth's surface were deposited in just one year's time during the Noachian Flood. This extreme form of catastrophism is not here championed, since obviously the earth has suffered other catastrophes since the Flood such as widespread droughts and vulcanism. However, many of the vexing problems of stratigraphy would be solved if we simply took the evidence we see at face value instead of attempting to fit it into the concept of uniformitarianism made popular by Sir Charles Lyell. Lack of space forbids a discussion of all the simplifications resulting from a return to catastrophism. The following are illustrative.

The phenomenon of *graded bedding*, i.e. coarse conglomerate on the bottom, with finer material graded upward is pertinent. Rodgers and Dunbar have this to say: "A reasonable explanation of graded bedding in terms of the standard processes of stream or shallow-water deposition has proved difficult. The facts seem to demand that material be dumped suddenly yet fairly evenly over a large area and then allowed to settle quietly in accordance with size, coarser before finer . . . and that the dumping be endlessly repeated though separated by intervals of complete quiet." ¹ This does not sound much like uniformity where a river continues its ceaseless flow, gradually building its delta farther and farther out into the sea; nor does it sound like the constant pounding of the breakers against the shore, building littoral zone deposits. We are reminded, however, of the statement in Genesis 8:1-3 how the Creator dried up the flood-waters by strong winds that drove the waters by a "going and returning," a tidal wave in one direction, then a reversal and a wave in the other direction. Thus we get the sudden dumping, followed by a period of quiet to account for the graded bedding.

Keeping this tectonic "modus operandi" in mind, let us consider briefly another common phenomenon of stratigraphy, interbedding, otherwise known as cyclic or repetitive stratification. Sometimes a rock exposure will show a white limestone band followed by a darker band of sandstone or shale, then another band of limestone until the entire exposure will resemble the American Flag. Such exposures occur in Topanga Canyon, near Santa Monica, California, where layers of red conglomerate alternate with layers of white limestone. Geologists who have made observations along the new Alcan Highway from Canada to Alaska have noted as many as 150 such alternations or repetitions of similar strata. In

fact, these types of formations are so common the world-over as to elicit no special wonderment, especially for those versed in Flood geology.

It would be difficult indeed to explain these features on the basis of uniformitarian geology, by river delta action, flood plain, or wave action at the seashore. But Genesis 8:1-3 mentioned above would seem to offer a far more logical explanation of the mechanics involved.

Two of the most notable examples of repetition of similar strata occur in the Highlands of Scotland and in the Alps. At least these regions have attracted more publicity on account of long drawn out geological controversy centering in these two regions. Not only have there been repetitions of the strata, judged from a lithological standpoint, but the fossils have also been repeated; and this violates a cardinal principle of paleontology. Five repetitions have been recorded in Scotland and six in the Alps. This presented a real challenge to orthodox geology.

Murchison and Lyell wrestled with this problem of interbedding in Scotland where gneisses and schists were interbedded with Paleozoic sandstones and limestones. They were convinced that they were dealing with a conformable series because they failed to discover any physical evidence to the contrary. But because the fossils were repeated, it was finally decided on fossil evidence alone that some earth movement had taken place to cause the repetition of the strata.

Field ² summed up the lesson to be learned from this experience: "Geologists all over the world began to realize that correlation by lithology alone was a dangerous procedure . . . fossils were the best and safest criteria." Field further expressed a view often held by scientists concerning Genesis: "While the Protestant Reformation helped to encourage interest in geologic research, Christianity had unfortunately included in its 'Sacred Writings' the Mosaic account of the origin of the earth as well as the Deluge." ³

Some blame for the controversy seems to have been placed on Moses' shoulders, broad enough incidentally to carry the load.

PARACONFORMITIES

To many, *Disconformities* may be a more familiar term, but the meaning is the same. Some have it "Deceptive Conformities." Geike ⁴ perhaps gave the best definition: "Fossil evidence may be made to prove the existence of gaps which are not otherwise apparent." With *Unconformities* there is an evident hiatus or gap in time between episodes of deposition, inasmuch as the earlier beds have been

tilted or folded, then eroded or truncated by a new deposition, exhibiting an angular discordance between the two formations. In a *Non-conformity* the sedimentary beds rest upon the igneous or basement complex. In a *Paraconformity* the physical evidence points to a continuous deposition, the only suggestion of a time gap being a sudden change in fossil types.

In the Grand Canyon, for example, no Pennsylvania fossils are to be found, the Permian fossils resting upon the Mississippian, and yet there is no evidence of erosion during that assumed hiatus of perhaps some 30,000,000 years. Even in our brief time since measurements have been recorded, coastlines are rising and sinking, in Scandinavia for instance. It is then inconceivable that the crust of the earth would remain so stable and at just the right elevation that it would be unaffected by either erosion or sedimentation for millions of years. Edward Suess⁵ says such things "may well be cause for astonishment." Field has this to say concerning this paraconformity in the Grand Canyon: "Without the aid of fossils, disconformities are usually very difficult to determine—the physical evidence of an hiatus between the Mississippian and the Permian periods is therefore not represented by a well defined plane of erosion." "But this is not the most acute stratigraphical problem in the Grand Canyon which, incidentally, is one of the best places in the world to study stratigraphy. Below the Mississippian in most places the Devonian is not present and nowhere does the Silurian or the Ordovician appear which means that the Red-wall formation which is Lower Mississippian actually rests upon the Cambrian Muav limestone, a time gap of over 50,000,000 years. Surely in this immense space of time we would expect to find effects of very extensive erosion, perhaps warping and folding with angular discordance, but what do we actually find? The appearance of a perfectly conformable series of beds, laid down in fairly quick succession. Surely there is "cause for astonishment!"

A few miles northwest of Windowrock, Arizona, in the Defiance Uplift, the Permian Supai formation rests upon the Precambrian quartzite in Bonita Canyon, near Fort Defiance. Most of the Paleozoic is missing; although in this case there is some evidence of truncation of the quartzite.

The region about Heart Mountain, Wyoming, shows the same perplexing problem of disconformities as in the Grand Canyon, where the Silurian and Devonian fossils are missing, representing a time hiatus of many millions of years, with no physical evidence to correspond. Concerning this assumed hiatus, Field has this to say: "We realize that what at first appears to be a perfectly gradational contact between the Big Horn and Madison represents a considerable stratigraphical hiatus, measured by the total absence of the Silurian and probably the

Devonian sediments and fossils. This experience serves to remind us of the value of fossils in helping to determine the age of the formations, for it is extremely difficult to discover any physical evidence of even a disconformity between the sediments which were deposited in the Ordovician and those which were deposited in the Mississippian periods."⁷

The root of the difficulty here appears to be "a priori" reasoning; even reasoning in a circle. Rastall was frank enough to admit as much when he said: "It cannot be denied from a strictly philosophical standpoint that geologists are here arguing in a circle. The succession of organisms has been determined by a study of their remains embedded in the rocks, and the relative age of the rocks are determined by the remains of the organisms that they contain."⁸

THRUST FAULTING

An overthrust is conceived of as a plate or block of strata in a more or less level position that is believed to have been displaced from its original position where deposited. Normal faults involve high angle dips where one block has fallen in relation to the other, involving tension or stretching of the crust at that point. Wrench faults are concerned with fractures, along which there has been differential horizontal movement. Overthrusting presupposes a previous folding of the strata due to compression in the crust of the earth at that point. If folding continues past a certain point, the top of the fold will break over like a wave or breaker on the ocean, and the continued compression will continue to move the broken and detached upper plate over the lower section until the stress is relieved. This may require considerable horizontal movement of the upper block if the rock is competent enough, or the stress may be relieved by numerous fractures in the moving block. If the block is soft enough or incompetent, we may find a series of small wrinkles. A very important factor governing the possible distance of movement is the coefficient of friction along the surface of movement.

