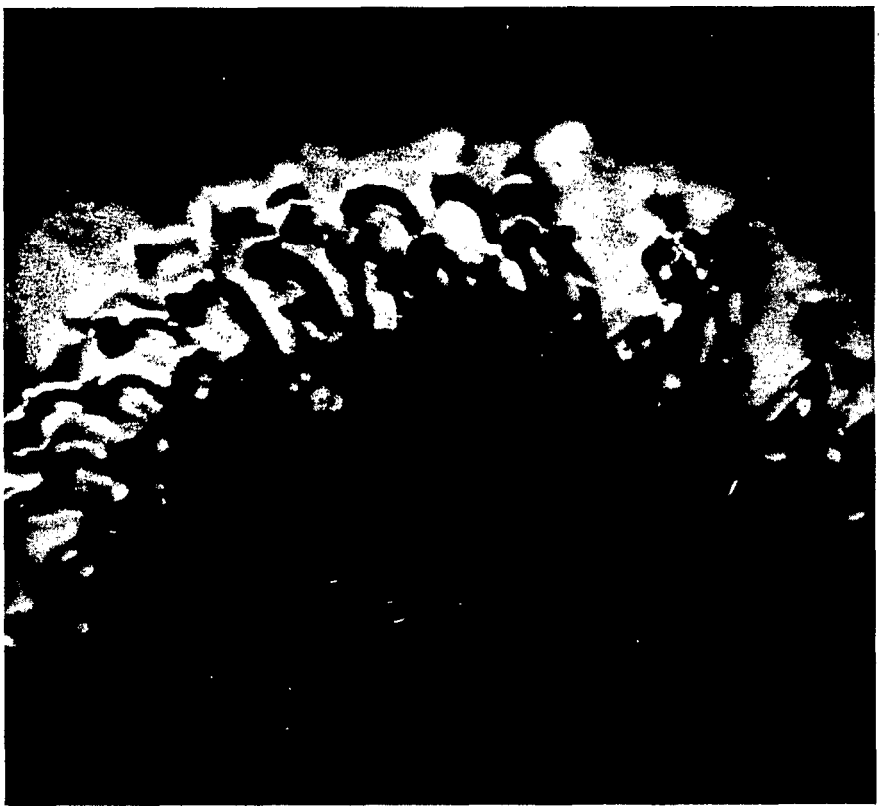
CREATION RESEARCH SOCIETY QUARTERLY



Haec credimus:

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

VOLUME 8 **DECEMBER, 1971** **NUMBER 3**

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All manuscripts submitted should be prepared * according to the "Guidelines for Contributors" * that appear inside the back cover.

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

CREATION RESEARCH SOCIETY

History The Creation Research Society was first organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creationism, with a current membership of about 400 voting members (with graduate degrees in science) and over 1300 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and is now recognized as probably the outstanding publication in its field.

Activities The Society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible.

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COVER ILLUSTRATION

The cover illustration shows a unique stalk (called the cremaster) by which a monarch larva attaches itself to a silk web while it sheds its old skin and feet. Such intricate provision and design in nature may be used to argue strongly for divine special creation. This photograph was taken by Willis Keithley and is described in his article elsewhere in this issue.

Willis E. Keithley is a nature photographer, scientist, and evangelist of much experience. During World War II he was an Army lieutenant teaching radio electronics in the Signal Corps. He was head instructor of photography at Okinawa University, an institution which he helped establish. Upon returning to the United States, Mr. Keithley taught photography at Oregon College of Education and in other schools. He served as official photographer for the Biology Department of the University of Oregon under the National Science Foundation, and has spent many years in nature and wildlife photography. He is presently an active member of the Creation Research Society. He ministers widely by presenting Bible-science lectures before church and other gatherings. He may be reached at Route 2, Box 1417, Madras, Oregon. Fortunately, Mr. Keithley has sent us some other fine photographs and photographic essays and these will appear from time to time in the *Creation Research Society Quarterly*.

EDITORIAL COMMENTS

The keynote for this December issue of *Creation Research Society Quarterly* is "diversity." Though a wide selection of papers lacks coherency around a theme, there is a gain in wider reader appeal. This issue contains articles on such topics as biochemistry, glaciology, astronomy, philosophy, and experimental botany. Such a variation of themes coupled with diversity of rigor and style among the authors practically guarantees that each reader will find material herein suitable to his own interests and background in the sciences. Thus the *C. R. S. Quarterly* continues to be one of the few general science journals geared to the needs of both the professional and the interested layman.

Each month, referees help the editors prepare articles for publication. This last issue the following individuals have been of key assistance in reviewing manuscripts and we would like to thank them for their help in this capacity: Dr. Larry Butler, Mr. Stuart Nevins, Dr. Henry Morris, Dr. Emmett Williams, and Dr. Walter Lammerts.

The paper on left-handed molecules by Mr. Coppedge presents strong evidence against the likelihood of life having "selected" left handed amino acids to the exclusion of right handed isomers. While this fact is a firm datum conflicting with the evolutionary concept of natural genesis in some "soup," it has been mentioned only briefly in our journals to this time. Mr. Coppedge's use of direct telephone interviews with leading scientists is a fascinating innovation in creation research.

Our society has held to the flood geological explanation of many phenomena commonly attributed to events over vast epochs of time. Yet critics of flood geology frequently ask, "What about great time periods involved in the glacial advances?" The paper, "Monoglaciology and the Global Flood," by Mr. William A. Springstead is a skilled attempt to answer such a question by asserting that there has been but one major glacial advance which may have been concurrent with or shortly following the Noachian Flood.

Evolutionary biologists make vague reference to mutation as a source of adaptive changes in origins. Yet most mutations (as C. R. S. readers realize) have adverse effects on the organism itself. Dr. William Tinkle has studied the viability of the tomato mutation for extra cotyledons (seed leaves). His careful report shows that even an extra leaf (something that might appear superficially to be a "helpful" change) leads to deleterious genetic consequences.

More about stalactites comes from Mr. Willis Keithley who shares photographic evidence of stalactite formation on the spillway ceilings of a dam.

What should be done in the public school science class to guarantee students their right to view all the facts and alternatives regarding origins? A science teacher, Mr. Richard Bliss, has answered the question in his article. I am sure that his call for revision and openness in this area will be much more widely applicable than the humble beginning of his title would imply: "One Man's View. . . ." We are grateful that there are many public school teachers and administrators like Mr. Bliss, and we hope his article will be of interest and encouragement to others in the area of public school science education.

There has been some discussion of the thermodynamic laws among physics-minded members of C. R. S. It was suggested that a principle of biological conservation should be enunciated to indicate that life can perpetuate only the information received and cannot increase its own complexity. Mr. McDowell has gone a long way toward formulating just such a "Law of Biological Conservation" in his paper by that title.

As usual, Professor Harold Armstrong captivates the C. R. S. reader with his vital analysis of current scientific reports. As part of that column, Professor Armstrong had sent a unit on comets which the Research Editor, Dr. Walter E. Lammerts, later earmarked as worthy of presentation in a separate article. We are pleased that the paper "Comets and a Young Solar System" can appear as a short but sturdy milestone in the support for a recent creation.

These features plus eleven book reviews and some letters to the editor complete this December issue of creationist studies. We are indeed grateful for these reviews as a guide to the literature of origins. As usual, however, a book review does not necessarily constitute an endorsement or a censure by the Creation Research Society.

As the end of this current age approaches, it is obvious that God is raising up a banner of true creationism among the ranks of Christians in science. Opposition has also arisen on several sides and evolutionary uniformitarians have made exceedingly brash pronouncements against creation science without refuting any of the scientific arguments involved. Such categorical denial of creationism is to be expected (see II Peter, chapter 3).

And yet the final "proof" of God's existence and of His ultimate control over nature is reserved for the tribulation period. The first four trumpets will be judgments brought to bear upon

nature itself in which God will curtail sea life. land life, and light from the heavenly bodies (Revelation, chapter 8). In what could be considered almost the reverse of "creation," God will demonstrate His complete Lordship over natural phenomena. Scoffers alive at that time will observe the great destruction wrought by God's angels and they will view the inadequacy of uniformitarianism as the great "'star" Wormwood quickly destroys the water supply of the third part of the earth!

Yet the evil, doubt, and corruption of man's heart is so great that even this direct Judgmental evidence will be ignored and we are told that

> . . . the rest of the men which were not killed by these plagues yet repented not of the work of their hands, that they should not worship devils, and idols of gold, and silver, and brass, and stone, and of wood; which neither can see, nor hear, nor walk: Neither repented they of their murders, nor of their sorceries, nor of their fornication, nor of their thefts (Revelation 9:20-21).

Thus there is no reason to be slack in our task of fostering solid evidence for creationism, even if many reject and even if there is no worldwide return to the truths of creation. Through it all, of course, some will see that we are truly without excuse to doubt God's existence and His power (Romans 1:20), and some will be saved through faith in Christ (pulled from the fire as in Jude 23) and that is a worthy objective.

GEORGE F. HOWE
Editor

COMMENTS FROM PRESIDENT MORRIS

Most of us who have been active in studying and propagating scientific creationism have at least two strong motives. First, as scientists, we believe that true science is best understood and advanced as we seek to "think God's thoughts after Him," studying physical phenomena in the context of His creative planning and design of all things.

Second, as Christians, we are concerned to reach not only the minds of men with true knowledge, but also the hearts of men with the good news of salvation through Jesus Christ. We are convinced that "science falsely so-called" has been a great stumblingblock to multitudes in our time and has effectively kept them from recognizing that the Holy Scriptures can lead them to saving faith in Christ Jesus (Note I Timothy 6:20; II Timothy 3:15, etc.).

Our work therefore is not mere intellectual argumentation, as some critics have alleged, but is rather a penetrating evangelistic probe, aimed ultimately at delivering men from the godless scientism of the age and leading them to the Author of true science, the Creator and Redeemer of all things. We desire to win scientists and those that are influenced by scientists, and eventually, by God's grace, even scientific activity, to Christ.

Occasionally, well-meaning Christian friends suggest that, as individual lay Christians, we should spend less time in "apologetics" and more in active soul-winning, campus evangelism, and other such witnessing activities that are more productive of immediate visible results. "The Bible needs no defense," they say, "just preach the Gospel."

I would not for a moment question the importance of evangelism. Every Christian should be capable of presenting the Gospel to others, and should be alert to such opportunities for effective witnessing as the Holy Spirit may provide. The Lord has given me through the years many opportunities to witness for Christ, and I have often experienced the thrill of seeing a new believer respond in faith and gratitude to Christ for saving his soul.

More often than not in such cases, however, a careful use of apologetics and scientific Christian evidences was very helpful in such witnessing. These are also very helpful in strengthening young Christians in the faith and enabling them to witness with greater confidence and effectiveness.

We certainly recognize that the work of the Holy Spirit in the heart of an individual is essential for salvation, and so is a clear presentation of the Gospel. One is never brought to genuine salvation by a decision to accept creation instead of evolution or even to accept the fact of the deity of Jesus Christ. Nevertheless both Scripture and experience indicate that the Holy Spirit often uses apologetics as one means of opening minds and hearts to an understanding acceptance of the Gospel, and then to a believing trust in Christ as Lord and Saviour.

For example, the early Christians frequently used the evidence of Christ's resurrection to lead men to accept Him as Saviour (Note Acts 4:33; 17:31; etc.). They also used the evidence of fulfilled prophecy (Acts 26:22, 23; II Peter 1: 19-21; etc.) and God's witness in the creation itself (Acts 14:17), as well as the evidence of

personal experience (Mark 5:19). The Lord Jesus Himself pointed to the evidence of His own miracles (John 10:38).

In this day and age, just as the false theory of evolution has turned many away from faith in God and His Word, so the strong evidence of creation accurately presented, can be used to open the door once again to confidence in the Holy Scriptures. Because of long indoctrination in the evolutionary system throughout his school years, almost everyone today has serious intellectual problems which need somehow to be resolved before he can seriously believe in Christ and His Word.

Though many skeptics, those to whom evolution is their religion and their basic excuse for continuing in sin, will never be convinced by any amount of evidence, there are still multitudes of confused but open-hearted people who are willing to believe if they can find satisfactory answers to their school-generated doubts.

We believe, and many testimonies confirm this, that the articles in these *Quarterly* issues, though not written as evangelistic tracts, can serve a powerful evangelistic purpose. In this issue, there are outstanding papers dealing with the evidence for creative design in the structure of living substance, the geological evidence for a worldwide flood such as the Bible describes, the evidence from thermodynamics in biological systems that life could not have come by an evolutionary process, the evidence for a recent creation, and many other strong evidences for the truth of God's Word and the unscientific character of evolutionary skepticism.

It is our hope and prayer that the work of C.R.S. will serve not only a good scientific purpose, but also will be used mightily "in the defense and confirmation of the gospel" (Philippians 1:7).

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* * * *

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THE MONARCH CREMASTER

WILLIS E. KEITHLEY*

Figure 1. Larva of Monarch butterfly.

A rather unusual suspension device is employed by the larvae of the Monarch butterfly. In its transformation from larvae to pupae, it spins a small anchor of silk to the milkweed leaf, then grasps the silk with its back pair of feet in preparation to moulting its skin.

As it assumes the position shown in Figure 1, it must have a more secure means of attachment, as the legs by which it clings will soon be stripped off with the skin. It is then that a stalk known as the *cremaster* appears. (See Cover Illustration)

By means of the microscope, we find that the end of the cremaster bears hundreds of tiny "fishhooks" as seen in the cover illustration of this issue. This unique stalk is thrust sharply into the web of silk, and as the hooks are securely embedded in the silk, it is safely suspended and the old skin and feet drop to the ground.

*Willis E. Keithley is a nature photographer and an evangelist. For details, see cover caption, inside front cover. His address is Rt. 2, Box 1417, Madras, Oregon.

As this is a necessary protective device, the question of course is how did the Monarch butterfly survive before it acquired the intricate device of the cremaster? And by what process did the mechanism appear?

Did the caterpillar acquire the ability to spin the silk before or after the first cremaster developed?

Did those mini-hooks appear one at a time over a period of years?

How many times did "nature" have to experiment with sizes and shapes of hooks before one was found that would be effective and competent?

A chance mutation of the order and magnitude necessary to produce all those hooks at once, to say nothing of the organism's ability to use them, seems to be a far greater tax on a person's faith and imagination than one single act of creation.

PROBABILITY AND LEFT-HANDED MOLECULES

JAMES F. COPPEDGE*

The mystery of stereo-selectivity in proteins is examined. The history of efforts to explain this strange phenomenon is traced from Pasteur to the present. Conversations with a number of prominent scientists regarding the current status of knowledge on this problem are reported. Probability theory is applied to the chance production of a minimum set of protein molecules for the smallest theoretically possible living entity with only left-handed protein components. The odds against this happening once among all the protein molecules that ever existed on earth are evaluated. Comparison of the naturalistic and creationist positions is examined regarding this mystery.

One of the strangest mysteries in biology is the fact that proteins are made of left-handed molecules. This remains without adequate solution after well over a hundred years of study.

Understanding Proteins—Complex Yet Built on a Simple Plan

To preface the mystery, we might review for those in other fields what proteins are like. They are, of course, a major class of the complex molecules of which all living things on earth are made. In primary structure, proteins are long, slender filaments or threads that are unbelievably small. In fact, Max Perutz of Cambridge University notes that they are 500 times thinner than the thinnest object a good optical microscope could reveal.[1] Although so tiny, they are by comparison to many other molecules positively gigantic. A single protein molecule may contain hundreds, and in some cases even tens of thousands, of atoms bonded together! The miniature long filament is often precisely folded into a globular shape.

Fortunately for our understanding, proteins are constructed on a simple plan, in one sense. They are made of smaller molecules called "amino acids." There are 20 varieties of these that are commonly used in proteins.† Each amino acid contains atoms of carbon, nitrogen, oxygen, and hydrogen. Two of these 20 have, in addition, a sulphur atom each. Separately, they range in size from 10 to 27 atoms. All of the 20 kinds of amino acids occur in proteins of all organisms.[4] The number of these building blocks in a single protein ranges from around 50** to several thousand in the more complex proteins which have several subunits.

Though proteins are very large and complicated, it is encouraging that the amino acids (of which they are made) possess a degree of uniformity. In fact, when joined to others, each amino acid residue is practically identical in its main section with all the others.