Much new scientific data has accumulated recently and it has been found that there is a definite limit to the possible size of thrust blocks or distance that they can be moved before the crushing strength of the rock is exceeded. When that is exceeded the result will be a mass or rubble rather than apparently conformable strata. It is generally assumed that there would need to be a contact layer like shale or some material of low coefficient of friction plus an adequate gradient to permit the movement. I can still hear Professor Leith, structural geologist at the University of Wisconsin, remark: "One wonders what giant lubricator enabled the great mass to be translated forward many miles with no unconformity or brecciation?" Small overthrusts

are commonplace. Thus one I examined in the southern part of the Santa Rita mountains, south of Tucson, Arizona, involved Permian blocks of limestone thrust northward for a distance of about one half mile. At the contact line a three foot thick gouge layer of finely powdered rock, or mylonite, ground fine by the differential movement of the two rock plates, was exposed. Where there has been movement of many miles as is postulated for the 40-mile Lewis thrust in Glacier National Park, Montana, one would expect a gouge layer of great thickness. Where is the evidence of such a layer?

In fact, Field was greatly puzzled over the plausibility of giant overthrusts: "If this be true, it represents one of the most astonishing and impressive features in the structures of the Alps. But what caused such a tremendous translocation as to move a portion of North Africa (Hinterland) toward and finally over Switzerland (Foreland)? The question still remains unanswered. Like any other outstanding hypothesis, even when built on careful and critical research, it must be open to discussion. What caused the western jaw to move is not known. Some geologists are skeptical of the whole interpretation of the structure of the Alps because they are unable to visualize the cause."⁹

Mention has been made of the problem of interbedding and repetition of fossils in the Highlands with which Murchison and Geike wrestled until they sent Peach and Home to work out the geology. They finally suggested the Moine overthrust concept involving an imbricate series of slices or thrusts. The Harmony formation is widely found in thrust sheets of various mountain ranges of Nevada. Slivers of Harmony presumably were stripped off underlying units and forced through and overrode the eugeosynclinal rocks.¹⁰ Hundreds of such "wrong order" formations are found.

We previously mentioned Heart Mountain in Wyoming as showing disconformities. It also has strata in the wrong order, according to fossil ages. It is capped with Paleozoic limestone and lower down is supposedly younger Jurassic and Tertiary sediments. The same is true of nearby Sheep Mountain, and last but by no means least is the aforementioned Lewis thrust extending from Glacier Park in Montana at least 500 miles along the Rockies wherein an area covering several thousand square miles is assumed to have been pushed from the west toward the east from thirty to sixty miles. The capping of the Rocky Mountain range in this section is composed of Cambrian, Precambrian, or Paleozoic strata. This mighty Rocky Mountain Cordillera rests upon a base of Cretaceous rocks, in some places showing dinosaur remains. The fossil flora of the mountain capping is mostly an algae.

Glacier Park, in the U.S.A. and Banff and Jasper National Parks in Canada are along the most scenic sections to study thrusting.

There have been many phases of geology over which controversy has raged over the years, and the subject of thrusting has been an outstanding example. This appears to have been due to three factors: 1. The concept of large-scale overthrusts never has made sense from the engineering or logical viewpoint. 2. The causes and mechanics of thrusting have never been well understood. 3. It is the only explanation of the many exceptions to the fundamental assumptions of historical geology, i.e., a more or less orderly evolution of life.¹¹

Small-scale thrusts have long been observed; it was therefore reasoned, why would not the same principle apply to larger ones? This type of logic may apply to many things, but in other applications there are limiting factors. For instance in fissionable elements there is a critical size, beyond which there is danger or even certainty of an explosion. This principle applies also to thrust blocks, the larger and longer, the greater the stress of compression required to move it. Soon this stress exceeds the crushing strength of the rock, and instead of movement we get shearing or crushing. This relieves the pent up crustal stresses and no forward translation of the block would take place.

Another illustration would be a freight train. In spite of the number of engines, there would be a theoretical limit to the number of loaded cars that could be pulled because the weakest coupling would break.

This is a vital point that should always be kept in mind when we read about how a certain thrust block was propelled a certain distance: are they talking about some small thrust where physical evidences of movement can be observed such as a gouge layer or slickensides, or are they talking about an assumed thrust block where the only evidence of a thrust is not physical but theoretical, based on fossil evidence alone? By frank admission on the part of leading stratigraphers, physical evidence for thrusting is often lacking. The thrusts are assumed because "older" fossils are embedded in the upper strata and "younger" ones in the lower beds.

This point can be amply verified by statements from famous stratigraphers such as Dana, who said: "The thrust planes look like planes of bedding and were long so considered."¹² Geike came to the same conclusion: "Had these sections been planned for the purpose of deception they could not have been more skillfully devised," and in his textbook we read, "The strata could scarcely be supposed to have been really inverted save for the evidence as to their true order of succession supplied by their included fossils."¹³

In the Alps, as well as the Scottish Highlands there is an interlacing of relatively thin thrust slices, far too thin to have the internal stiffness to withstand such pressures as needed to push these.

slices so far. The same anomaly was observed in Heart Mountain, Wyoming.

Lawson sums up the subject thusly: "It seems, therefore, mechanically impossible (a priori) that a single intact prism of the earth's crust could move more than a small fraction of a mile by real overthrusting as a mobile block past a passive underlying block, owing to the fact that strain is relieved by a succession of limited ruptures and the development of an imbricated structure."¹⁴

William Bowie, of the U. S. Coast and Geodetic Survey, is a specialist in isostasy and the mechanics of earth movements. He has this to say: "The theory that a mountain system has been caused by lateral thrusts originating from a distance presupposes a very anomalous condition. The theory implies that the earth's crust is competent to carry thrusts that would squeeze up mountains and plateaus, and that at the same time it is so weak that it can undergo the distortion incident to the movement causing the uplift — this, it seems is an inconceivable situation because no structure that is so weak as to be distorted to this extent (folded mountains of the Appalachians) could possibly transmit the stresses necessary to hoist the mountains. From an engineering standpoint, we cannot conceive of horizontal movements originating outside of the area occupied by the mountains as the cause of a mountain uplift."¹⁵

The foregoing pronouncements, although sound, still do not reflect the latest information available. Such laborers as Terzaghi, Hubbert, Rubey, Moore, Birch and others have investigated the problem of large overthrusts from laboratory investigation, as well as applied mathematics. Although Hubbert and Rubey have certainly contributed much of value to the science, it appears that their conclusions have by no means been universally accepted, as evidenced by the running debates from time to time appearing in recent issues of the bulletins of the Geological Society of America.

Their computations are far too technical and mathematical to outline here, but their conclusions may be summarized. Smoluchowski discussed the problem of sliding a rectangular block along a horizontal surface. The pressure needed would equal to $\frac{F}{ac} = Wbc$. If (b) equals 100 miles, the length of the block, the strength of the block must be capable of supporting a column 15 miles high; but the crushing strength of granite will be reached in supporting a rock column only two miles high.*

One alternative proposed was gravitational gliding when a bentonite or shaly layer acts as a lubricator between the top and bottom blocks. However, Chester Longell showed that gravitational gliding

*Where F=force needed, a=breadth of block, c=thickness, b=length, w=weight per unit of volume.

down a geologically acceptable slope incompatible with known values of the coefficient of friction.

Hubbert and Rubey¹⁶ argued from the analogy of high fluid pressures in an oil 'well whether the fluid be oil or water. This pore water pressure in porous rocks is assumed to cause the rocks to partially float over the lower block, and thus reduce the shearing force needed to overcome the coefficient of friction.

Terzaghi showed that low angle landslides occur in loose soils when the water pressures in the clays became great enough to reduce the frictional force pulling the block down the given slope. However, let it be pointed out that landslides in loose soils are not analogous to solid blocks. In the landslides, the discrete particles, sand grains, or larger pebbles and rocks in a semi-viscous state are free to rotate or give way in relation to the other particles when obstructions are met. In the case of the thrust in solid blocks, if a rock knob or obstruction meets an obstruction in the other blocks, nothing gives. but the coefficient of friction rises sharply and greater force is required to grind off the salient, for it would be almost impossible to find two blocks in contact that were perfectly smooth.

I examined an exposure in the Empire Mountains of Southern Arizona where the Paleozoic (Permian) limestone is mapped as having overridden a Cretaceous rock formation. However, in places the contact resembled the meshing of gears. There could have been no sliding without grinding off the intermeshing projections without the creation of a thick layer of mylonite or gouge which was not in evidence. It is difficult to envision how pore water pressure could have solved this problem. The top layer fitted the bottom one like a glove or as melted metal fits a mold.

To help clarify the picture of pore water pressure, the authors have used a homely illustration. If a frozen beer can is taken from the refrigerator and set upon a glass inclined plate, it will just sit there. However, if the bottom cap is cut off it will sit there until the heat of the room begins to expand the beer in the can, when the can will start to creep down the inclined glass because the friction between the glass and can has been reduced by the pressure of the beer in the can. In other words, the can of beer starts to float down the glass. This all sounds very plausible, but Francis Birch replied to Hubbert and Rubey in a subsequent issue of the G.S.A. Bulletin contending that the beer can was not analogous to pore water pressure in rocks.

Birch also says that if the pore water pressure so weakens the underlying rock layer that less shearing force is required to start the thrust, then the upper block must also be weakened thus lowering its innate crushing strength, resulting in fracture instead of forward movement.

And so the controversy continues as in so many

lines of geology. Has there been continental drifting? Has North America drifted westward to its present position from a former junction with Europe? I was once assigned to debate on one side of this subject which still remains unsettled.

However, the possible help of pore water pressure would not eliminate the grinding effect of rock against rock. If there has been thrusting one should observe gouge layers and slickensides. If the formations appear perfectly conformable, with no physical evidences of thrusting, caution would appear to be the watchword in diagnosing a giant thrust as such based on other criteria.

In summation let us return again to the original theme, Catastrophism vs Uniformity. In the Dec. 23, 1963 issue of *Newsweek* the science editor had this to say: "Catastrophism is a fighting word among geologists. It is a theory based on divine intervention, and its adherents held that the history of the earth and life on it were moved by a series of disasters inspired by God, the last one — Noah's Flood. It was the major line of thought for a few decades last century but a vigorous counterattack by naturalists against the supernaturalists eventually pushed it aside.

"But now many geologists believe the counter-attack may have been all too vigorous. In their haste to reject the hand of God, they have passed over some solid evidence that could help improve their understanding of both geology and evolution. As a result many geologists at the recent meeting of the American Geological Society were advising the rehabilitation of catastrophism, without recourse to the supernatural agent."

Norman Newell, paleontologist of the American Museum of Natural History in New York admits the past mistake of the orthodox viewpoint by saying, "Geology students are taught that the 'present is the key to the past' and they too often take it to mean that nothing ever happened that isn't happening now. But since the end of World War Two when a new generation moved in, we have gathered

more data and we have begun to realize that there were many catastrophic events in the past, some of which happened just once."

How like a breath of Spring to hear paleontologists finally admit that perhaps after all the Creationists and Flood geologists have produced valid evidence that demands recognition.

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DISCOVERIES SINCE 1859 WHICH INVALIDATE THE EVOLUTION THEORY

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Creationists of the later part of the Nineteenth Century such as Jean Agassiz had far too rigid a concept of species, postulating that even varieties were created in the places to which they were best adapted.

During his voyage with the Beagle, Charles Darwin quite correctly saw that this extreme and entirely unbiblical idea of creation held by scientists of his day was simply not true. He quite correctly reasoned that the various varieties of finches (then called species) of the Galapagos Islands all came from one or at most several species migrating from the mainland. Clearly they were not created in their various forms each peculiar to a particular island. But in 1859, he carried this idea to the extreme of claiming that all *kinds* of plants and animals by the natural selection of beneficial variations evolved from one or a few original simple one-celled forms of life.

MOLECULAR EVOLUTION

Later scientists have extended this concept to include the idea of chemical evolution, various simple gases such as ammonia (NH_3) forming a sort of organic "soup" in the original "primitive" ocean. From this complex of amino acids proteins, carbohydrates, and finally desoxyribose nucleic acid evolved. First, of course, only simple "naked" D.N.A. molecules developed the power of reproduction but finally these developed cell walls, united and over a billion years or so evolved into the complex of life we see around us.

Actually, this idea of chemical evolution is but a refined version of spontaneous generation. It is the only alternative to belief in creation ex-nihilo. From 1500-1860, few scientists doubted it. Aristotle, Newton, William Harvey, Descartes, van Helmont and Lamarck accepted spontaneous generation without question. Even many theologians such as the English Jesuit John Needham subscribed to this view.

Step by step in a great controversy that spread over two centuries, this belief was whittled away until nothing remained of it. First, Francisco Redi showed that when meat is placed under a screen so flies cannot lay eggs on it, maggots never develop. This was a serious blow to one of the basic proofs of spontaneous generation. Then Lazzaro Spallanzani showed that a nutritive broth sealed off from the air while boiling, never develops micro-organisms, and so never rots. Needham objected that

the air above the broth had been vitiated, so could not support life.

Louis Pasteur, in 1860 by a simple modification of Spallanzani's experiment, showed the air was not at fault. He drew the neck of the flask out into a long S-shaped curve with its end open to the air. Thus, while molecules of air could pass freely back and forth, heavier particles of dust, bacteria, and molds in the air were trapped on the walls of the curved neck.

Even yet it was not easy to deal with so deeply ingrained and common sense belief as that of spontaneous generation. Pasteur's greatest help in disproving it was a noisy and stubborn opponent named Felix Pouchet, whose arguments before the French Academy of Sciences drove Pasteur to more and more rigorous experiments. When he had finished this remarkable series not a shred remained of the belief in spontaneous generation.

As George Wald ¹ puts it we tell this story to beginning students of biology as though it represents a triumph of reason over mysticism. Actually it is very nearly the opposite. The reasonable view was to believe in spontaneous generation, the only alternative to belief in a single primary act of supernatural creation. There is no third position.