The sole difference between the various types of the 20 amino acids is that each has a different "side group" of atoms, often called the "R" group. This is fastened to a central carbon atom. (In the amino acid proline, the side group loops back and attaches also to the adjacent nitrogen atom, replacing a hydrogen atom usually found there. Proline is therefore actually an "imino" acid.)

In the various amino acids, the distinguishing side group contains from 1 to 18 atoms. There is considerable diversity in these side groups. This makes possible many of the things proteins do.

Amino acids can be linked together, end to end, in long chains called "polypeptides." In proteins, the sequence in which the various kinds are arranged is of great importance. Different proteins are simply different orders of the 20 varieties of amino acids.

When the units of the protein chain are in any particular sequence, the resulting chain will coil or spiral and fold in a specific way. This final shape makes the protein able to do its unique job in the cell. Each kind of protein has a specific function. It may be a digestive enzyme, for one example, or a structural molecule, for another.

When two amino acids unite, a molecule of water is released. This is formed from atoms that were part of the amino acids, so they now are not quite as large. This is why amino acids in a protein chain are called "amino acid residues."

It takes energy to get the amino acids to bond together. It is quite difficult to bring this about outside of living things, but it can be done by special techniques in the laboratory.

In living organisms, on the other hand, protein chains are linked up rapidly (polymerized). Special enzymes bring this about with the help

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†Various biochemists list 18, 20, 22, or even up to 27. The common universal ones are often totalled at 20 because of genetic coding considerations and convenience. Different totals arise if we combine or separate certain pairs that are similar and where one is derived from the other, or if we include those that are used only in special situations, as in collagen, etc.

An exotic new amino acid, "desmosine," has recently been investigated.[2] It is formed outside the cell from four units of lysine, another amino acid, and it functions as part of "elastin" in larger organisms. There are also many natural amino acids not ordinarily used in proteins. In the last few years, over a hundred of these have been discovered.[3]

**using the word protein in the non-technical sense.

of other unique molecules. The system used by living things for making proteins is very complex and efficient. It all takes place under instructions from the DNA code, the hereditary "language of life."

How Can a Molecule Be Left-Handed?

Amino acids can exist in both right-handed and left-handed forms. Your two hands show how this can be. They have the same components—fingers and thumbs—yet they are different. The thumb of one is on the left and of the other on the right. They are "mirror images" of each other. Some molecules are like that.

Let's imagine that we are able to look at an amino acid molecule. Remember each is built on the same simple plan. In the main part, there are three atoms which we could call the "backbone." These three atoms are in the direct line of the protein chain when the amino acid is united with others. Of the three, two are carbon atoms and the other is nitrogen.

Looking at it from a particular end,* we notice the center carbon atom. It appears to be elevated a bit compared to the other two atoms. That middle carbon atom is called the "alpha" carbon. It is said to be "asymmetric," that is, different on every side. This difference is not in the atom itself, but in the four items which are bonded to it.

As we view it from our vantage point at the carboxyl end of the amino acid, we note that this central carbon atom has two side projections which angle upward to the right and to the left. On one side, this extension is simply a hydrogen atom. Opposite it is the "side group" mentioned earlier, the group which differs for each of the 20 amino acid types.

If that identifying side group is on the left, the molecule is "left-handed." If instead it protrudes to the right, the amino acid is said to he "right-handed."

These two forms of the same chemical contain the exact same components and are called "isomers" or "stereoisomers" of that chemical. Their side groups are just positioned oppositely in space. Each form is the "antipode" of the other. They are "enantiomorphs" of each other.

We may note in passing that this difference was discovered in an accidental way.[6] A French physicist named D. F. Arago in 1811 shined a beam of plane-polarized light through quartz crystals. He discovered to his surprise that the plane of the light was twisted or rotated as it passed through the crystal. In 1815, J. B. Biot found that some aqueous solutions also would cause this. Whether the light was rotated to the right or to the left depended on the substance used. Solutions which rotate light in this manner are said to be "optically active."

Pasteur, while investigating this strange phenomenon, in 1844 found that the optically active substance he was studying was made of one-handed molecules, all of the same "hand." (Solutions made of the opposite enantiomorph of such a chemical may rotate the light plane the opposite way. Both forms mixed together equally usually will not rotate the light plane at all.) One might suppose that left-handed molecules would rotate light to the left, but this is not necessarily so. There is no simple relation between configuration and optical rotation.[5]

Only Left-Handed Amino Acids in Proteins

Francis Crick, of Cambridge, tells the way living things are in nature:

> It has been well known for many years that for any particular molecule only one hand occurs in nature. For example the amino acids one finds in proteins are always what are called the "L" or "levo" amino acids, and never the "D" or "dextro" amino acids. Only one of the two mirror possibilities occurs in proteins[7]

That is the mystery. English biologist John Maddox called it "an intellectual thunderbolt that natural proteins should contain only the left-handed forms of the amino acids."[8]

This is a special difficulty for those who believe that life originated from non-living matter by natural processes. A. I. Oparin, Russian biochemist, has perhaps had more to do with current evolutionary thought than any man since Darwin. He mentioned the subject in a recent book (1968) thus: "It is necessary to touch briefly on a problem which has been discussed in the literature for a long time."[9]

In an earlier book (1961) he went into more detail. The atoms involved in the different positions (right- and left-) are subject to the same forces. When amino acids are formed, the varying side group could just as easily be on the right as on the left. Oparin wrote:

> The probability of the formation of one antipode or the other is therefore the same. As the law of averages applies to chemical reactions the appearance of an excess of one antipode is very improbable, and, in fact, we never encounter it under the conditions of non-living nature and in the laboratory syntheses.
>
> In living organisms, on the contrary, the amino acids of which naturally occurring proteins are made always have the left-handed configuration. . . . This ability of protoplasm selectively to synthesize and ac-

*from the "carboxyl" end. See, for example, illustrations in Barry, *Introduction to the Structure of Biological Molecules* (1969), on pages 99 and 116. An excellent small book on proteins, DNA, etc.[5]

> cumulate one antipode alone is called the asymmetry of living material. It is a characteristic feature of all organisms without exception but is absent from inanimate nature.
>
> Pasteur pointed out this fact as follows: "This great character is, perhaps, the only sharp dividing line which we can draw at present between the chemistry of dead and living nature."[10]

In modern times, many have expressed the same surprise as Pasteur. For example, Linus Pauling, Nobel laureate in protein chemistry:

> This is a very puzzling fact. . . . All the proteins that have been investigated, obtained from animals and from plants, from higher organisms and from very simple organisms—bacteria, molds, even viruses—are found to have been made of L-amino acids.[11]

He concludes: "No one knows why living organisms are constructed of L-amino acids."

Dr. Larry Butler, biochemist at Purdue University, has said, "In all respects chemically and physically (except for physical properties associated with asymmetry . . .) D- and L-amino acids are not only equivalent but indistinguishable."[12] He then refers to the interesting observation that some amino acids can be discerned by taste. This is not an exception, he notes, because taste is a subjective response rather than a fundamental property.

Professor Dennis Englin of Los Angeles Baptist College calls attention to an amusing experiment. Scientists now can hook up protein-like chains which contain both the L- and D-amino acids, and put such chains into a living organism, e.g., a bacterium. The organism immediately takes them apart, and in some cases rebuilds the amino acids in the left-handed form![13]

It might be noted that D-amino acids do occur in nature, but not in regular proteins. As Ernest Baldwin and others have pointed out, the cell wall outside the cell of some bacteria uses right-handed amino acids as structural components, as one example.[14] Since these are not proteins and are outside the cell, the rule holds, that only L-amino acids are used in naturally occurring proteins. (Other examples are antibiotics (such as penicillin, and a substance used in luciferin, the light-making chemical in fireflies.[3])

Professor William Stokes of the University of Utah sums up what is actually known regarding this baffling question of the two forms as they occur in proteins:

> They are as identical in all other respects as a pair of gloves. When amino acids are prepared artificially, both L- and D- varieties occur in statistically equal amounts. But living things can use and construct only the left-handed type, probably for hereditary reasons going back to the first ancestors of all life on earth.[15]

Looking at it from the naturalistic standpoint for the moment, we may ask: How could living things have gotten started which use only left-handed amino acids in proteins? A lot of research has been done to try to account for this. A brief review is instructive.

The first problem is to explain how any amino acids could begin. For this, the current explanation is to postulate a primitive atmosphere that was totally different from that known today. Then it is claimed that amino acids might have been formed from that prescribed atmosphere by the action of ultraviolet rays, lightning, and perhaps heat.

In a famous experiment at the University of California at San Diego, Stanley L. Miller tried to duplicate that supposed atmosphere in laboratory containers. He then subjected a heated mixture of its gases to an electric spark for a week. He succeeded in getting the two simplest amino acids, glycine and alanine, for sure. There were perhaps three others (that were of doubtful identity).[16] The results, however, included both left- and right-handed isomers,[10] just as in other laboratory syntheses mentioned above. Such a result, containing both forms, is called a "racemic modification."

Later, Sidney W. Fox, now at the University of Miami, obtained perhaps as many as 13 or 14 of the amino acids. His experiments were more complex, and involved the use of heat (quartz sand at around 1,000° C), pressure, use of an acid, and other laboratory-controlled conditions.[17]

Summarizing these efforts and others, we may refer again to Dr. Stokes' statement that when amino acids are prepared artificially, both L- and D- varieties occur "in statistically equal amounts."

So we still have the problem even if the amino acids could be accounted for at all.* If they had occurred naturally, these experiments indicate that the supply would have been racemic, instead of all L- or all D-.

Efforts to Account for Exclusive Use of Left-Handed Amino Acids in Proteins

Oparin gives a good summary of the many efforts that have been made to find a way in which one-handed amino acids might have been formed, in contrast to the racemic products just mentioned. Let us briefly follow his report.[9]

In 1904, 1925, and 1929, some German scientists reported the use of "circularly polarized

*It is interesting to note that the hypothetical primitive atmosphere conveniently happens to contain methane, ammonia, hydrogen, and water vapor, from which it is a comparatively simple step to the amino acids.

light" to bring about a photochemical reaction. The impression is given that they managed to synthesize some one-handed molecules. Oparin's vagueness here leaves strong doubt whether they proved anything significant. (Light can be circularly polarized by reflection, and, as John Keosian points out, circularly polarized light may be present in moonlight.[18]) Natural circular polarization of light could at most be slight, however, and the activities that can be produced photochemically in the laboratory have usually been extremely small.[6]

In 1950, J. Bernal advanced another hypothesis. These amino acids, he says, may have been formed "on the surface of nonsymmetrical quartz crystals." Two Russian scientists (Terent'ev and Klabunovskii) claimed to have accomplished this in laboratory experiments.[9] We may note, however, that when quartz crystallizes, its two mirror image forms are produced with equal probability,[5] in contrast to living things.

Continuing Dr. Oparin's summary, we note that George Wald in 1957 "expressed doubt, however, that any of these abiogenic factors could create conditions for the emergence of stable asymmetry." Instead, Wald theorized, the selection of L-amino acids was made from both types "at the time of the selection of alpha spirals in proteins."

This idea must be examined. An "alpha spiral" is a special helical form of the protein chain. Pauling and his colleagues discovered this in 1950. Left-handed amino acids form a right-handed helix. If, by chance, a helix had gotten started, there is no adequate reason to suppose that only L-amino acids would link up at the end of such a chain. We will later discuss the idea that a helix may have some effect as to preference, but either L- or D- forms can and do join it in the laboratory. After both forms are used, the helical form may change or be discontinued, but the chain can continue to grow, with units of either hand.

Furthermore, "selection" cannot operate at all *unless there is a system for accurate duplication of all the needed parts.* This undeniable precept is stated by Theodosius Dobzhansky, now with Rockefeller University in New York, in these words: "'For natural selection to operate there must be reproduction, and reproduction is the key property of life."[19]

The only system known for duplicating amino acid chains accurately in nature is the intricately complicated system used by all known living things on earth. It is the DNA-RNA-enzymes-transfer-RNA-ribosome-protein system. Besides that fact, no model of any theoretical "primitive" system has yet been presented which is convincing, in spite of extensive attempts by Oparin and others following his lead.

Natural selection has been vastly over-rated. It would have been completely absent before there were self-replicating living systems. Logically, then, it becomes apparent that "alpha spirals" could not have been "selected" prior to complete replicating systems (even if an alpha helix could be formed).

Amino acid chains that use only one "hand" undeniably have some advantages. Dr. Fox among others, believes that a chain of left-handed amino acids, for example, is "thermodynamically more stable" than one that is composed of both forms.[20] (In either right- or left-handed helical form, the stability is increased by hydrogen bonds between the turns of the spiral.)

The big problem, which has no natural solution in sight, is how to get such a chain even the first time. It is important to keep in mind that selection could not have been operative at that stage, as we have seen.

Getting back to Oparin's summary of efforts to solve this mystery, we find that A. Pasynskii in 1959 suggested that "stereo-chemical proteins" may have been first formed by chance, and then these served as enzymes or catalysts to build the amino acid molecules in only the L- form.[9] This is as if a complex factory machine happened by chance, and then it manufactured the exactly needed simpler products. It boils down to random link-ups that just happen to turn out in an exactly needed sequence. The likelihood of that occurring is beyond conceivable probability as we will see.

Keosian (1964) gives an excellent very compact summary of these and other attempts, though none of them is a real solution.[18]

After considering all these, it is clear, then, that unless chance could do it, there is at present no adequate answer, from an evolutionary standpoint, which explains the mystery. As a result, there is little evidence of any agreement or consensus among scientists on the source of this stereo-selectivity. Oparin must presume it started without prior design. Any other belief would be inconsistent with his Communist philosophy. (Interestingly, that viewpoint—dialectical materialism—is not atheistic after all. Professor Claude Tresmontant of the University of Paris has pointed out with unanswerable logic that Communists are actually pantheists, worshipping matter-in-motion.[21])

Oparin does not make clear which of all these ideas he prefers, as to the supposed natural origin of the exclusive use of left-handed amino acids in proteins, but he assumes it happened nevertheless. He is admirably straightforward in realizing the difficulty:

> Even when we know how the asymmetry arose, though, we still cannot answer the question of why one antipode, rather than the other, should occupy such a monopolistic position in the life of all the organisms inhabiting the Earth. This question is important for an understanding of the essential nature of life but it remains for future investigators to supply the answer.[10]

On that subject, Pauling made this imaginative comment:

> The earth might just as well be populated with living organisms made of D-amino acids as with those made of L-amino acids. A man who was suddenly converted into an exact mirror image of himself would not at first know that anything had changed about him.
>
> He could drink water, inhale air and use the oxygen in it for combustion, exhale carbon dioxide, and carry on other bodily functions, just as well as ever—so long as he did not eat any ordinary food. If he were to eat ordinary plant or animal food, he would find that he could not digest it.[11]

He then reminds of a strange coincidence. Way back in 1872, Lewis Carroll's *Through the Looking Glass*, was published. In it, Alice said, "Perhaps Looking-glass milk isn't good to drink." (We have seen earlier that some organisms can convert some of the D-amino acids into the L-form. Similar conversion to the natural form does not seem to be possible, however, in the case of the "universal" energy food, glucose sugar[6] This is true of other vital foods such as Vitamin C, which is L-ascorbic acid.[22])

Left- and Right-Handed Amino Acids Can Link

We may ask, "Are the two forms of amino acids shaped so that any of them could unite, whether they are L- or D- in type, as far as contour is concerned?" According to California Institute of Technology's veteran researcher, James Bonner (noted among other things for his discovery of the role of certain proteins in gene repression), the answer is yes.[23] Whether left- or right-handed, it seems that any amino acid can conceivably link with any other of either hand. Dr. Fox said he was inclined to agree with Bonner on this.[20] The resulting shape of the chain, whether it spirals and how it folds, will be entirely different, but numerous polymers or chains have been put together containing both L- and D-amino acids of a variety of types, including some with the largest side chains such as the amino acids tyrosine and phenylalanine.[24]

Would both L- and D- forms hook up under the supposed conditions of primitive synthesis? Dr. Fox heated all the common amino acids at 200° C temperature under certain conditions. He obtained protein-like chains containing all the amino acids.[25] When asked if both left- and right-handed amino acids were included in the same chain, he replied that he was almost 100% certain that they were, but that there was no way to tell absolutely at the time.[20] At least both types were included cumulatively in the total of the various chains.