It is Wald's belief that a scientist has no choice but to approach the origin of life through a hypothesis of spontaneous generation. If one refuses to believe in a God with power to create ex nihilo, I heartily agree with Wald. He quite correctly states that Pasteur proved untenable the idea that living organisms now arise spontaneously under present conditions. He then endeavors to show that they may have so arisen under past conditions.

Naturally as he says, "Time is the hero of the plot." Given time enough and even the "impossible" becomes possible. Actually scientists such as Wald and Walter R. Hearn substitute time for power.

In discussing the possible spontaneous origin of life, Wald is more honest than most chemical evolutionists. He says that students of chemistry are usually told that when, in 1828, Friedrich Wöhler synthesized the first organic compound urea, he proved that organic compounds do not require living organisms to make them. Of course it showed nothing of the kind. Organic chemists are alive! Wöhler merely showed that they (living organisms) can make organic compounds externally as well as internally.

Organic chemists now mix inorganic substances such as water vapor, methane (CH_4), ammonia (NH_3) and hydrogen together under the activation of an electric spark and find traces of glycine, alanine, and other simple amino acids. S. L. Miller, Sydney Fox and Walter R. Hearn² are quite excited over these discoveries and believe as stated above that given time enough life would arise in the sea from such spontaneously generated simple amino acids. Actually these men are only demonstrating that intelligent beings can make organic compounds from inorganic compounds. The complexity of the chemical apparatus used is such as to be a bit unrealistic in terms of their postulated primeval world free of oxygen. The strange fact that our planet appears to be unique in having water so necessary to life is taken for granted by them. A complete discussion of this modern version of spontaneous generation is too involved, but reference to Zimmerman's paper (pgs. 13-17) will show the many insurmountable problems involved.

There is no question but what this as a working hypothesis has much attraction to the modern "scientific" mind. At least the vocal majority of scientists believe it either in its entirety or in part. The question is should the Church again make the same mistake as it did in adopting the pagan concepts of Ptolemaic astronomy taught by leading scientists from Ptolemy (100 A.D.) to Copernicus (1473) ? There is considerable evidence that the concept of evolution has insidiously influenced the philosophy of not only biology, organic chemistry, geology, and paleontology but such disciplines as anthropology, archeology, sociology, psychology, history and even theology.

So then what really is the evidence for Darwin's extrapolation of his undeniably true micro-evolutionary observations into the general theory of evolution?

BIOLOGICAL VARIATION

First, let us consider variation, natural selection of which according to Darwin developed new species. He considered variation as essentially *unlimited* with those individuals most fitted to the environment being naturally selected. Again, the following generation, the same *range* of variability would occur. Thus, in the classical case of the evolution of the giraffe, quoting Darwin,³ "So under nature with the nascent giraffe the individuals which were the highest browsers and were able during dearths to reach even an inch or two above the others, will often have been preserved, for they will have roamed over the whole country in search of food. These slight proportional differences, due to the laws of growth and variation, are not of the slightest use or importance in most species. But it will have been otherwise with the nascent giraffe, considering its probable habits of life for those individuals which had one part or several parts of

their bodies more elongated than usual, would generally have survived. These will have intercrossed and left offspring, either inheriting the same bodily peculiarities or *with a tendency* to vary again in the same manner. By this process *long continued* combined with the *inherited effects* of increased use of parts (the longer neck) it seems to me certain that an ordinary hoofed quadruped might be converted into a giraffe." It should be noted that Darwin assumes " (1) continuous variation, i.e. each generation showing the same *range* in variation of neck length and (2) effects of continuous use (or disuse). In fact, he devised a scheme of pangenesis now disproven to explain this presumed inheritance of the effects of use or disuse.

J. B. Lamarck was the most noted proponent of the doctrine of the inheritance of acquired characters, i.e. changes in plants or animals due to the environment, use or disuse. That such characteristics are acquired by individuals during their life is obvious. However, as the physical basis of heredity became better known, the possibility of inheriting environmental effects became increasingly difficult to believe. First, August Weismann developed his germ plasm theory "Das Keimplasma" in 1892. He clearly showed that reproductive cells instead of being developed by gemmules assembled from various parts of the body as suggested by Darwin, formed a continuous line from generation to generation developing only from germinal tissue. The body or somatic cells are then the result of germ cell activity. His views were clearly shown to be correct by proof developed from 1900 to 1930 that the chromosomes carry the genes or factors determining the characteristics of the body. Since they are protected during cell division and gamete formation from most *normal* environmental internal or external influences, acquired characteristics cannot of course be inherited. More recently proof that deoxyribose nucleic acid molecules (D. N. A.) arranged in helical fashion actually form an information code by which the body develops according to a master template makes even clearer the reason why the effects of environment cannot be inherited.

Now what are the real laws governing the inheritance of variation? Working diligently in his garden the Austrian monk Gregor Mendel carefully crossed various strains of peas and found a definite statistical pattern governing the inheritance of such characteristics as tall vs dwarf growth habit. Tall (TT) habit was dominant to dwarf (tt) so that the first generation hybrids (Tt) were all tall. The dwarf habit of growth did not show up until the second filial generation or F₂ when 1/4 of the plants were dwarf in habit (tt). Such traits are called recessive and some are due to two factors so occur in only 1/16 of the F₂ population, and others due to three factors occurred in 1/64 of the F₂ plants. Later work has shown that most major factors such as tall have modifying factors. Accord-

ingly, by selections slightly taller plants may be obtained. But the limits are soon reached and from then on selection is no longer effective since the strain has been thus made true breeding or homozygous for all of them. Variability is then *definitely limited* instead of being unlimited as Darwin thought. This is quickly shown in breeding for such characteristics as long bud in roses, where the ultimate in bud length is achieved in 5 or 6 generations. Yield in corn is another example — corn breeders making phenomenal progress during the first 20 years.

But then these inbred lines of corn used to produce the famous high yielding hybrid corn seed could no longer be further improved since all the major factors for high yield had already been accumulated. Now corn breeders' time is mostly spent in maintenance of these inbred lines and breeding for increased disease resistance, local adaptation and other related problems. All of our experience shows that *contrary* to what Darwin believed the variability potential of each species is definitely *limited*.

ON THE NATURE OF MUTATIONS

What then do present day evolutionists appeal to for the mechanism of evolution? The answer is mutations which occur with varying frequency in plants and animals. Actually they are the result of a "mistake" in the process of gene reproduction or more specifically the duplication of the deoxyribose nucleic acid or D. N. A. molecules which either are or house the genes which determine the characteristics of plants and animals. Various agencies such as cosmic radiation and chemical mutagens cause mutations, but there is considerable evidence that a basic percentage are spontaneous. i.e. the reproductive mechanism simply does not *perfectly* reduplicate itself each time.

Can these chance "mistakes" or defects really explain the origin of the complex variation we see around us? Elliot G. Watson, British zoologist writing for the *Saturday Evening Post* 'lists four examples of life histories that simply cannot be explained by orthodox evolution theories. Thus the coral reef crab has claws so small as to be useless as weapons. But their backward curving teeth grasp the slippery bodies of small sea anemones. detaching them carefully from their hold on the rocks without injury. They are then held close to the pirate crab's mouth and continue to operate their tentacles so as to capture small creatures. These the crab with his free front pair of walking legs removes as dainty tidbits, leaving those he dislikes for the anemones which are finally released unharmed.

Are these adaptations to be explained by chance mutations? Did a chance modification of the claws due to a "mistake" in the duplication of some D. N. A. molecule prompt some ancestral crab to detach

an anemone for the mere fun of it and by chance hold it near its mouth? If so, the crab passed on to its offspring this behavior tendency, and so through natural selection the crab species developed their close association with various anemones, the species differing, of course, to make the problem more complex for each species of pirate crab. This, Watson says, he simply cannot accept and I agree.

My scientific colleagues who are evolutionists make much of the undoubted fact that under unusual new environmental conditions some mutations are advantageous. Thus, when bacteria are catastrophically exposed to high levels of penicillin or streptomycin, most of them die. But occasionally one lives because of a mutation to tolerance of these antibiotics. In penicillin this resistance is a step by step phenomenon, i.e. by increasing dosage rate increasingly resistant strains appear. In streptomycin the change to maximum resistance is effected in one mutation. But Pratt and Dufrenoy³ point out that these resistant types are lower in metabolic ratio and at a *disadvantage* in cultures free of antibiotics. Are we then to believe in the strange concept that complex forms of life evolved by constantly stressing organisms in such a catastrophic manner? There is certainly no evidence that penicillin or streptomycin resistant bacteria continuously grown in high level antibiotic culture ever achieve a metabolic ratio superior to the original type.

Mutation merely increases the variability potential thus enabling a species to survive what otherwise would be complete annihilation. But this variability potential is definitely limited. Again my evolutionary colleagues argue that this only seems so because our time of observation is so short. But they for some reason fail to see that adaptation either by mutation or segregation of already existing variability (heterozygosity) *rapidly* occurs up to a certain level, and then stops.

Also the *more* complex the organism the less chance there is for mutations to occur of advantage even under new environmental conditions. Thus, my own Neutron Radiation experiments with roses resulted in hundreds of mutations, some of possible horticultural value. However, *without exception* all were either weaker or more sterile than the variety radiated. While a National Research Fellow at the California Institute of Technology, it was my privilege to see the wonderful array of mutations of the fruit fly *Drosophila melanogaster* obtained by Sturtevant, Bridges and Dobschansky who were then working with the great Thomas Hunt Morgan who first realized the experimental value of this "biological Cinderella." Though remarkable as chromosome markers in linkage studies, demonstrations of allelomorphism and other genetic problems, not one could he said to have a higher survival value than the normal type. Occasionally as described by Timofeef-Ressovsky some mutations such as *eversae* or *singed* have a slightly greater

viability at higher temperatures.⁶ But even these, if combined in one individual by cross breeding and selection, are reduced in viability and if combined with a third mutation have a lower viability than normal even at the higher temperature. And most certainly to effect significant changes in a species such as to warrant classification of it as a new one or place it in a different genus would involve the accumulation of *many* mutations. The possibility of such accumulation most certainly *has not* been demonstrated.

ORIGIN OF HIGHER CHROMOSOME NUMBERS

Much has been made of the voluminous experimentation attempting to show how species with higher chromosome numbers have been built up by what is called amphidiploidy. Before discussing this perhaps we should make clear what is meant by "species." Many are really only what Jens Clausen calls ecotypes or distinctive genetic or physiologic races. All have the same internal balance and there is no genetic obstacle to a free interchange of genes where such races meet and hybridize. The so-called snow Camellia *C. rusticana* found along the cold coastal mountain plateaus of Northern Japan is really only a race of *C. japonica*.

Others are ecospecies and have the genetic balance so distinctively intricate that genes of two ecospecies cannot *freely* interchange genes without seriously impairing the vitality of the hybrid offspring. The species of conservative taxonomists working along conventional lines are usually good ecospecies. Chromosome pairing appears rather normal but marked sterility is observed when these are hybridized.

Cenospecies are those entirely unable to exchange genes with one another. The chromosomes do not form pairs at the reduction division even though sterile hybrids may occur.

It is by the crossing of these cenospecies with subsequent doubling of the chromosome number that amphidiploidy is presumed to have occurred.

The question then is, how much evidence is there for the origin of cenospecies or compariums of them usually equivalent to "genera"?

When amphidiploids were first produced "it was tacitly assumed that simple doubling of the chromosome number would in some miraculous way render any sterile hybrid fertile and vigorous." ⁷Forty-five years of cytogenetic research has shown this is simply not true, though many even recent research men seem unable to realize the limitations imposed. Successful amphidiploids arise only from vigorous interspecific hybrids. If they are to remain so during succeeding generations, the original balance must remain unchanged. This means that only interspecific hybrids between cenospecies of one comparium have a chance of being successful amphidiploids.

Perhaps the most famous one is *Raphanobrassica* hybrid first produced by Karpechenko in 1927.⁸ As reported by him, a uniform F₃ population was obtained, all 36 plants being quite fertile having $2n = 36$ chromosomes.

Richaria and Howard⁹ in their later, more thorough and detailed studies obtained quite different results as follows: (1) The F₁ hybrids formed a variable number of bivalents at the reduction division usually 2 to 3 per cell; (2) Many of the F₂ plants had less than 36 chromosomes and those with 36 showed variable pairing at IM with univalents, and quadrivalents occurring. Seventeen to 19 chromosomes were found in the pollen mother cell nuclei and accordingly even in the F₄ plants varied in chromosome number from 33 to 37 chromosomes. (3) The F₂ plants were only partially fertile and even in the F₄ fertility varied from 5 to 42%! Howard quite correctly believes that this formation of quadrivalents in F₂, F₃ and F₄ follows from the fact that bivalents are formed in the F₁. In fact, Howard points out that Karpechenko's published F₁, IM figures show only 16 or 17 chromosomal bodies in some cases instead of the 18 one would expect if no pairing occurred. As a result, 40% of the F₂ plants grown by Karpechenko were partially sterile, due to incomplete chromosome complement or loss of genes due to chromosomal fragmentation during the F₁ reduction division.

Another widely accepted amphidiploid is that of *Galeopsis* artificial Tetrahit reported by Arne Muntzing (1930, 1932)^{10,11} *Galeopsis pubescens* $n = 8$ x *G. speciosa* $n = 8$ when crossed gave an F₁ population of 7 plants. These mint species showed some chromosome homology since 5 to 8 pairs of chromosomes were observed at the reduction division. A diploid F₂ generation of 197 plants was grown. This segregated for many characteristics and had an average fertility of 22%. One F₂ plant was triploid and almost completely sterile. Hand pollination of this gave no seed, so it was left among the other F₂ plants. Also, one of the wild type *G. Tetrahit* plants was only 60 to 90 feet away as was *G. pubescens*. Now, only **one** seed was harvested from this sterile plant and it grew into the artificial Tetrahit which as illustrated by Muntzing (1930) is *identical* to *G. Tetrahit*. He suggests that a triploid egg cell of the F₂ hybrid was fertilized by a pollen nucleus of *G. pubescens*, i.e. 16 *G. speciosa* + 8 *G. pubescens* chromosomes from the F₂ and 8 from *G. pubescens* resulted in the 16 II F₃ plant. Were this actually the case, one would expect some quadrivalents since 5 to 8 11 were found at F₁ IM. None are reported in Muntzing's cytological study. What then is the explanation of this hybrid?