This question of whether there would be "steric hindrance" or difficulty of fitting together due to shape was put to Dr. Pauling, now at Stanford University. He mentioned that there was that possibility between opposite hands,[26] but for details he referred to a section in his 1964 book mentioned earlier. There he had written, "We have no strong reason to believe that molecules resembling proteins could not be built up of equal numbers of right-handed and left-handed amino acid molecules."[11]

On the same matter, I questioned Dr. Arthur Elliott of the Biophysics Department at King's College in London.[27] He replied that he knew of none of the common amino acids that could not be connected to any other opposite isomeric form. Dr. Harry Block of the Chemistry Department, University of Liverpool, was of the same opinion—that he did not know of any exceptions.[28] In other words, it is possible for any of the 20 amino acids to connect with any other of the same or opposite hand. (Drs. Elliott and Block have authored several reports on experiments in this field.[29,30])

Will Opposites Join with Equal Facility?

In the literature, there are hundreds of write-ups of experiments where D- to L- link-ups were made, and vice versa. Almost never is any mention made of any more difficulty in joining opposite hands than the same isomers. There have been some rare exceptions to this general picture which we will look at in more detail, which seem to indicate a degree of stereo-selectivity in some particular joinings.

At the present stage of experimental knowledge in this field, there is nothing like complete certainty on whether there is an average preference for the same hand, or, if not, what degree of selectivity exists. Study of experiments to date seems to warrant this conclusion: the truth may turn out to be either equal probability *on the average*, or some limited degree of preference that is usually too small to be noticed.

For those who are interested in delving more deeply into the evidence, we will have to get a bit more technical. (Some may wish to skip over the remainder of this section, and to continue with the next main heading.)

An article in *Biopolymers* (April, 1971) by E. Klein, *et al*, is a good example of description of matter-of-fact linking of opposites.[31] In this instance, the amino acid chains formed were

"poly-D, L-leucine, co-D, L-methionine." I asked Dr. Klein, a research scientist for Gulf South Research Institute at New Orleans, if he and his colleagues knew of any preference of L- for L- or D- for D- in their experiments. He said if there is any selectivity, they had not detected it in their work which often involves joining of preformed blocks of each isomer within the same chain.[32]

There is great variety in the side chains of the 20 amino acids. This diversity was stressed by Daniel Levy at the University of Southern California in connection with the question whether there is equal ease of joining.[33] It depends on which amino acids you are considering.

One of the best ways to get an understanding of this matter is to work with models of the amino acid residues. If ready-made atomic models are not available, it is possible to get by with styrofoam balls or other round objects. These may be colored in order to distinguish the different kinds of atoms, and some may be glued together. It is very important to make the models to scale. Accuracy involves attention to comparative sizes of the different atoms, length of bonds, bond angles, and bonds which allow rotation.

A convenient source for most information needed is Pauling's *The Chemical Bond* (1967), available in most city or school libraries.[34]. He gives tables of effective radii or size of the atoms (van der Waals radii), and bond lengths (pages 136 and 152). Angles and positions are shown on page 229.

It is interesting that the four bonds of a carbon atom usually point in the direction of the corners of a regular tetrahedron. Each bond is approximately 110° from each of the others (actually 109° 28' average). In making models, one discovers that the bond lengths will require him to gouge out quite a bit on the sides of various atoms in models so they can fit together at proper distance. In other words, their surfaces overlap considerably. There is some leeway in the van der Waals radii when atoms seem not to have room to fit next to others at the side. If the conflict is within a comparatively small angle from the direction of the bond,[34] a little of the edge may be trimmed to allow room for fit.

Some crafts-supply stores carry several sizes of styrofoam balls (in the range of 1 inch diameter or so), which are close enough to proper proportion to use in making approximate models.

In general, some rotation is allowed on single bonds. In the backbone of an amino acid chain, these bonds on which rotation is possible are on either side of the alpha carbon atom.[35] There is also rotation permitted on single bonds in the side chains (especially the "methyl" groups).[33]

Where two amino acids are joined in "peptide linkage," the four atoms involved (C'O-NH) are "co-planar," and therefore more or less fixed or rigid.[34] The reason for this is that the C=O bond, which is a double bond, "resonates" back and forth between the oxygen and the NH group.

Two Part Construction

For this reason, we have found it logical to make the models in two separate parts. The peptide linkage group can be one separate model item (the co-planar C'O-NH just mentioned). The alpha carbon, with the hydrogen atom and R group, is the other. In this way, only a few of the peptide linkage units are needed, since they are all the same (except in the case of proline).

The alpha carbon group, however, requires a different model for each enantiomorph of each amino acid. A preliminary idea of this fact can be gained by experimenting with models of a few representative shapes of the 20 types. If the atoms of the side chains are glued into proper position, then one must keep in mind that rotation on single bonds is possible in real molecules. P. K. Ponnuswamy and V. Sasisekharan, of the University of Madras, India, give helpful information on positions of the atoms.[36]

It is out of the question to try all conformations, for the number is infinite. It will be apparent, however, that some amino acids will link more easily with those of the same hand, and some more easily with those of the opposite hand. The general impression can be gained that the probability is approximately equal, on the average.

We might mention also, that electrostatic forces may in some cases restrict rotation to a degree, but this does not seem to be a barrier to more or less equal ease of fit.

Experiments on Preferential Linkage

In 1962, Dr. Akiyoshi Wada at the Department of Physics of Tokyo University discussed the implications of certain experiments in the 1950s by Doty, Lundberg, and Blout. These tests seemed to show that a preformed chain consisting of L-residues begins reaction more rapidly with another L- unit than with the opposite isomer, in the case of polymers of gamma-benzyl-glutamate NCA.[37] Important work on the same question was done by C. H. Bamford and Harry Block, who are now at the University of Liverpool.[30] Put in simplest terms, they found indications that an L-amino acid was five or six times more likely than a D- unit to connect at the end of a preformed L-chain, and vice versa, in certain circumstances.

The synthetic polymers used in much of this type of work are not simply amino acids. In-

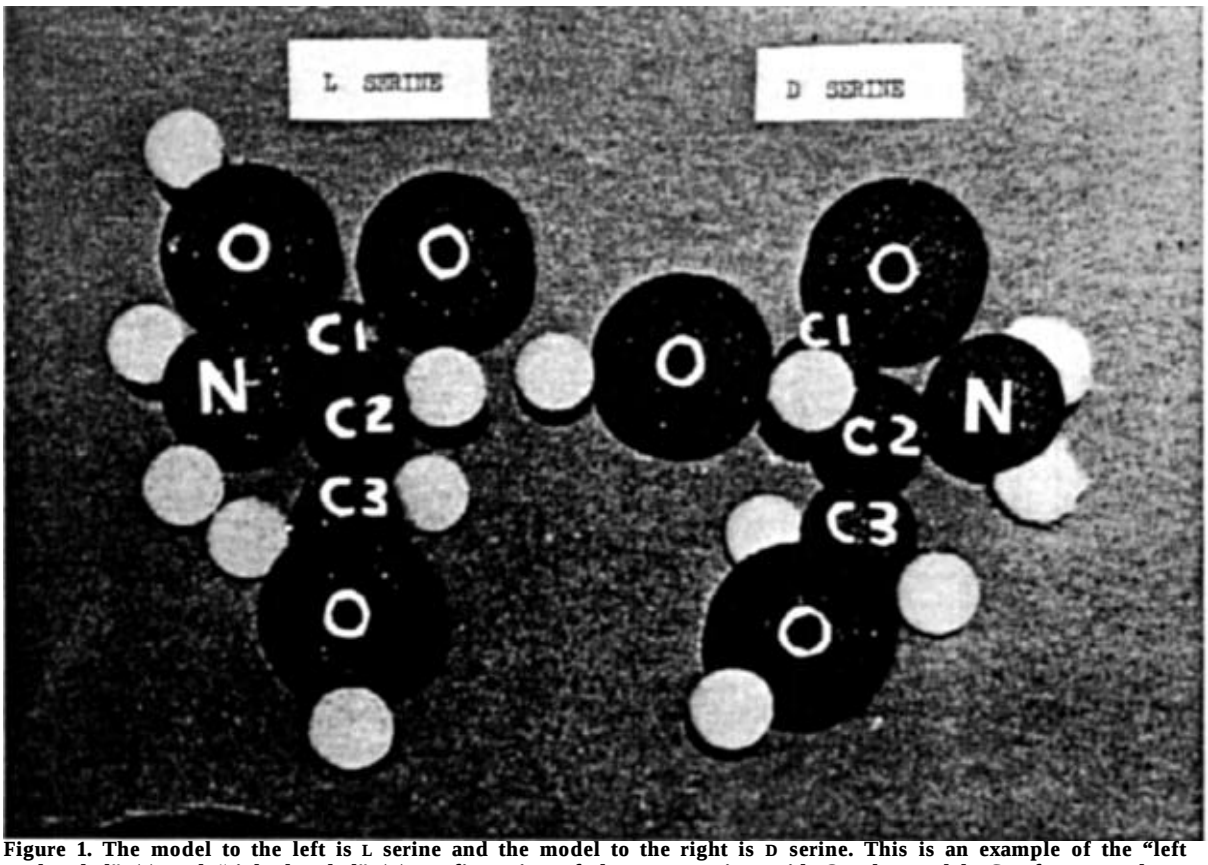

Figure 1. The model to the left is L serine and the model to the right is D serine. This is an example of the "left handed" (L) and "right handed" (D) configuration of the same amino acid. On the models C refers to carbon, N to nitrogen, O to oxygen, and hydrogen is a white ball unlabeled. The L form, with the amine (NH_2) group to the left of the #2 carbon atom, is the form found in living protoplasm. The D form has the amine group to the right of the #2 carbon. Notice that attached to the #l carbon atom of each molecule is an O and an OH group. The lone oxygen is double bonded to the carbon atom; whereas, the OH group is singly bonded to the carbon atom. The double bond is rigid, while the single bond is free to rotate, unless physically hindered. The differences between the linear arrangements of the carbon atoms of the molecules reflect this ability of the single bond to rotate. (Molecular models and figure caption by Dennis Englin. Photograph by George Howe).

stead, an attachment consisting of a carbon ring and several other atoms has been added to the usual side chain of glutamic acid (one of the 20 amino acids). It seems likely that this long and bulky extra portion of the side chain might cause more steric hindrance than a normal amino acid would have. (Glutamic acid and aspartic acid each have an acidic (COOH) group in their side chains, and this must be protected from reaction with other molecules in the solution. The "protection" of these and other reactive groups, including the ends of amino acids, is one of the main problems of peptide chemistry.[38])

Dr. Elliott called attention to other polymerizations that are done—e.g., poly-alanine—where extra attachments are not left on the amino acid residue in the chain.[27] I later asked Dr. Block if in cases of that kind any selective bonding of L- to L- as compared to D- to L- was observed. He indicated that experiments with the amino acids, alanine and phenylalanine did seem to show a preference. He had no data as to the degree of preference, but said there must have been some selectivity, because there were, in the resulting chain, blocks* of L- and blocks of D- residues.[28]

Such experiments by Doty, Bamford, Block and others led some to believe that this stereoselectivity was a result of steric hindrance or other conflict with the preformed helix. Dr. Fred

*Applying probability theory to this matter of "blocks" would seem to lead to this result: As soon as, by chance, one isomer happened to get four in a row, probability would favor that type, by a certain factor. On the average, the opposite would finally show up, and there would be equal probability till one or the other got four in series. The final result would not favor either hand, as to total residues, with each having the same average number and length of blocks. On the question of whether the length of the helix of one isomer increased the preferences, Dr. Block said it did not.[28]

D. Williams, with co-workers at Michigan Technological University, however, doubts that this is the cause. They report polymerization of monomers of the same glutamic acid complex in which results seemed to indicate a selectivity even before a helix was formed.[39] This was quite marked in degree, in the second stage of reaction. (This is another case where the bulky artificial side chain mentioned earlier may be affecting the outcome.)

Dr. Williams told me of quite opposite results in recent experiments with D, L alyl-isoleucine. These two amino acids exhibited a crosswise stereo-selectvity (e.g., D- to L- instead of L- to L- preference).[40] Shröder and Lübke in West Berlin reported a similar reverse preference in "cyclo" polymers of glycine and D, L leucine.[41]

The picture is, hence, far from final on selectivity, at this writing. There are many variables which enter into the reaction potentials. The type of solvent used, temperature, pH reading, protecting attachments, all these can affect the linking. The activating intermediates which must be used to bring about the polymerization also complicate the picture. There is, moreover, a tendency of many chemical reactions to bring about "racemization" as a side effect—changing some amino acids themselves to the opposite isomers.[41]

Then there is the problem of trying to "read" the results. When we recall that biochemists are working with molecules far too small for the ordinary laboratory microscope, one must emphasize how hard it can be to tell exactly what happened in a reaction, and to what degree. The results must be discovered by indirect means. Sometimes a bit of guesswork is required. Later experiments may disprove the tentative conclusions of a certain experimenter.

A fairly good case might be made for the idea that there is equal probability of opposite antipodes linking, as an average of all types. Here are some facts which may be used to support this conclusion:

(1) Numerous reports of D, L chains with no mention of any stereo-selective factor; specific statements by experimenters such as Dr. Klein that they have not noted any such specificity.

(2) Reports of a reverse preference of L- for D- or vice versa in the case of some experiments.[40,41]

(3) The evidence from models of amino acid residues.

(4) Opinions of prominent researchers such as Banner and Fox who make no mention of selectivity when commenting on the ability of all to fit.

(5) A mysterious reaction reported by Bamford and Block,[30] in which the addition of lithium perchlorate to the reaction mixture *eliminated the optical specificity,* leaving both forms reacting at the same rate with a "15-mer" as would be expected with a "3-mer" chain. (This was part of experiments mentioned earlier which involved gamma benzyl glutamate N-carboxy anhydride, where reaction of the same isomer with a preformed helix was thought to be five or six times as fast.) It was thought that the lithium perchlorate reduced hydrogen bonding of the NCA to the helix. The result seemed to show "that the specificity may, in part, be connected with adsorption." (Adsorption is the attaching of one atomic or molecular entity to another through electrostatic forces.)

(6) It seems likely that in the presumed "primitive" environment prior to the existence of life, the numerous variables that might affect reactions would by chance be as likely to favor one type of hook up as another. Apparently, no steric reasons would prevent equal ease of fit. There is no reason to think "nature" would happen to provide the same highly specific reactant preparations and conditions that a biochemist might choose, from his artificially prepared supply.

The Odds Against Proteins Having Only L-Amino Acids

The "laws of chance," or principles of probability theory, are widely depended upon in science, industry, engineering, government, and everywhere. Since the advent of "quantum mechanics" in the 1920's, these rules of probability have been carefully verified. It is logical that they be applied to this question, since nothing other than chance has been found that could account for this mysterious left-handed phenomenon.

In order to be certain, probability reasoning should be applied to the two outer limits of what may be the real situation: (1) either there is equal probability, on the average, of opposites linking under natural conditions prior to life on earth, or (2) a preference of 6/7, at the most, in favor of joining with the same isomer. Because it is simpler, the odds regarding equal probability will be calculated first.

(1) Equal Probability Calculated

Dr. Harold Morowitz of Yale University has done extensive research for the National Aviation and Space Agency to discover the theoretical limits of the simplest possible autonomous self-replicating entity.[42] He took into consideration the hazards of thermal motion, electrical properties, and functional space. He concluded that the smallest conceivable such entity would re-

quire at the very least 45 different kinds of proteins averaging 400 amino acids each.*

Nothing simpler than that could meet the test of replication. As we have seen, there can be no natural selection without ability to duplicate all necessary parts. Chance alone, unaided by natural selection, would have to link up at least one complete set of 45 proteins with all-left-handed amino acids of the universal 20 kinds. (There is strong evidence that all 20 were in use from the time of the first living thing.)

Now consider just one of those average size proteins with 400 units. First, we must allow for the amino acid, glycine, which exists in only one form. Its side chain is just a hydrogen atom, the same as exists opposite it. If we assume that 1/20 of the chain will be glycine, that leaves 380 which could be L- or D-. There is 1 chance out of 2 that the first one might be left-handed. The same is true for each of the other 379.

Calculations of probability require the famous Multiplication Rule, the heart of probability theory. Physicist George Gamow once said it thus:

> If you want several different things, you may determine the mathematical probability of getting them by multiplying the mathematical probability of getting the several individual ones.[44]

To get the probability of all 380 of the isomeric amino acids of just one chain happening by chance to be all left-handed, we must multiply the "1/2" probability which is the case for each individual step. It is like flipping a coin 380 times expecting to get all heads. For each step, there is 1 chance in 2, so we must multiply the 2 by itself until we use the figure 380 times. That is 1 chance in 2^{380}.

It will be easier to work with this figure if we translate it to powers of 10 instead of powers of 2. Multiplying 10 by itself is just adding another zero. 2^{380} is about the equivalent of 10^{114}.**

The probability of one average-sized protein molecule of the smallest theoretically possible living entity happening to turn out with only left-handed amino acids is, therefore, 1 in 10^{114}.

That is a rather discouraging chance. A different expression might give the reader more appreciation of that number: There is one chance in 1,000,000,000,000,000,000,000,000,000,000,000, 000,000,000,000,000,000,000,000,000,000,000,000, 000,000,000,000,000,000,000,000,000,000,000,000, 000,000,000 that all 380 of the amino acids would be left-handed!

Professor Murray Eden at Massachusetts Institute of Technology estimated that the total number of protein molecules that ever existed on earth might be 10^{52} as an extremely liberal approximation.[45] If we assume for the moment that all these were the same size as the average protein in the smallest possible autonomous living thing, we can then calculate *the probability that any one protein that ever existed on earth would have only left-handed amino acids just by chance,* as follows:

The answer is 1 in 10^{62} (which is 10^{114} divided by 10^{52}). Written out, that is only 1 chance in 100,000,000,000,000,000,000,000,000,000,000,000, 000,000,000,000,000,000,000,000,000, that even a single one of all these protein molecules that ever existed would happen by chance alone to have only L-amino acids. Saying it another way, *the odds are a hundred thousand billion trillion trillion trillion trillion to one against that happening!*

That isn't all. Even if one *did* happen, many more all-left-handed ones would be needed to work with it, or all would be lost. The odds against each one would be the same. Those huge numbers would then have to be MULTIPLIED together, according to the Multiplication Rule. This would give the odds against the necessary group of proteins being all left-handed. The number is beyond all comprehension. And, if we had all such amino acids, they still could not duplicate themselves, so it would be the end of the line, unless chance could also produce the DNA code and enzyme system.

It is enough to remember that the number of inches across the known universe from one side to the other is less than 10^{28}. The odds against even one average-sized protein with all left-handed amino acids is a figure 10 million billion billion billion times that big, namely 1 in 10^{62}.

The foregoing were the figures if there is equal probability of either hand linking up each time. There remains the second outer limit to be computed on the basis of supposing the opposite extreme, namely a preference factor of 6 chances in 7 that the same isomer will link up next.

(2) Calculation of Preference Factor

Starting with the average number of 400 amino acids per protein, we subtract the 20 which are

*Compare this with the smallest known actually living thing, which is the minuscule bacteria-like *Mycoplasma hominis* H39. It has 600 different proteins, averaging 400 amino acids each.[43] We have no real reason to believe anything simpler has ever existed, from present scientific knowledge. We will, however, use the much smaller total of different proteins from Morowitz' theoretical smallest autonomous self-replicating entity mentioned above.

**For the non-mathematician, there is a simple way to change from 2 to 10 as a base. If you multiply 2 by itself until the total is about equal to a power of 10, you find that 2^{10} is about the same as 10^3. The convenient formula, then, is .3 times the exponent of 2. That gives the proper power of 10 which is approximately equal to it. Applying it to our figure of 2^{380}, we get: $10^{380 \times .3}$, which is 10^{114}.

presumed to be glycine, since it is not one-handed.

Of the 20 symmetric glycine molecules, on the average perhaps two of them would be together in the chain. We will assume that there are 18 glycines that are followed by another kind. In each such case, there would be no preference exerted on the one following the glycine, since it is neither L- nor D-. Those 18 would therefore be on a 1 in 2 probability, while the remaining 362 (380 less 18) would be figured at 6 in 7 probability of the same hand. (In this, a concession is being given to chance, in that calculations are based on the preference at 6/7 even before there are several of the same hand in a row.)

The 18 at 1/2 probability by the Multiplication Rule would result in $1/2^{18}$. The 362 at 6/7 probability (odds of 6 to 1) give rise to this result: $6^{362}/7^{382}$. Multiplying by the preceding figure which resulted from the other 18 at even probability, and translating to base 10, we arrive at 1 chance in 6 X 10^{29} (600 thousand million billion billion.) That is for one average protein chain. To get the absolute minimum needed for the smallest theoretical living thing, we need at least 45 such proteins. By the Multiplication Rule, the odds are around 10^{1334} to 1, after dividing by a million to allow for overlapping. That is the same as 1 with 1,334 zeroes after it. It would require the greater part of a column to print the number.

Going back to the total number of proteins that might have existed on earth, 10^{52}, that would be enough to make $10^{52}/45$ sets for the smallest conceivable living entity, which is 2.22 x 10^{50} sets. Dividing that into the big figure, we find that the odds against one set (they would have to be located together in order to work together) would be about 10^{1283} to 1 that no set of 45 proteins of all that ever existed would by chance have only L-amino acids.

One cannot comprehend such a number! Compare those odds (10^{1283} to 1) with the number of seconds since the universe supposedly began, which is 10^{18} seconds for the longest such estimate.

Even if the L-amino acids were 100 times as likely to link with L- as with D-, and considering all the proteins that ever existed on earth, the odds against one set of 45 together having all left-handed amino acids would be more than 10^{258} to 1. It would require saying the word "billion" 26 times. Each time, the entire preceding figure *is multiplied* by a billion.*

*Word from Dr. Morowitz just prior to press time informed the author that the smallest theoretical living entity's requirements are now estimated at 124 instead of 45 different kinds of proteins!

Conclusion

No natural explanation is in sight which can adequately explain the mystery that proteins use only left-handed components. There is little hope that it will be solved in this way even in the future. Even if such a result occured by chance, life still would not exist. The proteins would be helpless and non-living without the entire complicated DNA-RNA system to make copies for the future.

There is, however, no problem here for the person who believes in an intelligent Creator of living things. For reasons of his own, such an infinite Planner could have decided to use just L-amino acids in proteins. He would have placed the proper L-enzymes and coding in the cells which would form only left-handed amino acids for use in proteins.

These created enzymes would thereafter be replaced as needed at the "orders" of the DNA code. The same Creator would be the Author of that amazing code, a complete instruction book written in the genes of every cell of every living thing, incredibly comprehensive and detailed.

For those whose philosophy is evolution, this left-handed matter is an embarrassing problem. The efforts at solutions which Oparin catalogued are noteworthy for the questions they bring up rather than for answers. It is not likely that this mystery will ever be adequately explained, as long as the evidence of intelligent planning is ignored.

But what if some day we happen to find a really adequate natural solution to this question? It has frequently been the case that when we discover "natural" explanations for mysteries, at the same time we uncover other complex new problems which only deepen the underlying mystery of this amazing universe.

Finding that birds and other creatures use celestial navigation, for example, solved one question. It opened up much more intriguing mysteries that seem to add far more to the wonder of what exists about us. How can a bird instinctively navigate by the sun and stars, and how is this coded for inheritance?

It has been a mystery how bird eggs all hatch so close to the same time. Now scientists actually have tape recordings of quail eggs "talking" to each other by clicks and vocal sounds to synchronize hatching.[46] Thus, a greater mystery appears.

The left-handed amino acids are not the only one-handed molecules. The stereo-selective phenomenon is found throughout living nature. For example, vitamin C, which is L-ascorbic acid, is always left-handed in its natural form in foods. This compound can be made in the laboratory in

both D- and L- isomers, but only L-ascorbic acid has Vitamin C activity.[22] Sugar molecules, conversely, are habitually D- or right-handed.

Remembering the weakness of chance is a necessary step in deciding which philosophy of origins one will believe: evolution or creation. Blind chance requires an average of ten billion tries in order to count to ten. Can this pathetic source account for the intricacies of the eye, or a beehive, the song of a mockingbird, or the metamorphosis and migration of the monarch butterfly? Natural selection is completely inadequate as a solution, since it cannot invent ordered and intelligent new material.

Final Thought

We find that there is no lessening of confusion until one accepts the logic that intelligent systems could not arise without an intelligent Designer.

In Genesis, chapter one, we are given the idea that God did the deciding how each living creature would be assembled. He apparently used L-amino acids, formed by himself, for reasons of his own. We may some day discover those reasons. It is the privilege of scientists to experiment in a well-equipped cosmic laboratory, trying to find out how the Creator put things together, trying to understand the wisdom built in.

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Relevant Quote

Pasteur, speaking of the "mysterious influence" in this "dyssymmetry" of living matter, said in 1860: "There are here mysteries which prepare immense labors for the future, and from this time invite the most serious meditations of science."[3]

References

[1]Perutz, Max. 1970. 1970 Yearbook of science and the future (Britannica). p. 365.
[2]Ross, Russell, and Paul Bernstein. 1971. Elastic fibers in the body, *Scientific American,* 224(6):49. June.
[3]Meister, Alton. 1965. The biochemistry of the amino acids. Academic Press, N. Y., pp. 58, 114, 117, 113.
[4]Thompson, John F., Clayton J. Morris, and Ivan K. Smith. 1969. New naturally occurring amino acids, *Annual Review of Biochemistry,* 38:137.
[5]Barry, J. M., and E. M. Barry. 1969. An introduction to the structure of biological molecules. Prentice-Hall, Inc., Englewood Cliffs, N. J. pp. 99, 116, 42 and 52.
[6]Stereochemistry. 1967. *Encylopaedia Britannica,* 21: 214-215 and 218.
[7]Crick, Francis. 1966. Molecules and men. University of Washington Press, Seattle. p. 60.
[8]Maddox, John. 1964. Revolution in biology. Macmillan Co., N. Y. p. 59.
[9]Oparin, A. I. 1968. Genesis and evolutionary development of life. Academic Press, N. Y. pp. 80, 81.
[10]Oparin, A. I. 1961. Life, its nature, origin and development. Academic Press, N. Y. pp. 59-61.
[11]Pauling, Linus. 1964. College chemistry (Third Edition). W. H. Freeman and Co., San Francisco. pp. 727, 730, 731.
[12]Butler, Larry, Purdue University, personal correspondence and telephone conversation, April, 1971.
[13]Englin, Dennis. Los Angeles Baptist College, telephone conversation, June, 1971.
[14]Baldwin, Ernest. 1967. Dynamic aspects of biochemistry (Fifth Edition). Cambridge Univ. Press. p. 237.
[15]Stokes, William Lee. 1966. Essentials of earth history. Prentice-Hall, Inc., Englewood Cliffs, N. J. p. 176.
[16]Wald, George. 1954. The origin of life, *Scientific American,* August, p. 48.
[17]Strong, C. L. 1970. The amateur scientist, *Scientific American,* January, p. 134.
[18]Keosian, John. 1964. The origin of life. Reinhold Publications Co., N. Y. p. 75.
[19]Dobzhansky, Theodosius. 1967. The biology of ultimate concern. New American Library, Inc., N. Y. p. 48.
[20]Fox, Sidney W., University of Miami, telephone conversation, April, 1971.
[21]Tresmontant, Claude. 1967. Interview. *Réalités,* April, p. 47.
[22]Pauling, Linus. 1970. Vitamin C and the common cold. W. H. Freeman and Co., San Francisco. p. 89.
[23]Bonner, James, California Institute of Technology, telephone conversation, April, 1971.
[24]Venkatachalam, C. M., and G. N. Bamachandran. 1969. Conformation of polypeptide chains, *Annual Review of Biochemistry,* 38:627-690.
[25]Fox, Sidney W. 1965. Simulated natural experiments in spontaneous organization of morphological units from proteinoid. (in) The origins of prebiological systems and of their molecular matrices. Edited by Sidney Fox, Academic Press, N. Y. pp. 361-382. See also *Encyclopedia Americana,* 1971, 1:743 (Article on amino acids).
[26]Pauling, Linus. Stanford University. telephone conversation, April, 1971.
[27]Elliott, Arthur, King's College; London, telephone conversation, April, 1971.
[28]Block, Harry, University of Liverpool, telephone conversation, April, 1971.
[29]Elliott, Arthur. 1967. X-ray diffraction by synthetic polypeptides. (in) Poly-alpha-amino acids. Edited by Gerald D. Fasman, Marcel Dekker, Inc., N. Y. pp. 1-64.
[30]Bamford, C. H., and H. Block, 1962. The polymerization of alpha amino acid N-carbonic anhydrides. (in) Polyamino acids, polypeptides, and proteins. Edited by M. A. Stahmann, University of Wisconsin Press, Madison, Wisconsin. pp. 65-78.

[31]Klein, E., *et al.* 1971. Permeability of synthetic polypeptide membranes, *Biopolymers,* 10(4):647-655. April.
[32]Klein, E., Gulf South Research Institute, New Orleans, telephone conversation, June, 1971.
[33]Levy, Daniel, University of Southern California, telephone conversation, April, 1971.
[34]Pauling, Linus. 1967. The chemical bond. Cornell University Press, Ithaca, N. Y.
[35]Poland, Douglas, and A. Scheraga. 1987. Theory of noncovalent structure in polyamino acids. (in) Poly-alpha-amino acids. Edited by Gerald Fasman, Marcel Dekker, Inc., N. Y. p. 396.
[36]Ponnuswamy, P. K. and V. Sasisekharan. 1971. Studies in conformations of amino acids, *Biopolymers,* 10(3): 565-582. March.
[37]Wada, Akiyoshi. 1962. Chain regularity and dielectric properties of poly alpha amino acids in solution. (in) Polyamino acids, polypeptides, and proteins. Edited by M. A. Stahmann, University of Wisconsin Press, Madison, Wisconsin. pp. 131-146.
[38]Wieland, T., and H. Determann. 1966. The chemistry of peptides and proteins, *Annual Review of Biochemistry,* 35(II):627-690.
[39]Williams, Fred D., M. Echaque, and Ronald D. Brown. 1971. Stereoselective polymerization of gamma benzyl glutamate NCA, *Biopolymers,* 10(4):753-756. April.
[40]Williams, Fred D., Michigan Technological University, telephone conversation, June, 1971.
[41]Shröder, Eberhard, and Klaus Lübke. 1965. The peptides. Academic Press, N. Y. pp. 274-275 and 319-326.
[42]Morowitz, Harold J. 1967. Biological self-replicating systems, *Progress in Theoretical Biology,* 1:52-57.
[43]Bode, Hans R., and Harold J. Morowitz. 1967. Size and structure of the *Mycoplasma hominis* H39 chromosome, *Journal of Molecular Biology,* 23:198. Also personal correspondence with Morowitz. November, 1970.
[44]Gamow, George. 1961. One, two, three . . . infinity. Viking Press, N. Y. p. 208.
[45]Eden. Murray 1967. Inadequacies of neo-Darwinian evolution as a scientific theory. (in) Mathematical challenges to the neo-Darwinian interpretation of the theory of evolution. Edited by Paul S. Moorman and Martin M. Kaplan. Wistar Institute Press, Philadelphia. p. 17.
[46]Biological sciences. 1971. Britannica book of the year. p. 166. (Regarding tape recording by biologist Margaret A. Vince of Cambridge University.)

(Continued from page 161)

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For three generations, the theory of evolution has been dominant in the textbooks and teaching materials used in the public schools. This has been true, not only in the natural sciences, but also in the social sciences, and even in the humanities and fine arts. Man has been considered essentially as an animal or a machine, either implicitly or explicitly.

Many educators and scientists, as well as a great number of concerned parents and other laymen are convinced that the evolutionary philosophy is both scientifically false and sociologically harmful. However, the alternate approach, that of creationism, has been commonly rejected as "religious" and, therefore, unacceptable in public educational institutions.

Modern educators and jurists are now recognizing this practice as discriminatory and unconstitutional. Creation and evolution are both "religious" and both "scientific," so that if either is taught, then both should be taught, on as nearly an equal basis as possible. However, no textbooks presenting the scientific aspects of creationism, apart from any religious aspects, have heretofore been available. The "Science and Creation" series will now make it possible to teach creationism, on a purely scientific basis, as a valid alternative to evolution.