A paper published by R. E. Clausen and Lammerms (1929)¹² disclosed that among hybrids of *N. digluta* x the recessive white *N. tabacum* ♂, the unusual white plant, was a haploid resulting from a

pollen grain nucleus stimulating the cytoplasm of an *N. digluta* egg cell to grow into a plant even though the female nucleus did not function. Unusual diploid *N. tabacum* hybrids were similarly explained as due to the functioning of diploid pollen grains. Since then many similar cases have been found in rose and especially camellia hybridizing.

Thus, the Captain Rawes camellia is shown by Lammerts (1959)¹³ to have so originated. Also, plants of *C. japonica* ($n = 15$) x *C. reticulata* ($n = 45$) which are practically identical with *C. reticulata* and have 45 pairs of chromosomes are clearly shown to be the result of diploid merogony.

G. artificial Tetrahit also probably resulted from such a diploid pollen grain and so in reality was *G. Tetrahit*! Its identity of appearance to that species and lack of quadrivalent formation are thus explained. Also, and more important, the strange reduction in size of the F_3 flower is thus accounted for. As is well known, real amphidiploids combine the characteristics of their F_1 parents and do not so radically depart from them in appearance as does *G. artificial Tetrahit*.

Though I urged Arne Muntzing to repeat this cross and verify his conclusions, he never saw fit to do so. Since in science it is axiomatic that experiments should be made in such a way as to be verifiable, I cannot accept his claim of the experimental origin of artificial *Tetrahit* because of the much more likely explanation by diploid merogony.

I have gone into this case at considerable length since for some reason there has been a tendency to accept evidence for the experimental evolution of plant species, which would not be acceptable in other more exact sciences.

Thus, it is obvious that for any amphidiploid to qualify as a species (1) the original F_1 hybrids show no pairing, yet give a reasonable percentage of diploid gametes, (2) the experiment should insure conditions such that ONLY self-fertilization could occur, and (3) fertility and vigor of the F_2 should be at least comparable to that of the diploid species.

Judged by these criteria even Jens Clausen's cases of experimentally produced amphidiploids from crossing *Layias* and *Madias* leave much to be desired. All were either so sterile or weak that they could not compete under natural conditions with the parental species.

It does indeed appear that the tobacco of commerce *N. tabacum* originated from the hybridization of *N. sylvestris* x *N. tomentosiformis*, each of which have 12 pairs of chromosomes. The sterile F_1 has 24 unpaired chromosomes. Greenleaf¹⁴ by decapitating the stems caused callous tissue by application of hetero-auxin. Shoots from this tissue had 2411 of chromosomes like *N. tabacum*. Though most of them are female sterile, recently D. R.

Cameron (successor to Dr. R. E. Clausen) has obtained fertile ones. Jens Clausen suggests this synthesis must have occurred long before the discovery of America by Columbus. Since Indians undoubtedly must have chopped down old tobacco plants, the idea that naturally occurring hybrids so cut down developed fertile shoots from naturally developed callous tissue is not too far fetched. However, this sort of thing would certainly not occur naturally without man's intervention.

The many recently reported cases of amphidiploids produced by colchicine treatment such as Towner's *Tagetes*¹⁵ involve such complicated procedures that surely the authors of these experiments cannot imply these would occur under natural conditions.

TOWARD A MORE REALISTIC APPROACH

Considerable lack of critical judgment has been shown by some cytologists who infer relationship of species from the observation of occasional loose pairing of chromosomes in the F_1 hybrids. As both McClintock¹⁶ and Lammerts¹⁷ have clearly shown, pairs of chromosomes are frequently found in both haploid corn and *N. tabacum*. In the case of *N. tabacum* variety coral haploid as many as six bivalents or pairs were observed. Since *N. tabacum* has been shown to be the result of chromosome doubling of *N. sylvestris* x *N. tomentosiformis* as above described, these pairs certainly are not the result of homology. In fact, pachytene studies showed they were clearly the result of non-homologous association since unlike chromomeres were aligned together in the paired strands. Also, and more important, strands often folded back on themselves to form pairs! As I state in the paper cited above, "homologous attraction of chromomeres is due to a regulatory mechanism in some way causing an orderly alignment of the threads when the cell as a whole is timed for synapsis. When true homologies are not present this tendency for two by two association expresses itself in part by non-homologous pairing."

In view of such clearly shown facts why do cytogeneticists still infer relationship of species simply because occasional pairs of chromosomes are found? Clearly they are motivated by a preconceived concept of evolutionary divergence from a common ancestor. I am, of course, not referring to clear cut cases of regular pairing such as the *Drosera* type found in the hybrid of *N. tabacum* (2411) x *N. sylvestris* (12II) $\neq$ where 12II are regularly formed.

Fortunately, a trend toward a realistic approach is now evident. Thus, Lennart Johnson¹⁸ gives an excellent appraisal of the chromosome pairing he finds in the intergeneric crosses of *Oryzopsis*, Indian Mountain Rice and *Stipa* the Spear grass. He clearly shows that the number of pairs is proportional to the number of chromosomes involved. Accord-

ingly, they must be due to non-homologous association of chromosomes. Relationship of the plants as expressed in homology of the chromosomes is thus not the cause of pairing in his and many other cases.

C. J. Bishop in his recent "Reviews in Genetics and Cytology I Plant Breeding" (March 1963) ¹⁹ is quite candid in pointing out the failure of the older chromosome homology and pairing concepts to hold up as regards practical plant breeding. Thus, he says it was postulated that frequency of multivalent chromosome association was a major factor in determining the degree of fertility of the individual plant. Recent research has failed to reveal any *fully consistent relationship* between *chromosome association* and *plant fertility*. Some plants with regular bivalent formation may be quite infertile.

The possibility that some diploids with high chromosome numbers arose from the tendency of auto-tetraploids to progressively favor bivalent formation was early suggested by Muntzing (1936) ²⁰ The view that this is a slow progressive development has not received general support. Recent discovery of a single gene controlling bivalent formation in wheat (Riley and Chapman, 1958) shows clearly that diploid behavior is genetically controlled and not the result of lack of homology, whatever that term has come to mean.

The human mind tends to think of species with higher chromosome numbers having risen from adding chromosomes of two species with lower number. As shown above, most such experimentally produced amphidiploids combining the chromosomes of the basic diploid species would hardly survive under natural conditions. Recently an increasing number of diploid monoploids or polyploids have been isolated from tetraploid lines. Several Hindu (Indian) students have recently found that certain forms of *Rubus* classified as species are really polyploid derivatives of octoploid species, i.e. a reduction to the tetraploid level.

Very possibly we may find that many so-called "species" are really derived from pre-existing complex species of higher chromosome number and in a sense are degenerate offspring of a formerly much more intricate species pattern.

Thus, a recent paper on the rainbow and cutthroat trout by Simon and Dollar (1963) ²¹ indicates that the rainbow trout with 60 chromosomes was rather recently developed from the cutthroat trout having 64 by two centric chromosome fusions involving a centromere shift. This occurred since the last glacial period of the Pleistocene since the species were not isolated until the continuity of the Snake River and thus North Pacific drainage with the now extinct Lake Bonneville ended. The Provo strand line indicates a date less than 55,000 years ago, even on the basis of the very questionable orthodox ecological dating techniques.