MONOGLACIOLOGY AND THE GLOBAL FLOOD

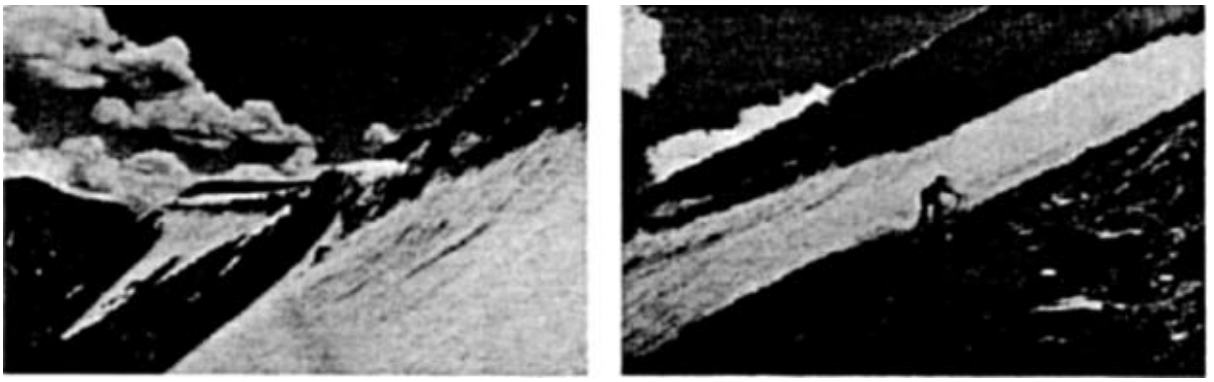
WILLIAM A. SPRINGSTEAD*

Scientific data affirming the Genesis account of a global flood have been increasing in recent years. There is likewise evidence for a serious reappraisal of the classic views on glaciation in the Northern Hemispheres. There is the need to reconsider the earlier and older views of the monoglacologists. Such views are quite favorable to the concept of a world wide deluge.

The Ice Age, scientifically termed Pleistocene or Quarternary, was the last geological epoch and the most carefully studied time of continental glaciation. Its express nature, causes, and duration are crucial factors for postulating one or several glaciations, and for the evidence supporting the global flood.

Although monoglacialogists postulate continental ice caps, the ice caps are thought to have been much smaller in extent and to have been accompanied by marine transgression, floating ice and other fluvatile elements. Like polyglaciologists, monoglaciologists adhere to the belief that the ice disappeared about 8-10,000 years ago. But unlike polyglaciologists, monoglaciologists hold to a drastically shorter period of glaciation.

This paper will deal primarily with the Pleistocene period of time. The weaknesses of classic polyglaciology and the increasing plausibility of once discarded monoglaciology will be considered in detail. The conduciveness of the theory of monoglaciology to the Biblical revelation of a world wide flood will be shown.



Editor's Note: **Glacial masses of ice and snow occur in high mountain areas such as this near Interstate-70 at Loveland Pass in the Colorado Rockies. There is strong evidence suggesting that in times past vast sheets of glacial ice covered major portions of eastern North America. In this interesting paper, Mr. William Springstead presents a strong argument favoring only one ice advance instead of several.** ***(Photos by George F. Howe)***

Specialists in the study of Pleistocene evidences frequently acknowledge numerous difficulties in explaining the causes, sequences and times of the age. Sparks thus writes: "One of the greatest problems in natural science."[1] Kraus: "A most difficult and controversial one."[2] Howells: "A difficult science."[3] Wells and Kirkaldy: "They bristle with unsolved difficulties."[4] Daly: "Ten major mysteries for every one solved."[5]

Reeves, Jr., outlines the generally held views of the age thus: "Division of the Pleistocene in all areas of the world has long been based on four major periods of glacial advance, each separated by a major interglacial period."[6] Using the tool of uniformitarianism (the extrapolation of present process rates into the past), geologists have generally postulated four periods of slowly growing and declining continental ice caps, interspersed with even lengthier intervals of warmth.

The Penck Bruccner terminology for these ice ages, based on a study of Swiss Alpine glaciation, has been widely used for classifying glaciation elsewhere. Such procedure is quite commonly used in hypothesizing geological processes in various places. There are however inherent dangers in this type of theorizing without verification from thorough geological fieldwork and consequent correlation.

Oakley has recently warned: "The use of Penck Bruccner terminology for Pleistocene deposits outside the Alpine regions has proved difficult, and attempts to apply it throughout the world on the basis of inadequate evidence of correlation have probably actually hindered the progress of Pleistocene geology."[7] Professor Emiliani has lucidly pointed out: "The notion that there were four glaciations has such great classic fascination that it will not die easily."[8]

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Yet there is virtually no unanimity among the specialists as to the number of glaciations, what caused them, and how long they were in duration. Differences over such matters have indeed caused such widespread age computations as those of 3,000,000 years; 2,000,000 years; 1,000,000 years; 600,000 years; 500,000 years; 300,000 years; 250,000 years; 100,000 years; and less. It should be objectively noted that the duration of time decreases with the number of glaciations postulated.

Ericson and Wollin write: "Unfortunately, students of Pleistocene disagree as to the number of continental glaciations which occurred during the Pleistocene. Consequently there is no unanimity regarding the lower stratigraphical boundary even in glaciated regions."[9] Eisley notes: "The glaciations are constantly being reassessed as to time and number."[10] Soviet scientists "think that the Quarternery system covers so short a time and is so incomplete that it should not be subdivided into four series or stages."[11]

I. Dating of Events in the Ice Age

Primary bases for interpreting the last age have been such features as: amount of sedimentation; conjectured thickness of the ice; evidence of glacial movement in lowlands; faunal and floral association; evidence of climatological change; the presence of human fossils and artifacts; radio active dating, etc. Yet none of these have proven very satisfactory to students of the Pleistocene.

The recency of the Pleistocene (some students believe it is still going on) has posed problems for specialists in historical geology. Russell has written: "Paleontology offers little help because there is nothing really distinguishing to separate late Pleistocene from recent faunas."[12] Sparks notes: "It cannot be solved by geological methods alone, as there are not fossils of sufficiently wide range and sufficiently restricted to certain horizons to act as zone fossils."[13] Johnson says of paleontologists: "Their competances are not with Pleistocene material but with that of the Pre-Pleistocene,"[14] Zeuner writes: "In the Pleistocene, however, this paleontological method of dating meets with a very limited success."[15]

One reads in popular treatments of the age, about ice being a mile thick over New England and elsewhere. This is somewhat speculative. Bowen has candidly said: "The extent of Pleistocene age is uncertain because, although its real occurrence is fairly well known, its thickness is a matter of conjecture. . . ."[16]

Oakley has pointed out: "The commonly accepted durations of the Miocene, Pliocene and Pleistocene periods (20, 15, and 1 million years respectively) have been estimated mainly on the basis of relative maximum thicknesses of the strata."[17] Yet Osborne has recently noted: "Most authors have abandoned all hope of using stratigraphic data to define time units. The thickness of a sediment is no parameter of geologic time unless more reliable data are obtained concerning rules of deposition."[18] The question then rises, how much dating is postulated upon unproven rates of deposition?

Attempts at dating according to animal or plant association have also run into real problems. The French archaeologist Pradenne has been quoted as saying: "The difficulties are such that after fifty years of study to which the greatest geologists have devoted all their energies, there is no certainty yet as to the exact number of glaciations and the way in which faunal changes are related to them."[19] Sauer has cautioned: "The appearance or disappearance, increase or decrease, of particular plants and animals may not spell out obligatory change, as has been so freely inferred."[20] Flint states: "The mammals like the plants have undergone little change throughout Pleistocene time, which appears to have been too short for conspicuous evolution to have occurred."[21] Hole and Heizer state: "Dating by means of faunal association is thus inexact and may at times be very misleading."[22]

And Rankama writes in his introduction: "It seems likely then, that climate will continue to be an important, if not the chief means of subdividing both the continental and marine Quarternary."[23] Dreaminis writes: "Climate has to be considered as the most important factor in Pleistocene stratigraphy and correlations."[24]

Notwithstanding its importance, there is again no unanimity as to the express climate of the age. Reeves, Jr., points out: "A great deal of controversy exists as to whether the glacial periods were actually colder and wetter than the interglacial periods (Charlesworth, 1957, Quinn, 1966)."[25] Ewing and Donn, in contrast to other students, propound: ". . . The idea of an ice-free Arctic during the Wisconsin time and hence during earlier glacial stages."[26] Stokes writes: "The Pleistocene, then may have been a period of sharper contrasts of climate and of shifting climates rather than a period of great cold."[27]

No stratification exists as indisputible proof of the proposed eight periods for the Pleistocene. In fact Koenigswald has taken all of the earth's history into his observation: "No continuous stratum was ever laid down over any part of the earth,"[28] Of the Pleistocene, Dreaminis writes: "To the best of the author's knowledge, there is no single geological section in the classical Midwest or any other glaciated area where a complete record of the eight Pleistocene ages have been preserved."[29] Emiliani writes:

> These sediments (continental) are always discontinuous and nowhere represent more (than) one or two glaciations, with only one or two interglacial deposits sandwiched between. For about a hundred years, geologists have been trying to reconstruct the history of the Pleistocene from this very fragmentary evidence.[30]

In order to account for this noticeable lack of field evidence, geologists have resorted to the assumption that the last glaciation (Wisconsin) wiped out the previous evidences. Dreaminis writes: "Each glacial advance wiped out most of the sediments of the previous glacial and inter glacial ages."[31] Ericson and Wollin similarly state: "Each succeeding glaciation has tended to obliterate or seriously disarrange the deposits and traces of all other glaciations."[32]

Yet there is admitted reference to insufficient evidence for the existence of these preceding sequences. Wolfe thus writes: "The oldest of the glacial stages is the Nebraskan, its record is rather obscure, and the remnant of its drift deposits are few and small."[33] Deevy writes: "It is particularly puzzling that fossils of Yarmouth age are almost unknown. These facts may mean that the widely accepted division of the Pleistocene into four glacial and three interglacial stages is based on incorrect pre-conceptions."[34]

The last glaciation is being considered more and more to have been equal to, if not greater than, the previous three. Bowen observes: "Antev's conclusions drawn from very different data that the last glaciation, the Wisconsin, was as great as any of the others, or even greater."[35] Millward notes: "The last great ice period, coincident with the Wurm in central Europe or the Wisconsin in North America, is now thought by Scandinavian geologists to have been more extensive than it seemed to earlier workers."[36]

The dynamic effects of this last glaciation are also being noted. Megitt thus writes: ". . . The climatic changes of the late Pleistocene and early Holocene, changes which greatly affected the flora and fauna of Europe."[37] Oakley writes: "The fauna of Europe suffered much greater damage in the course of the Wurm glaciation than during the two preceding ones."[38] Kowalski notes: "The Wurm glaciation brought a great extension of the Scandinavian ice sheet and the total destruction of fauna of northern Europe."[39]

The quick advance of the last ice sheets is also noted. Higgs writes: "A climatic change, however, was not necessarily a slow process for in the Mankata advance the ice came so fast it overrode the living forest."[40] This Mankata substage of the Wisconsin is thought by uniformitarians themselves to have occurred only 11,000 years ago.

II. Significance of Monoglaciology Theory

In a geological treatise on Minnesota the following appears, which is pertinent to the history of glaciology: "For a long time after the existence of continental glaciers in North America had been clearly established, geologists believed that there had been one single glacial period, followed by a definite retreat of the ice."[41] Geologists who believed in only one glaciation are called *monoglacialogists.*

Monoglacialogists have been numerous in both England and in North America, and a few may be found in France today. The late glacialist Richard J. Lougee was a proponent of monoglaciology. His abstract on "Ice Age History" in *Science,* Vol. 128, Nov. 21, 1958, pp. 1290, 1292 should be read.

Among the numerous scientists who have espoused monoglaciation, was a noted Canadian named Sir J. William Dawson. Milne and Milne have labeled him "the distinguished botanist."[42] Sir Dawson was a brilliant contemporary of Sir Charles Lyell, and the two did some field work in Canada together.

Dawson's views on the Ice Age deserve modern reconsideration. He wrote:

> In short we arrive at the conclusion that there has never been a continental glacier properly so called, but that in the extreme Glacial period there has been great centers of snow and glacial action, . . . while the lower lands have either submerged, or enjoying a climate habitable by hardy animals and plants.[43] . . . The writer and those with whom he has acted in this matter, have never held that icebergs alone, or fields of ice alone have produced the Pleistocene deposits. Their contention has been that the period was one in which glaciers, icebergs, and field ice acted together, and along with aqueous agencies in producing the complicated formations of this remarkable age.[44]

And in a 1963 treatise edited by Sims: "Recent studies have led some geologists to conclude that the glaciers originated as mountain glaciers in the highlands of Baffin Land, Labrador, and Quebec."[45] Andrist also notes:

> Contrary to popular belief, the ice did not form around the North Pole and then flow southward. It formed in a number of glaciers —Canada, Greenland, Northern Europe, . . . more or less simultaneously, and spread from each of these places. Nor was the glacial epoch a period of unusual cold; the essential for glacier formation is only that more snow fall during the winter than melts in summer.[46]

Dawson's observation of "great centers of snow and glacial action" are now being reaffirmed.

The express nature of the Pleistocene phenomena are mentioned. Bird writes: "The Pleistocene was not solely a glacial period, and glaciations and the marine transgressions that followed modified the scenery more than the interglacial processes."[47] Flint has written of Arctic Canada: "Many of the striations. within the submerged area may have been made by floating ice. Hence the broad problem of glacier ice movement in that region is still unsettled."[48] Clark and Stearn note: "When the Pleistocene was an epoch of glaciation in higher latitudes, in the low and middle latitudes, it was a stormy time of increased rainfall."[49] Bird writes also: "West of Hudson Bay, Pleistocene marine transgression was greater than anywhere else in North America. On the mainland the sea reached a depth of 200 - 400 and 500 - 600 feet on the islands north of Hudson Bay."[50]

The present Canadian Sea (which includes Hudson Bay) extends for about 1300 miles from north to south and is nearly 600 miles wide. Farley Mowatt points out: "The sea has shrunk by something like half its area during the past ten thousand years; its coastal plains for as much as two hundred miles inland clearly shows that they were formerly sea bottom."[51] Gignoux writes of the former Great Lakes region: "Traces of the old shores are progressively to the north, where they are found at a maximum altitude of 500 feet above Hudson Bay."[52] Dawson's description of "glaciers, icebergs and field ice . . . along with aqueous agencies" begins to take on more significance.

And Stirton observes: "The ages of different water levels in these Pleistocene lakes have not yet been correlated with glacial advances, but the time of their maximum extent was probably Wisconsin."[53] He thus postulates the possibility of Pleistocene lakes along with the glaciation of the Wisconsin period. In addition, Ewing and Donn note: "There is a considerable amount of evidence which suggests strongly that pluvial and glacial conditions occurred simultaneously."[54]

One of the large Pleistocene lakes was Lahontan. Wyckoff informs us that Lahontan "drowned about 8,000 miles of Nevada, California and Oregon to a depth of at least 500 feet."[55] Farb notes that Lake Bonneville: ". . . was an enormous inland sea that covered most of Western Utah, Eastern Nevada and Southern Idaho . . ."[56] Sanderson states that it was once "350 miles long and 150 miles wide and some 1000 feet deep."[57] Bertin states: "In North Dakota, Minnesota, Manitoba and Saskatchewan a vast lake, Lake Agassiz, covered 110,000 square miles."[58]

If, as seems possible, the glaciation, marine transgression, and enlargement of the fresh water lakes were synchronous, the areas covered by fluvatile elements were enormous indeed. One is reminded of Platt's statement concerning the Mississippi river valley: "The sides of the original valley are gravel terraces up to 200 feet above the flood plain. They show the high water mark of the last floods of the Ice Age. Such a flood staggers the imagination."[59] Gleason and Cronquist note: "The coastal plain province is undoubtedly the youngest in the United States. . . . The present lands of the coast plain along the Atlantic Ocean and the Gulf of Mexico were only recently, geologically speaking, still under water. A good share of the coastal plain is even today submerged."[60]

Dawson wrote of the Ice Age: "Submergences and emergences of land in the glacial age were more rapid than has hitherto been supposed."[61] Broecker has written: "There is little doubt that 11,000 years ago marks the midpoint of a rapid transition from glacial to interglacial condition."[62] Clark and Piggot note: "The end of the Pleistocene Ice Age seems to have been as sudden as the thawing of a frozen pond. Its date can already be fixed to within a few hundred years."[63] Cullen refers to "an exceptionally rapid rise in sea level between 11,000 and 9,000 years B.P."[64] Later he says: "Many times more rapid than the immediately preceding."[65] Braidwood notes that Professor Garrod is "much impressed with the speed of the changes during the later phases of the last glaciation, and its probable consequences,"[66]

Nor is there reason for uniformitarian geologists to hastily reject the concept of a rapidity of ice melt. Cowen, for example, notes: "The Arctic Sea ice has shrunk 12% in total area in the past 15 years and now averages 6 feet thick."[67] He then observes: "That is about half as thick as it was in the late nineteenth century."[68] Sanderson gives us another striking example of glacial melt in Alaska:

> The fact that fifty miles of solid ice three thousand feet deep can completely vanish in a little over a hundred years, and then vast glaciers that once formed large parts of them retreat another ten miles or more over land in a further century should make us reappraise our ideas about ice caps and so-called ice ages.[69]

The present thus affords us the plausibility of rapid ice melt in the past.

Of the end of the ice age Dawson said: "Knowing as we do that the culmination of the glacial age may have occurred less than 10,000 years ago . . ."[70] Platt writes: "The lobe of the big ice left the Minneapolis area 7,800 years ago."[71] Bird writes: "The post glacial period has been brief—less than 10,000 years in many parts of the Arctic."[72] While these and other dates mentioned

may be too great, their obvious recent character is in keeping with Bible-based chronologies.

Then Antevs has pointed out: "Independent time estimates in North America and in Europe show that the last ice sheets in the two continents disappear at the same time."[73] Deevy has written of Europe: . . . Scandinavia and Britain, where post glacial events moved with some of the demoralizing swiftness of an Arctic springtime."[74] Ardrey notes of the Wurm ice sheet: "That retreat occurred abruptly just eleven thousand years ago."[75] Dawson was again amazingly close in his interpretations.

The plausibility of the last glaciation being the one and only one fits in remarkably well with the Genesis account of a world flood. Whitcomb and Morris have written: "Glaciation was only one of the after effects of the deluge though undoubtedly the most spectacular."[76] Glaciation, with its alteration effects upon the continental shelves would allow for the return of biotic life to various parts of the world. Glacial melt would then in turn cut off these temporary land bridges. The rapidity of glaciation would account for the remarkable preservation of enormous amounts of animal remains in the Alaskan and Siberian muck beds. Sanderson writes:

> This perma frost in Alaska and Siberia contains enormous quantities of animal bones and flesh, half decayed vegetation, wood, and other remains of living things that, in some areas, together constitute a sizable percentage of the who1e.[77] . . . It is weird to think that one-seventh of the land surface of our earth is covered with perma frost and that about half of this (mostly in Siberia) is riddled with plant and animal remains aggregating untold millions of tons.[78]

The phenomena causing the Deluge are given us in Genesis 7:11,12: "In the six hundredth year of Noah's life, in the second month, the seventeenth day of the month, the same day were all the fountains of the deep broken up, and the windows of heaven were opened." The water sources were subterranean and atmospheric. The first was the result of a breaking up of the water sources of the great deep. The second was unprecedented, continuous rainfall. Is there evidence of such phenomena occurring in the past?

Rainfall was admittedly a major factor in the glaciation ascribed to the last age. Ardrey refers to "The Pleistocene's world wide phenomenon, rain."[79] Elsewhere he notes: "The time when the weather went mad."[80] Wright and Frey point out: "The Pleistocene is characterized by its dynamic temperature, humidity and sea level changes."[81] Raikes notes: "For it cannot be over emphasized that climate is a world wide phenomenon."[82] Ericson and Wollin observe: "It is scarcely conceivable that glaciers could spread without increase in precipitation."[83]

Rain fell in abundance all over the world, not only in glaciated areas, but also in the great arid regions of our day. Aridity was minimal, if not non-existent during the close of the Pleistocene. Grant has noted of the Great Basin: "During the latter half of the Wisconsin glaciation, a period of heavy and widespread rains known as 'the great pluvial' created many large lakes, particularly in the Great Basin."[84] Dunbar has concluded: "There can be little wrong in interpreting the Pleistocene Ice Age as a climatic catastrophe."[85]

III. Volcanism and the Ice Age

Water from the earth's interior is the first mentioned water source of the Deluge. Movius states: "From the beginning the Pleistocene was a period of climatic instability and crustal movements of considerable magnitude."[86] Ericson and Wollin state: "The Pleistocene was a time of exceptional mountain building and volcanic activity."[87] Berkner points out: "There is convincing evidence that the present atmosphere and hydrosphere arose largely from the earth's interior by volcanic emanations."[88] Williams has noted: "By far the principle gas given off by volcanoes is steam or water vapor. Seldom does it constitute less than 80% of the total discharge and generally it makes up more than 95%."[89] It is now generally held that water is the trigger of volcanic eruptions.

Briggs has pointed out: "The Pacific floor has still uncounted thousands of volcanoes, called Sea Mounts, that never rose above sea level. It also has at least 1,400 that once made it to the sun and then slipped back under the water."[90] Shepard has observed: "So far as is known all the Pacific sea mounts are volcanic in origin."[91] Heusser notes of the Pacific coastal area: "The late Pleistocene has been an interval during which the processes of gradation, diastrophism, and volcanism have been intensely active on this coast."[92]

The volume of water released by a volcano is quite large. Bertin observes: "The amount of water released during an eruption is amazing. At the height of its activity Paricutin produced 16,000 tons of water daily, as well as 100,000 tons of lava."[93] A simultaneous volcanic eruption of dozens of volcanos could theoretically release enormous amounts of water, and so cloud the atmosphere as to lower the temperature and bring on an ice age. Sanderson has pointed out that:

> The surface of the earth is covered with a series of vast cracks along which almost all the volcanos are strung; so that, if one of these cracks suddenly opens up or makes a

> move to close a little, a whole string of them might go off at once.[94] . . . What affects one seems to affect all, and it is now thought that from time to time the infliction may be so great that they all act in concert.[95]

Kurten has noted: "Continental ice sheets seem only to form at times of intense mountain building."[96] He then says of the geological change of the Ice Ages: "This was like an explosion, a total revolution in the tempo of geological events."[97] A recent Israeli research bulletin has urged: "That the history of volcanic activity in prehistoric and historic times should again be carefully compared with the eustatic changes of the ocean levels, and the recorded climatological changes in the world."[98] Stokes has postulated: "It may be that the numerous sharp uplifts that came about in North America and other parts of the world were sufficient to insure the formation of ice fields where none had existed before."[99]

IV. The Significance of a Shorter Ice Age

Dawson wrote of the ice age duration: "If we adopt the shorter estimates afforded by these facts, it will follow that the submergences and emergences of land in the Glacial ages were more rapid than has hitherto been supposed."[100] He also notes: "Such results would greatly shorten the duration assignable to the human period."[101]

It is quite apparent that the proponents of human evolution are absolutely dependent upon a Quarternary of lengthy duration. Eisley has querried: "Suppose that this period we have been estimating at one million years should instead have lasted a third of the time. In that case what are we to think of man?"[102] Later he writes: "Such an episode, it is obvious, would involve a complete re-examination of our thinking upon the subject of human evolution."[103] Ericson and Wollin admit: "If the ice ages and the topographical change of the Pleistocene had not begun about one and a half million years ago, it is probable that our species would have failed to develop."[104]

The ardent desire to adhere to a lengthy Ice Age has caused many students to disregard the faulty field evidence and to cling to radio-carbon and potassium argon dating as support. Yet even here, honest appraisal is by no means assured of success. Kurten has pointed out: "The main part of the Pleistocene is too young for the Uranium method and too old for the radio-carbon method."[105] Dreaminis writes of Canadian research: "Most of the reported potassium argon dates tend to be greater than those obtained by other isotopic methods (though on different samples)."[106]

Cowen has written: "Radioactive dating of rocks is unreliable for intervals shorter than about 10 million years. This leaves a considerable gap from early Pliocene to late Pleistocene in which dating is largely guess work."[107] Beals and Hoijer note: "Many people believe the potassium argon dating method to be less reliable than either carbon 14 or radium dating."[108] Possibilities of contamination and the fact that radioactive dating depends on unprovable suppositions, make it an unreliable criterion for absolute dating.

For example, carbon 14 dating depends upon the stability of the oceanic level over the past. A world deluge would throw the clock out of kilter. In an article on the carbon 14 clock, Libby writes: "We have fairly good evidence that the ocean hasn't changed much, either in composition or level, in 5,000 years."[109] Supposing Libby is right, what about 6-10,000 years ago? Would not a major ocean rise during that time make a notable difference in such dating?

According to Genesis 8:2, the rainfall was "restrained" and the fountains of the deep "stopped" somewhere toward the middle of the global flooding. We have suggested that the continental glaciation followed the flood. How then, it may be asked, can it be postulated that the effects of the flood were also causes of glaciation?

First of all, it seems reasonable that the enormous volumes of flood water continued to have after effects on world climate. Even with the return of the waters off of the earth (Genesis 8:3-5), there still must have been a far greater amount of water in the world ocean and on the dry land. Much of this water would continue to be absorbed in the atmosphere and then released in mountain areas of the world.

Secondly, when volcanic action in the world ocean came to a halt, there may well have been subsiding of the ocean bottom. Correspondingly, it may be postulated that there was sharp mountain rise on some of the world continents, especially those in the northern hemisphere.

With the sharp rise of northern mountain ranges, along with a still pronounced rainfall (though not of previous flood proportions), continental glaciation could conceivably take place. Such glaciation was a heavy contributor to the decrease of remaining flood waters.

Regarding the time of glaciation with respect to the flood, the following suggestion is made: In Genesis 11:8-19. Scripture reveals the time element for the world wide dispersal of mankind. It would seem that the Tower of Babel incident occurred well within two centuries after the flood. Such dispersal probably coincided with the dry continental shelf land bridges made

possible by continental glaciation. It would follow then that the glaciation was also within two centuries of the flood.

Conclusion

In brief conclusion then, we have associated monoglaciology with the scriptural revelation of a global flood. Monoglaciology better fits the prevalent suggested causes of glaciation, those of world wide rainfall and sharp mountain uplift, than does polyglaciology. Monoglaciology is much simpler to explain from a scientific point of view than is polyglaciology.

The Genesis account attributes the flood to the vast release of water from the atmosphere and the earth's interior. It came suddenly and overwhelmingly, and made the earth a watery grave. The flood was followed by a sharp rise of mountains, especially in the northern hemisphere, causing continental glaciation. This glaciation resulted in the last, and probably only ice stage confronted by mankind.

References

[1]Sparks, B. W. 1960. Geomorphology. Longman's. London. p. 5.
[2]Kraus, Bertram S. 1964. The basis of human evolution. Harper and Row, New York. p. 56.
[3]Howells, William. 1952. Mankind so far. Doubleday and Co., Inc., Garden City, New York. p. 259.
[4]Wells A. R. and J. F. Kirkaldy. 1966. Outlines of historical geology. Thos. Murby and Co., London. p. 455.
[5]Daly, Reginald Aldworth. 1934. The changing world of the ice age. Yale University Press, New Haven, Connecticut. p. 111.
[6]Reeves, Jr., C. C. 1968. Developments in sedimentology, Part II. Introduction to paleolimnology. Elsevier Publ. Co., Amsterdam, London, N. Y. p. 112.
[7]Oakley, Kenneth. 1964. Framework for dating fossil man. Aldine, Chicago, Illinois. p. 24.
[8]Emiliani, Cesare. 1968. The Pleistocene epoch and the evolution of man, *Current Anthropology*, Vol. 9, Number 1. February.
[9]Ericson, David B. and Goesta Wollin. 1964. The deep and the past. Alfred Knopf, N. Y. p. 160.
[10]Eisely, Loren. 1967. Time and stratigraphy in the evolution of man. National Academy of Sciences, National Research Council. Publication 1469. Washington, D. C. p. 67.
[11]Krasnov, I. I. 1967. The quarternary, Europian, USSR. 1965. (in) International studies on the quarternary. Wright and Frey, Editors. Special Papers 84. New York. p. 254.
[12]Russell, Richard J. Instability of Sea Level. (in) Science in progress. Edited by H. S. Taylor. Eleventh Series. Yale University Press, New Haven, Conn. Oxford University Press, London. p. 56.
[13]Sparks, B. W., *Op. Cit.*, p. 5.
[14]Johnson, Sheldon. 1957. Geology. (in) The identification of non-artifactual archaeological remains. Walter W. Taylor, Editor. National Academy of Sciences, National Research Council. Publication 565. p. 48.
[15]Zeuner,. Frederick E. 1964. The Pleistocene-period. Humanities, N. Y. p. 21.
[16]Bowen, Robert. 1966. Paleotemperature analysis. Methods in geochemistry and geophysics. Vol. 2. Elsevier Publ. Co., Amsterdam, London, N. Y. p. 188.
[17]Oakley, Kenneth. 1952. Dating fossil human remains. (in) Anthropology today. A. L. Kroeber and others. University of Chicago Press. Chicago. p. 54.
[18]Osborne, F. Fritz. Geochronology in Canada. History of the Devonian system. Royal Society of Canada. Special Publication #8. p. 93.
[19]McGowan, Kenneth. 1950. Early man in the New World. Macmillan, N. Y. p. 50.
[20]Sauer, Carl. 1962. Readings in cultural geography. Philip L. Wagner and Marvin W. Mikesell. University of Chicago Press, Chicago. p. 543.
[21]Flint, Richard. 1947. Glacial geology and the pleistocene epoch, John Wiley, N. Y., p. 522.
[22]Hole, Frank and Robert F. Heizer. 1965. An introduction to prehistoric archaeology. Harper Row and World, N. Y. p. 171.
[23]Rankama, Kalervo, Editor. 1965. *Quarternary*, Vol. 1. Inter Science Publ. Division of John Wiley and Sons, Inc. N. Y., London, Sydney, Introduction p. xix.
[24]Dreaminis, A., 1964. Notes on the Pleistocene time scale. (in) Geochronology in Canada. Edited by F. F. Osborne. Royal Society of Canada. p. 140.
[25]Reeves, C. C., Jr., *Op. Cit.*, p. 121.
[26]Ewing, Maurice and Wm. L. Donn. 1956. A theory of the ice ages, *Science*, 123(3207):1064, June 15.
[27]Stokes, William Lee. 1955. Another look at the ice age, *Science*, 122(3174):816, October.
[28]Koenigswald, G. H. R. 1962. The evolution of man. University of Michigan Press, Ann Arbor, Mich. p. 2.
[29]Dreaminis, A., *Op. Cit.*, p. 142.
[30]Emiliani, Cesare. Issues in evolution, Vol. III. Evolution after Darwin. Sol Tax and Charles Callendar, Editors, University of Chicago Press. p. 161.
[31]Dreaminis, A., *Op. Cit.*, p. 142.
[32]Ericson, David B. and Goesta Wollin, *Op. Cit.*, p. 137.
[33]Wolfe, C. Wroe. 1949. This earth of ours—past and present. Geopublishing Co., Watertown, Mass. p. 267.
[34]Deevy, Edward. 1965. The Quarternary of the United States. H. E. Wright and David G. Frey, Editors, Princeton, N. J. p. 652.
[35]Bowen, Norman L., Joseph H. Cushman, and Roy E. Dickerson. 1941. Shifting sea floors and coast lines. University of Pennsylvania, Bicentennial Conference. p. 23.
[36]Millward, Roy. 1964. Scandinavian lands, MacMillan & Co., St. Martin's Press, London. p. 151.
[37]Meggitt, M. J. 1965. Man, culture and animals. American Association for the Advancement of Science, Washington, D. C. #78. p. 8.
[38]Oakley. Kenneth, *Op. Cit.*, p. 22.
[39]Kowalski, Kazmierz. 1967. Pleistocene extinctions. The search for a cause. Martin and Wright, Editors, Yale University Press. New Haven and London. p. 354.
[40]Higgs, Eric. 1963. Animals, (in) Science in archaeology. Edited by Don Brothwell and Eric Higgs. Thames and Hudson, Basic Books, Inc. New York. p. 195.
[41]Sims, Paul K. 1963. Minnesota's rocks and waters. Minnesota Geological Survey Bulletin 37. p. 159.
[42]Milne, Lorus and Margery Milne. 1967. Living plants of the world. Random House, N. Y. p. 7.
[43]Dawson, J. William. 1894. Some salient points in the science of the earth. Harper and Brothers, New York. p. 373.
[44]*Ibid.*, pp. 376-7.
[45]Sims, Paul K., *Op. Cit.*, p. 154.
[46]Andrist. Ralph K. 1969. Footprints of the great ice, *Reader's Digest*, p. 251.