Harlan Lewis, in a recent paper on catastrophic selection, ²² comes to the conclusion that reorganization of the species chromosome genomes or makeup is a rapid process in which all the differences become consolidated within a few generations. In the genus *Clarkia*, which is his specialty, all the derivative diploid species are better adapted to xeric or dry conditions. The history of the genus is one of response to increasing aridity and change in seasonal distribution of rainfall. Lewis' concepts are in marked contrast to the usual evolutionary one which postulates that structural and quantitative changes in chromosomes accumulate as homozygotes one by one over a long period of time through random fixation or by selection of those with presumed slight selective advantage. He rather clearly proves that *Clarkia lingulata* is of recent origin. It has an additional chromosome not present in *C. biloba* ($n=8$) homologous to parts of two chromosomes of *C. biloba*. In other words, part of the basic genome of *C. biloba* is duplicated in *C. lingulata* ($n=9$). The genomes also differ by a large translocation and at least two paracentric inversions. Hence the hybrids between them are *always sterile*.

Lewis suggests interspecific hybridization or a mutator gene similar to that reported by Ives ²³ in *Drosophila* as the mechanism of chromosome reorganization.

From the viewpoint of creationism and flood geology, Lewis' concepts are most interesting. Certainly there is abundant evidence that since the Flood great areas of the world, including much of the Pacific north and southwest have become increasingly arid. As mentioned above, Lake Lahontan, once a vast inland body of water, is completely dried up and Lake Bonneville has shrunk to the Great Salt Lake.

He does not, however, show how translocations or inversions became established. Dobzhansky has clearly shown that translocations in homozygous condition are inviable. Of four translocations involving the second and third chromosome of *D. melanogaster* only one could be established in homozygous or true breeding condition. It was definitely less vigorous than the wild type. ²⁴ Muller earlier had reported the same thing and work by Meta Suche Brown involving translocations between the third and fourth chromosomes resulted in her conclusion that "No completely fertile strain could be isolated." ²⁵ Inversions are, of course, merely translocations within the same chromosome and involve breakages and resulting injury also.

We are thus left in the strange dilemma of wishing to believe that changes such as postulated by Lewis could occur, since it would make an explanation of how the world became repopulated by so many distinct and obviously adapted species much simpler. Similar adaptation of species of roses, apples and other deciduous plants to the cold weather brought on by glaciation as a result of the Flood is quite

obvious and must have been as Lewis postulates for *Clarkia* quite rapid, also.

Though not "scientific" in the usual sense, I suggest that we are constrained to believe that these reorganizations or transformations are the result of intelligent design. Those of us who believe in the power of God should have no difficulty in believing that following the Flood, as the surviving basic species repopulated the world, God used such mechanisms as translocation, inversion and duplication as means to adapt species to the changed environment. This phenomena is much like that in mankind where the languages were *suddenly* and *rapidly* developed following the confounding of tongues at the Tower of Babel. In mankind, little in the way of chromosome variation or cross sterility of races has as yet been demonstrated. The pattern, however, is much the same since the obvious physical, psychological and adaptive features of human races are obviously fully as great or even more so than the one slight morphological differences separating *Clarkia biloba* from *C. lingula*, i.e. the much narrower shape of the petal!

ASSUMPTIONS INVOLVED IN AGE ESTIMATES

The statement is so often made that our observational time scale is too short to verify evolution. Given several hundred thousand or a million years and changes on the specific or genetic level could easily be effected. It is very easy to appeal to such unverifiable assumptions. But science is or should be demonstrated facts, not imaginary possibilities. So often the statement is made, for example, that radioactive dating by observation of the half-life of uranium, actinium, and thorium as they give off alpha particles and slowly change through a series of radioactive chemicals to radium and finally to the stable lead 206, 207, and 208 prove that the earth is about 1.5 or more billion years old.²⁶ But surely a little reflection will show that several basic assumptions must be made before any conclusions from half-lives of radioactive elements have any meaning. Four of these are: (1) in the specimen of mineral used only uranium and none of its degeneration products were present at Time = 0; (2) no loss of uranium by leaching or loss of radon gas occurred; (3) there was never in the past a time when the rate of alpha particle loss was much greater than now; and (4) in the creation of uranium the reactions went the whole way. Or stated more precisely, how can we be sure that in the build up of uranium from 'hydrogen nuclei as physicists now conceive of the creation of the elements some lead 206 and radium did not simply remain as such instead of all being converted to uranium and then disintegrating giving the series of derivatives now used by the uniformitarian school of thought as being evidence of such great age? Morris

and Whitcomb²⁷ give a thorough-going critique of radioactive dating in *The Genesis Flood*.

The same may be said of the so called astronomical evidence of such a great age of the universe. The red shift is interpreted as indicating that the various galaxies of stars are speeding away from each other, or the universe is supposed to be expanding at a speed close to that of light as regards the most distant stars. Some astrophysicists now consider this as merely a "tiring effect" resulting from light photons traveling such great distances. Also, it has recently been pointed out that much of the red shift effect may be simply due to the effect of dust particles in space distorting the quality of light observed. Finally, touching on this subject of astronomy in relation to time, we should remember that evidently water is a unique feature of the earth found nowhere else in the solar system (Genesis 1:2). Thus, the data of Explorer II show that Venus once considered the "watery planet" does not have any so could not support life.

THE SIGNIFICANCE OF "LET THERE BE LIGHT"

The first spoken word of creation was "let there be light." As is now clear, light is only one form of energy. Most probably all forms of energy were called into use or being during this first creation day. The various stars and galaxies were then created by conversion of energy into mass according

to the formula
$$\frac{e(\text{energy})}{c(\text{speed of light squared})} = m$$
 or
$$\frac{e}{(3 \times 10^{10})(3 \times 10^{10})} = 1 \text{ gram of mass.}$$
 Thus 9×10^{20} ergs of energy became 1 gram of mass. Since one joule = 10^7 ergs of energy, 9×10^{13} joules of energy were used up in the creation of only 1 gram of mass. In more commonly understood electrical terms, since one watt is equal to one joule per second, this may be expressed as 9×10^{13} watt second or 9×10^{10} kilowatt seconds. Dividing by 3600 seconds this gives 25×10^6 kilowatt hours of energy. Now Niagara Falls generates about 415 thousand kilowatts per hour or about 9960 thousand KW per day. If one uses a rough figure of 10,000 thousand (10^7) kilowatts per day for Niagara Falls, it is startling to realize that the amount of energy used in the creation of **only** 1 gram of mass is almost equal to 2.5 times the amount of energy generated by Niagara Falls in one day! The creative effort involved in the creation of the universe really staggers even mathematical concepts of power.

Obviously all of the light photons connecting all of the various orbital centers making up the galaxies were also set up at this time, i.e. the whole universe was one vast system of light and energy since one cannot from the viewpoint of physics conceive of visible light as distinct from other forms of energy. By the fourth day the conversion of

energy into mass evidently reached a concentration in the various gravitational orbits high enough to "activate" the various systems of atomic furnaces we now recognize as the sun and stars. It should be emphasized that, however vast the universe may be, light photons from the most distant stars would be immediately visible since the stars were made by conversion of light into closed orbits of energy we call mass.

A crude analogy is that of filling a large tank with water under pressure through a hose several hundred feet long. Once the tank is full the flow immediately reverses when pressure is discontinued. No matter how long the hose, water pours out *immediately* at a rate determined by the tank pressure. Astronomers of the uniformitarian school would have us starting with an empty hose. Then, of course, the time taken by the water to travel through the hose would be a measure of the length of the hose. So they assume stars beginnings to shine with no photons of light connecting them with the earth or other stars. But if the stars are conceived as being created by the flow of energy into them, then as soon as they begin to shine by virtue of this accumulated energy, a reversal in flow of light photons would immediately be visible here on the earth.