[47]Bird,. J. Brian. 1967. The physiography of arctic Canada. The Johns Hopkins University Press, Baltimore, Md. p. xix.
[48]Flint. Richard Foster. 1957. Glacial and Pleistocene geology. John Wiley and Sons, Inc. N. Y. p. 58.
[49]Clark, Thomas H. and Cohn W. Stern. 1960. The geological evolution of North America. The Ronald Press Co., New York. pp. 277-288.
[50]Bird, J. Brian. 1954. Postglacial marine submergence in central arctic Canada. (in) Annotated bibliography of Quarternary shorelines. Horace C. Richards and Rhodes W. Fairbridge. *Bulletin of Geological Society of America.* p. 22.
[51]Mowatt, Farley. 1967. Canada North. An Atlantic Monthly Press Book. Little, Brown and Co., Boston, Mass. and Toronto. p. 73.
[52]Gignoux, Maurice. English Translation 1950 by C. Woodford. Stratigraphic geology. W. H. Freeman Publishers, San Francisco, Calif. p. 663.
[53]Stirton, Reuben Arthur. 1958. Time, life and man. The fossil record. John Wiley, N. Y. p. 342.
[54]Ewing. Maurice and Wm. L. Donn. 1958. A theory of the ice ages (II), *Science,* 127:1161.
[55]Wyckoff, Jerome. 1966. Rock. time and land forms. Harper & Row, New York, p. 269.
[56]Farb, Peter. 1963. Face of North America. Harper and Row, New York. p. 238.
[57]Sanderson, Ivan. 1961. The continent we live on. Random House, Inc., New York. p. 237.
[58]Bertin, Leon. 1961 and 1967. Larousse encyclopedia of the earth. Promotheus Press, New York. p. 347.
[59]Platt, Rutherford. 1965. The great American forest. Prentice Hall, Englewood Cliffs, N. J. p. 55.
[60]Gleason, Henry A. and Arthur Cronquist. 1964. The natural geography of plants. Columbia University Press. New York. p. 216.
[61]Dawson, J. W., *Op. Cit.,* p. 420.
[62]Broecker. Wallace S. 1966. Absolute dating and the astronomical theory of glaciation, *Science,* 151(3708): 301, January 21.
[63]Clark, Grahame and Stuart Piggot. Prehistoric studies. (in) The history of human society. General Editor J. A. Plumb. Knopf Publishing, N. Y. p. 140.
[64]Cullen, David J. 1967. Submarine evidence from New Zealand of a rapid rise in sea level about 11,000 Years B.P., *Paleo-Geography, Climatology, Ecology,* 3(3): 289. Elsevier Publ. Co. Amsterdam.
[65]*Ibid.,* p. 292.
[66]Braidwood, Robert. 1961. Prehistoric man. Oceana Publishing, Inc., New York. p. 74.
[67]Cowen, Robert C. 1960. Frontiers of the sea. Doubleday. N. Y. p. 190.
[68]*Ibid.,* p. 190.
[69]Sanderson, Ivan., *Op. Cit.,* p. 64.
[70]Dawson, *Op. Cit.,* p. 476.
[71]Platt, *Op. cit.,* p. 51.
[72]Bird. *Op. Cit.* p. xix.
[73]Antevs, Ernst. 1928. The last glaciation. American Geological Society Research Series, #17. p. 163.
[74]Deevy, Edward S. 1967. (in) Pleistocene extinctions. Edited by Martin and Wright. Yale University Press. New Haven and London. p. 66.
[75]Ardrey, Robert. 1970. The social contract. Athenum Publishers, N. Y. p. 385.
[76]Whitcomb, John C. and Henry M. Morris. 1961. The Genesis Flood. Presbyterian and Reformed Publishing Co., Philadelphia, Pa. p. 311.
[77]Sanderson, *Op. Cit.,* p. 52.
[78]*Ibid.,* p. 53.
[79]Ardrey. Robert. 1962. African genesis. Athenum Publishers, N. Y. p. 231.
[80]*Ibid.,* p. 222.
[81]Wright, H. E. and David G. Frey. 1965. The Quarternary of the United States. Princeton, N. Y. p. 557.
[82]Raikes, Robert. 1967. Water, weather and prehistory. Humanities Press. N. Y. p. 55.
[83]Ericson and Wollin, *Op. Cit.,* p. 256.
[84]Grant, Campbell. 1967. Rock art of the American indian. Thos. A. Crowell Co., New York. p. 7.
[85]Dunbar, M. J. 1968. Ecological development in polar region. Prentice Hall, Inc., Englewood Cliffs, N. Y. p. 60.
[86]Movius, Hallam L., Jr. 1944. Early man and Pleistocene stratigraphy in southern and eastern Asia. Published by Cambridge Museum. p. 9.
[87]Ericson and Wollin, *Op. Cit.,* p. 250.
[88]Berkner, Lloyd V. 1967. Memorial symposium on evolution of the earth's atmosphere, *Science,* 158(3806): 1350, December 8.
[89]Williams, Howell. 1962. The ancient volcanoes of Oregon. Condon lectures. Eugene, Oregon. p. 3.
[90]Briggs, Peter. 1969. Mysteries of our world. David McKay Co., Inc., New York. p. 79.
[91]Shepard, Francis. 1963. Submarine geology. Second Edition. Harper and Row, N. Y. p. 383.
[92]Heusser, Calvin J. 1960. Late Pleistocene environments of north Pacific North America. American Geological Society Publication #35. N. Y. p. 4.
[93]Bertin, Leon, *Op. Cit.,* p. 141.
[94]Sanderson, Ivan, *Op. Cit.,* p. 289.
[95]*Ibid.,* p. 289.
[96]Kurten, Bjorn. 1968. Pleistocene mammals of Europe. Aldine Publishing Co. Chicago, Ill. p. 5.
[97]*Ibid.,* p. 4.
[98]Bloch, M. R. and W. B. Hester. 1963. Climate and volcanic outbreak, (in) *Bulletin Research Council of Israel,* Vol. 11G:174. The Weizmann Science Press of Israel, Jerusalem.
[99]Stokes, William Lee, *Op. Cit.,* p. 819.
[100]Dawson, *Op. Cit.,* p. 420.
[101]*Ibid.,* p. 420.
[102]Eisley, Loren. 1957. The immense journey. Random House, New York. p. 113.
[103]*Ibid.,* p. 113.
[104]Ericson and Wollin, *Op. Cit.,* p. 7.
[105]Kurten, Bjorn, *Op. Cit.,* p. 20.
[106]Dreaminis, A., *Op. Cit.,* pp. 146 147.
[107]Cowen, Robert C., *Op. Cit.,* p. 99.
[108]Beals, Ralph J. and Harry Hoijer. 1965. An introduction to anthropology. Third Edition. Macmillan, New York. p. 68.
[109]Libby, Willard. 1968. Carbon nuclear clock for archaeology. Unesco Courier, New York. July-August issue. p. 25.

PLEIOTROPY: EXTRA COTYLEDONS IN THE TOMATO

WILLIAM J. TINKLE*

Aristotle noted that living things develop according to type. If we are to ascribe development of kinds to natural selection we must believe that the plan of an organism is incomplete and tenuous; so much so that among the chance variants there are some which are superior to their parents, along with others which are inferior. Yet among the variants which are hereditary, nearly all are inferior and this study describes such a strain. The data favor the idea that the type is important.

A tomato plant with an extra cotyledon might be considered an advantageous type but in these observations it was found to be inferior in germination, rate of growth, and resistance to frost. A few morphological peculiarities were noted.

History

The first lateral structures formed on a seedling plant differ from true leaves and are called cotyledons. In species where the normal number is two cotyledons, three or more cotyledons appear occasionally. Holtorp[1] found that in mustard, *Brassica,* tricotyledony (3 seed leaves) is heritable and can be changed by selection. He did not note the weakness which I have found, probably because he chose the best specimens and gave them superoir care.

Dessureaux[2] found four cotyledons occasionally in alfalfa as well as three. He found the two-cotyledon condition to be dominant although incompletely so. He has reported that an average of 3.55 cotyledons has been recorded in one selected strain.

Tashima,[3] a graduate student in the Ohio State University, found that the tricotyl condition in tomatoes is hereditary but does not follow any simple Mendelian ratio. The present author suspects chromosomal aberration, but the chromosomes of the tomato are hard to examine.

Elton F. Paddock[4] of the Ohio State University has found a split leaf condition and the stem division (bifurcation) to be associated with the tricotyl condition in tomatoes.

Procedure

In 1968 a tomato plant came up in a flower bed from a stray seed. Since the plant had vigor and produced fruits that were smooth and ripened evenly I saved seeds from it The next year, 1969, one plant from the seeds of this plant had three cotyledons, spaced evenly around the stem. Another abnormality was a terminal leaflet split along the midrib, resembling observations by Paddock. Set out 100 feet away from others, in good soil, fruits on this plant started to ripen 11 days later than other plants of the same set of seeds (sibs). The fruits were numerous but slightly smaller than those of the sibs.

In the summer of 1969 I planted 100 seeds from fruits of this mutant, 3-cotyledonous tomato plant. A total of 69 plants developed: 3 with 3 cotyledons and 66 with 2 cotyledons. By December 25, 1969, the following results were recorded:
3 coty. plant no. 1: 4 in. high 5 green leaves
3 coty. plant no. 2: 8 in. high 10 green leaves
3 coty. plant no. 3: 14 in. high 8 green leaves
2 coty. plant, typical: 17 in. high 8 green leaves

On March 1, 1970, I planted seed from the mutant 3 cotyledon plant of 1969 in good soil with favorable moisture and temperature. A total of 37 plants developed: 7 with 3 cotyledons and 30 with 2 cotyledons. By April 30, 1970, the following results were typical:
3 coty. plant no. 1: 4 in. high
3 coty. plant no. 2: 4 in. high
3 coty. plant no. 3: 4 in. high
3 coty. plant no. 4: 2.5 in. high
3 coty. plant no. 5: 1 in. high Came up late
2 coty. plant no. 1: 11 in. high
2 coty. plant no. 2: 7 in. high
2 coty. plant no. 3: 3.5 in high—Growth from axillary branch only
2 coty. plant no. 4: 3 in. high—Growth from 2 axiliary branches only

Of particular interest is the fact that plants number 3 and 4 of the 2 cotyledon plants stopped growth of the stem at an early age for no apparent reason. Growth was resumed at axillary branches, retarding the maturity of the plants. It should be noted that: these plants are heterozygous for extra cotyledons, suggesting that this crippling abnormality is associated with the break-down of cotyledon type.

All of these plants bore normal fruits, although of reduced size, and they started bearing at the same time as controls, of non-mutant ancestry, planted a month later.

Other Results Obtained

Comparison under adverse conditions; under slat frame out of doors. By July 29, 1970:
40 seeds planted from 3 coty. mutant: 18 plants
40 seeds planted from 2 coty. normal: 16 plants

Plants still living on September 14, 1970:
3 coty. parentage: 1 plant, number leaves 3
2 coty. parentage, 6 plants, avg. no. leaves 3.8

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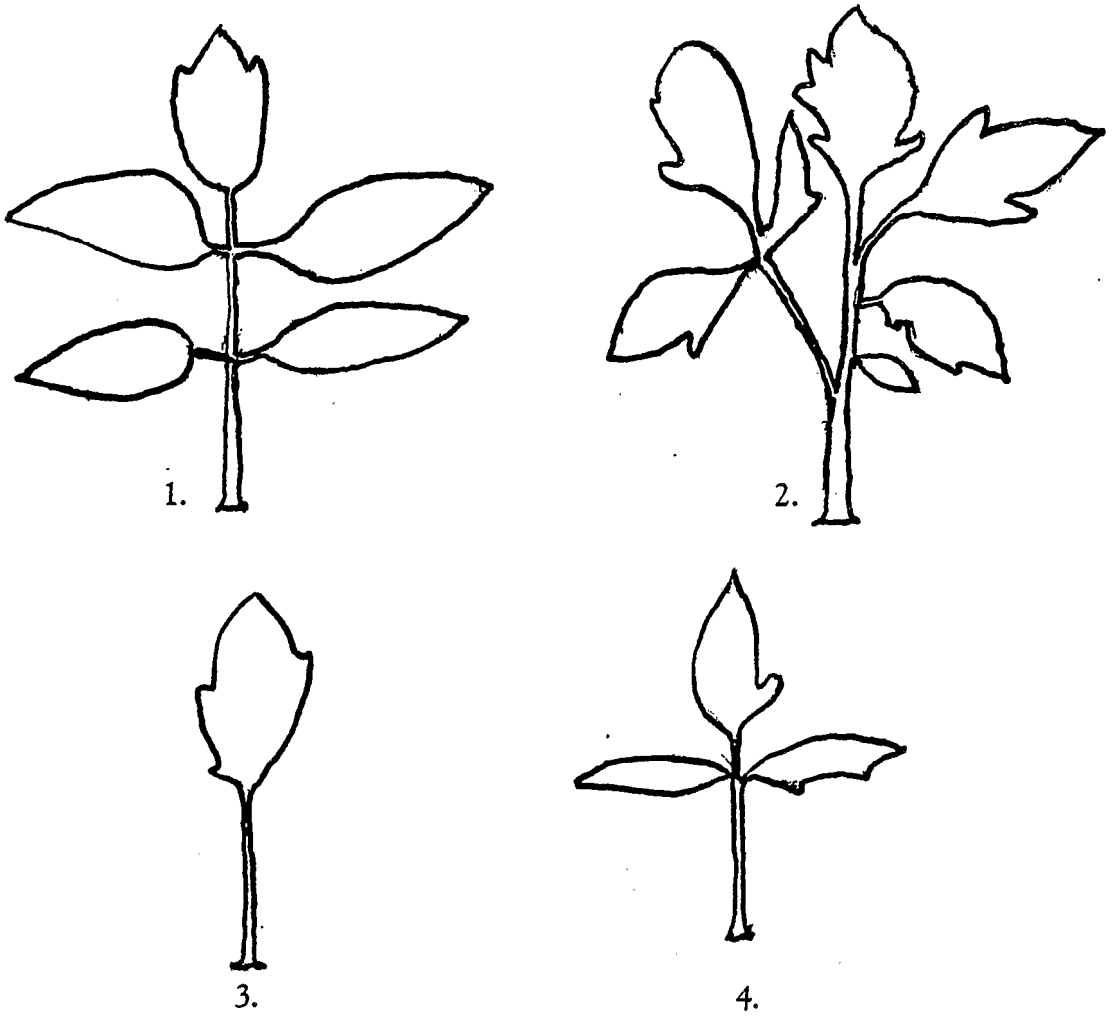

Figure 1. Four leaf shapes in tomatoes having 3 cotyledons. 1. Normal tomato leaf. 2, 3, and 4. Various shapes on 3 cotyledon plants. Normal size.

Resistence to frost by October 17, 1970:
First 3 coty. plant: frosted leaves 95, intact 31
Second 3 coty. plant: frosted leaves 34, intact 18
First 2 coty. plant: frosted leaves 55, intact 50
This 2 cotyledonous plant had no mutant ancestry.

Unfavorable environment: basement 55-60 degrees, feeble light (April 1, 1971):
100 seeds planted from 1970 3 coty. plants
100 seeds planted from normal 2 coty. plants
On May 29, 1971, of the 3 coty. planting, 20 living
On May 29, 1971, of the 2 coty. planting, 37 living

All the living plants had two cotyledons. We concluded that the homozygous 3 coty. seeds did not germinate under these unfavorable conditions.

Discussion

One might think that an extra cotyledon when a plant has no other leaf surface would be a benefit, which it probably is. But the disruption of its genetic code works more harm than this change works of good. There is an error in the genetic information received by the zygote which reduces the vigor. This is characteristic of mutants in general, and needs to be mentioned more frequently.