The creation account by stating that the sun, moon, and stars were not activated until the fourth creation day indirectly supports the Copernicus system of astronomy. For if as Ptolemy assumed the sun in its daily cycle around the earth caused Night and Day, how could there have been nights and days before the sun gave lights? The answer, of course, is that the earth's rotation gives our diurnal cycles and always has since God said, "Let there be light." This light came directly from Him until the fourth day, by which time the sun was activated as suggested above.

Actually many astro- and geo-physical facts indicate the universe and solar system is in the order of thousands of years old. Space allows mention of but five:

(1) Rapid disintegration of comets. Since they are part of the solar system, the maximum age of the comets would correspond to that of the solar system. Unless one adopts the strange theory of Whipple that a reservoir of comets exists far out on the edge of the gravitational field, for which no real evidence exists, there is no other conclusion.

(2) A great annual amount of meteoritic dust, 14,300,000 tons, settles to earth each year. So in the presumed five billion years, a layer 54 thick all over the earth should have accumulated. No such layer is found on the ocean floor. Identification would be easy since about 2.5% of a meteor is nickel in contrast to .008% in the rocks of the earth.

(3) operation Mohole studies²⁸ show that instead of an average of 18,480 feet of sediments on the ocean bottom expected after a billion years of

erosion, only about 1800 feet are found at the *maximum*.

(4) Tektites of glassy meteorites show maximum ages far less than even 1,000,000 years even granting the validity of the questionable argon method of age determination.

(5) Sulphates (SO₄) are being carried into the ocean at more than twice the rate of sodium and chlorine, yet there is more than seven times as much chlorine in the ocean as sulphate and four times as much sodium.²⁹ Evidently then both sodium and chlorine were abundant at $T = 0$. Since sulphates are fully as soluble as salt they must have been present, also. The earth then must be considerably younger than the 10,670,000 years it would take to accumulate the sulphates were there none at $T = 0$.

Only by tying the Biblical concept of an original creation with the various curses resulting in the transformation of many life forms, and ending in the final catastrophe of a world-wide Flood can we build an adequate explanation of the world we see around us. Whitcomb and Morris very effectively present the argument for a universal flood being the cause of the major portion of the fossil bearing water deposited strata in their recent book, *The Genesis Flood*. The after effects lasted for thousands of years as the earth's interior basins such as Lake Lahontan and Bonneville gradually dried up. Now the Caspian Sea is drying up at a rate causing such alarm to Russian agriculturists that an entire river is being diverted so as to empty into it. Southern California which enjoyed a winter rainfall in 1750-1850 great enough to fill the large Los Angeles and San Gabriel river channels is now practically a desert! Undoubtedly following the Flood rainfall was so great in many areas as to cause deposition of stratified rock several hundred feet or more in depth in a hundred years. In fact, the major mistake made by Sir Charles Lyell was his assumption that the rate of erosion and deposition of sediment then occurring (1830-1850) was a constant one. We can well liken the imbalance caused by the world-wide flood catastrophe to that of starting the swinging of a large pendulum. As the years go by the arc of action and reaction gradually lessen. However, the earth is still not entirely recovered from the strains due to weight inequalities which frequently adjust themselves by earthquakes. Not only during the flood but for a long time thereafter great lava flows occurred. The glaciers which once covered the upper half of North America have shrunk to pitifully small remnants of their former grandeur. Several students of geophysics predict that all of them will be melted by 2040, thus causing sea coast towns such as London and New York to be hundreds of feet under water!

As we are learning more about the deoxynucleic

acid patterns which govern heredity, we are learning how a few such transformations were effected in bacteria. Only by a careful study of all the facts of science can we understand how God effected all these changes or better stated permitted them to come about. Though we can never hope to make this a perfect world, we can by the grace of God make it a better one. As Christian research scientists we have a twofold duty. The first is to God in that our science should ever more clearly show the glorious complexity of His creation. Though marred by the evils caused by man's sins, it still has much of its original beauty and when properly interpreted will give us a better understanding of the glory of that "new heaven and earth" which will be our home when our Lord and Saviour returns. The second duty is to our fellow man in that we must endeavor to make our scientific efforts of value to him. Also, we of all Christians in this age of skepticism and doubt must constantly remember that God's glory is shown in his wonderful creation and He expects us to reveal it to our fellowmen during our work in the laboratories, in our scientific papers, and generally in our lives.

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SUPERIORITY OF SCIENTIFIC APPROACH THAT ACCEPTS ITS LIMITATIONS AND MAKES USE OF THE SCRIPTURES

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There is no means by which science, per se, can determine with certainty how matter and energy or living things came about. From a strictly scientific point of view their beginnings are indeterminate. This *principle of indeterminate inception* is comparable to the uncertainty principle which plays such a fundamental role in quantum mechanics. It points out the futility of scientific efforts to provide an absolute solution to the problem of the beginnings.

The principle of indeterminant inception rests on the premise that the beginnings must have taken place outside the domain of the two most inclusive laws of science, namely the first and second laws of thermodynamic, because those laws renounce anything other than a full-blown system and its irreversible transitions toward a lower-ordered system.

After one recognizes the limitations imposed on science in regard to absolute knowledge of the beginnings, he is in a better position to weigh the relative merits of the Scriptural account of origins as opposed to evolutionary theories.

If one accepts the Biblical record of creation with "apparent age," and acknowledges that it took place by God's special means which are indeterminant and by means which are perhaps nonexistent now, he may then gain insight into subsequent phenomena by applying laws which can be checked by experiment.

The evolutionist is not so fortunate. He cannot employ the experimental technique to check evolutionary theories. Theodosius Dobzhansky in his article *On Methods of Evolutionary Biology and Anthropology*, *American Scientist*, Vol. 45, December 1957, p. 388 states "These evolutionary happenings are unique, unrepeatable, and irreversible. It is as impossible to turn a land vertebrate into a

fish as it is to effect the reverse transformation. The applicability of the experimental method to the study of such unique historical processes is severely restricted before all else by the time intervals involved, which far exceed the lifetime of any human experimenter."

The only evidence for evolution carrying any real weight is that afforded by the fossil record and its classification with the geologic time table. In their book, "The Genesis Flood," *Presbyterian and Reformed Publishing Co.*, 1961, Drs. Henry M. Morris and John C. Whitcomb, Jr. show with well documented arguments that the uniformitarian theory upon which this is based is fraught with difficulties. The authors then present a consistent framework based upon a harmonious relationship between science and a literal interpretation of Genesis which could displace the uniformitarian-evolutionary concepts of geology and biology. The position of the authors is stronger than that of the widely accepted uniformitarian-evolutionary position in two respects: It requires fewer amendments to explain known scientific data. It makes use of the first and second laws of thermodynamics — a generalization of those important laws.

In conclusion: There are great weaknesses in the uniformitarian-evolutionary theories. They cannot give a positive insight into the beginnings because this is indeterminate scientifically. They run counter to the greatest laws of science. The experimental method cannot be employed to check those theories. The theories themselves require too many amendments to check with known scientific data.

The scientist who is willing to accept the Scriptures at face value is then able to discard the uniformitarian-evolutionary concepts and finds that science and Scripture blend into a harmonious relationship that opens new avenues to both life and science.