In addition there is association of morphological changes: extra cotyledon, split leaf, and stoppage of growth in the main stem. One plant, not hitherto mentioned, stopped growth of the main stem in winter when light was unfavorable and continued growth by sending out a branch. One would expect all branches to die and growth to continue on the slender main stem.

Another change not mentioned above and with no tricotyledon ancestry, was a cotyledon split half way from the apex to the base.

Conclusions

Tricotyledony or the more inclusive condition, pleiotropy, in tomatoes is evidently hereditary and recessive but the ratio of normal to mutant has not been determined.

Like mutations in general, this change reduces the vigor of the plant. Loss is manifested in later bearing and less resistance to cold and other unfavorable environmental factors. This loss is another difficulty for the theory of evolution, which is dependent upon mutation.

Literature Cited

[1]H. E. Holtorp. 1944. Tricotyledony, *Nature,* 153:13-14.

[2]L. Dessureaux. 1967. *Canadian Journal of Genetics and Cytology,* 9:658.

[3]Masayuki Tashima. 1950. A study of the inheritance of multiple cotyledons, fruit color, dwarfness and potato leaf in the tomato. Ohio State University Thesis.

[4]Personal letter to the author.

ONE MAN'S VIEW ON THE TEACHING OF ORIGINS IN THE PUBLIC SCHOOL SCIENCE CLASSROOM

RICHARD BLISS*

The teacher in public school must avoid coercion and unfair dogmatism in the presentations of origins. Students should be given empirical data bearing on origins and then be allowed to examine alternatives to the evolution concept. This objective might be achieved in part if student teachers were asked to write about arguments opposing evolution during their own college preparation. It is also suggested that data regarding competitive theories be collected into an appendix or addenda for use with all types of textbooks or laboratory manuals.

The word evolution means different things to different people. I find that, as I am asked to speak on the subject of "Teaching Evolution in the Classroom," I am often confronted with this problem in semantics. To be sure that this is not the case in this paper, let me clarify what I mean.

That evolution is *"the continuous genetic adaptation of organisms or species to the environment by the integrating agencies of selection, by hybridization, inbreeding and mutation"* is the biological definition often used. In this respect evolution or adaptation is constantly going on around us and would be difficult if not nearly impossible to deny.

There is another aspect of evolution, however, that impinges upon origins. I am referring to the evolution of all species from a single coacervate cell, or some substance, that has spontaneously developed from some primordial soup.

Now this is where the problem comes into view and I wish the reader to understand that this is what I am referring to. It is this point of view that brings some of the most bitter controversy, a controversy that I personally cannot avoid because it is dealt with in practically every biological textbook, and science curriculum (K through 12) is inescapably my business.

I begin, then, with "One Man's View" that may well be considered unorthodox and totally unacceptable to some.

Background Observations

Some time ago an article appeared in a science journal in which the author was reacting to the non-evolutionist, and he stated that any educated person who says evolution was not the case is basing his position upon rejection of scientific evidence and not the application of it. (This statement was made from the point of view of the *amoeba to man hypothesis.)* Then he went on to say:

> This rejection may be for a variety of personal reasons, which we must respect. In a democracy a citizen can believe anything that he wishes and, in a large country such as ours, surely every conceivable point of view must have at least one adherent. Some believe the earth is flat; others do not believe that micro-organisms can cause disease. But we can hope that few of the former will become pilots of our planes and ships, and few of the latter will become physicians and surgeons. *We can also hope that few who hold these views, or reject evolution, will have the responsibility for teaching science to our young people."*[1] (Emphasis in original.)

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A few years ago I found myself in a graduate course related to the history of biology. One of the requirements of this course was to present a paper on any subject germane to our study. As we had spent some time on the subject of evolution in relation to historical figures of the past, I decided to do a paper on Darwinian Evolution; only I thought I would do my research with a particular view in mind, that is, "Evolution in Question."

The professor presiding said: "Bliss, this is a monumental task, you will never find anything significant or worth reporting." After this statement I was sure that I wanted to pursue the task, so I began writing letters and searching out other scholars in the subject area. Information began coming in and the more that arrived the more interested I became.

I tested some of the views out on my fellow graduate students and found that they too had harbored doubts on many aspects of evolution. And I was told by well meaning friends, "You're nuts if you bring that paper in, it isn't worth the grade you will get." The indication was that I had better be careful on this subject with this professor because he might become vindictive.

Now, I don't want to intentionally cast aspirsions on these fine men or on the respectable *theory* of evolution. Rather I would like to draw attention to the seriousness of coercion in the academic community which we must admit is frequently happening.

To Challenge, or Not to Challenge

I feel, respectfully and perhaps naively, that even among many of our most brilliant educators in the field, that we have closure on this subject without a full realization of its implications to science. There is testimony to the effect that evolution is a *theory;* yet, when one dares to attack this theory, a person literally places his academic integrity on the line. I like G. A. Kerkut's way of putting it when he says: "If one tries to question, the protagonists round on one and say in an accusing tone of voice, don't you believe in the theory of Organic Evolution? What better theory have you got to offer?"[2]

Now it seems to me that if there is anything in this world today that we should be able to rely upon, it is the empirical knowledge that we are able to gain from scientific investigation. There is little danger of being accused of using unfair dogmatism, if a clear contextual representation of fact is made, and a highly controversial and competitive theory is placed *in proper context* and not scrambled in among the facts. However, I often feel that some ignore the basic tenets of science and in effect propagandize young people, thus stultifying their minds in favor of one's own prejudices.

At this point, let me ask, what are we attempting to do as far as science education is concerned? In the K-6 sequence we teach our children to discover scientific relationships by using the "Process of Science." We ask the child to observe-classify—infer—communicate his findings—experiment—build models—predict, etc. Over and above the cognitive aspects of these experiences are those of the effective domain where we teach our children, through science, to respect logic—to consider the consequences—to long for understanding—to consider the premises—to question all things and I am sure we could extend this value arrangement.

However, we turn around, in our life science and biology classes, and not only indoctrinate them in the highly controversial theory of organic evolution, but all too often demand preset evaluative responses to the theory. Sadly, this somewhat rigid response is often no higher taxonomically than memory or translation. I really wonder what kind of answers we would get from these young people if we just gave them the empirical view as far as is possible and asked for a response on the creative level?

Many Views on Origins—One View?

On the subject of evolution the academic powers (those that are on the college and university level and actively engaged in research) have a loyal following of young and fewer older biology teachers, that are carrying the torch for organic evolution far beyond the point that they would personally condone.

Of course the research scientist is fully aware of the tremendous possibilities for error and misinterpretation. Therefore, the scientist who is engaged in research activity is not the object of my concern. Rather, I am concerned about the classroom teacher who is espousing the scientists' views. Often, the classroom teacher has not been given the breadth of exposure to have a complete understanding of evolutionary controversies. In fact, in talking to many young biology teachers over the years, I find that a frightening few have any view of origins outside of the evolutionary theory.

I remember how concerned one person was that his students would understand that evolution (amoeba to man) was the case. He expressed this view after stating that he had personally researched all aspects of the subject and it was clarified by his professor. I asked if he thought that any opposing view to this subject should be entertained. The response was that there wasn't anyone in the field of science that he knew of or had read about that would entertain any other point of view.

I sincerely feel that an indictment is on those college and university professors that neglect,

either by accident or design, to inform their students about the logic of all points of view . . . or I wonder . . . is there really only *one* point of view??? What could be better in a two credit course on biological origins than to have included all of the fine writings on all sides of this issue?

A volume entitled, *Man's Origin, Man's Destiny*, by A. E. Wilder Smith[3] was recently given to me by a student in my methods class. As I read the book, I found no quarrel with his argument from the point of view he chose. Here is a man that holds doctorates in three areas of science, is widely known as a speaker to university student groups both in Europe and the United States, has been involved in research plus a long list of other credits. Certainly in every respect he is a qualified scientist and writer.

Now are we going to offer our students an opportunity to reflect on this man's views? Or do we just categorically reject anything that comes from his pen because he has a creationist point of view? These are the decisions that are going to have to be made in the college classroom.

If we are determined to give young people the freedom of their own logic, the science teacher is going to have to be scrupulously direct in presenting all scholarly points of view. Why shouldn't we insist that a student in science, and certainly one that is going to enter the profession of teaching, do a literature research based on writings from scientific scholars who harbor opposing points of view on evolution?

Too often have I heard that these views are derived essentially from faith and lie outside the realm of scientific reasoning. What is it then that we have when we say the fossil record points to a progressive type of evolution? It seems that we are employing a great deal of faith in this respect, as well as in many other cases.

Conclusions and Proposals

If I were to propose a curriculum in biology and the life sciences, I would suggest use of a text that deals, not in the centrality of evolution, but rather in the centrality of universal order and the diversity of all living things. Within these general areas of order and diversity one could develop the necessary conceptual patterns and relationships without dealing with the serious conflicts within the area of origins. I can think of nothing more exciting for a young person than to be able to observe life in a factual context, or at least a context where there is unanimity of view and draw from these some non-directed conclusions regarding the speculatives.

But this wouldn't be complete, for we must also give him the opportunity to view the speculations and theories proposed by scholars in science. In this respect then, the student should have access to scientific interpretations of even the most controversial of these theories. The question now is, how is this going to happen if we don't place it in the body of our material?

I propose that we collect the highly conflicting and competitive theories in an appendix or addenda to our high school biology texts.* I propose that the fine textbooks and lab manuals that are presently on the scene be rewritten to include these suggested features. If we are so inclined to do this, it will be then and only then, that we can say that our science curriculum places an emphasis on developing logical thought patterns and where serious conflicts and reasonable doubts occur we are depending upon the student mind to make sensible choices.

I submit this paper as one man's opinion.

*Editor's Note: It is obvious to C.R.S. readers that some action along the lines suggested by Mr. Bliss has come recently. The text book, *Biology, A Search for Order in Complexity*, is available through Zondervan Publishing Company, Grand Rapids, Michigan. This will serve either as a central text for public school classes, or as an auxiliary text to provide creationistic evidences. Then, too, a Handbook for Teachers has been prepared by the Creation-Science Research Center, 2716 Madison Ave., San Diego, Calif. 72116. This handbook entitled, *Science and Creation*, and written by Drs. Morris, Boardman, and Koontz is ready for widespread circulation and usage.

References

[1]Moore, John A. 1966. Patterns of cellular and organismic evolution, *The Science Teacher*, April, pp. 69-76.

[2]Kerkut, G. A. 1960. Implications of evolution. Pergamon Press, New York.

[3]Smith, Wilder A. E. 1969. Man's origin, Man's destiny. Harold Shaw Publisher, Wheaton, Ill.

NOTE ON STALACTITE FORMATION

WILLIS E. KEITHLEY*

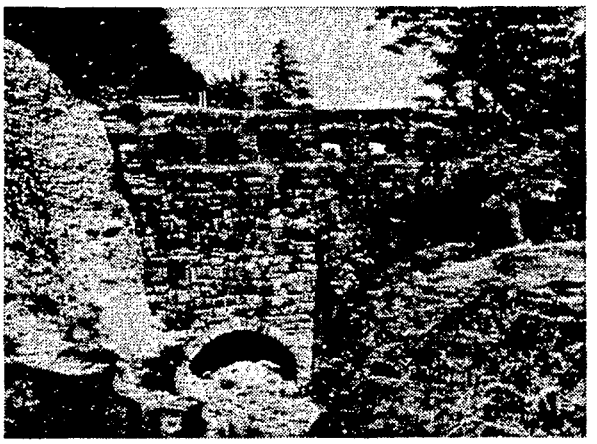

Figure. 1. Old dam on North Santiam River, 50 miles east of Salem, Oregon.

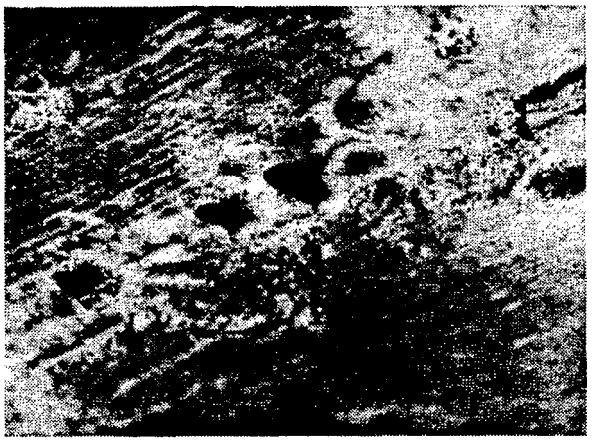

Figure 2. Stalactite formations on spillway ceilings are from 18-20 mm. in length. Shadows are produced by the stalactites.

In the September, 1970 issue of the C.R.S. Quarterly, a list of research problems were presented; among them was a suggestion to investigate the growth rate of stalactites. Based on the two accompanying prints I conclude that stalactite growth may be more rapid than postulated.

This pictured dam is located on the North Santiam River, 50 miles east of Salem, Oregon. It was built in the late 1890's to provide power to manufacture paper from straw; the project was abandoned in 1912, but the dam is still standing as shown.

Of rock rubble construction, very little grout was used, and a thin veneer of cement less than 25mm. in thickness formed the ceiling of the spillways at the top of the dam.

All of the spillway ceilings show evidence of stalactite formation, apparently from the meager amount of lime present in the mortar. Those shown in Figure 2 are from 18-20mm. in length. Evidence of vandalism suggests that longer ones may have been chiseled out.

Since the rubble on top the spillways is scarcely a meter in thickness, it seems unlikely that there would be much opportunity for extensive percolation, and indicates that stalactite formation may occur much more rapidly than presumed by classical geologic dating.

This information could substantially affect the time span of the geologic column and contribute to the ever-growing volume of evidence for a recent, Scriptural creation.

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"A LAW OF BIOLOGICAL CONSERVATION"

IAN MCDOWELL*

A "Law of Biological Conservation" is developed in the context of the well-known Laws of Thermodynamics. It is asserted in this Law that the total information implicit in all living creatures at a given instant cannot exceed the total information coded upon all the genes of all their cells. As a corollary of such a law, it becomes obvious that creation requires a Creator because the information implicit in these living beings today cannot exceed the total amount of information of all kinds which was required to specify the whole of the original creation. Evolutionists should face this issue and consider its implications.

Introduction

One form of the First Law of Thermodynamics is the Law of Conservation of Energy, which states that the total energy within a closed system remains constant. In other words, energy cannot be created or destroyed, though it may be changed from one form into another.

Energy is the quantitative measure of the capacity to do work. A closed system is one into which no energy enters from or escapes to the outside.

Energy takes many forms, e.g. mechanical (a battering-ram in action), chemical (petrol), heat (the heat of the sun).

Energy still exists undiminished after doing work, but is less available to do further work. Heat energy within a closed system at a uniform temperature is not available within that system at all. The system has suffered a "heat death."

This gives rise to the Second Law of Thermodynamics, which states that all changes in the form of the energy within a closed system must increase the entropy of that system. Entropy measures quantitatively the non-availability of energy to do further work. It measures the disorder of the system in the sense that when energy levels vary greatly, energy is more available to do work than when such levels draw together as work is done.

This paper extends thermodynamic concepts via the information theory of the communications engineer to the realm of biology, leading to a "Law of Biological Conservation" and some corollaries.

Order and Disorder

Thermodynamic entropy has to do with the availability of energy in a closed system for doing work, but we may apply the concept in other ways.

Consider a pack of playing cards. Begin by arranging the 52 cards in order of suits and values. Define this arrangement arbitrarily as the most orderly one. Shuffle the pack—this destroys the order, though plenty of traces of it remain. As shuffling continues the order of cards in the pack becomes more "random" in relation to the original order, i.e. the "entropy" of this system increases.

To find that the initial order suddenly recurred would surprise us, and we would prefer to believe that somebody who knew of our most orderly arrangement had intervened to rearrange the pack. This being so, we would expect some relationship to exist between the knowledge (or information) he possessed, and the order, or non-randomness, or decrease in entropy in this different sense, which he introduced.

The Measurement of Information Content

The concept of order in a transmitted message, such as a telephone conversation or a television transmission, becomes important to the communications engineer. He has the task to compress the maximum amount of information upon the frequency band width of the available communications channel by eliminating as much redundant (repeated in some way) material as possible.

Spoken or written English is highly redundant in this sense, i.e. any given sentence contains many more characters or sounds than it needs to convey its essential message. So the communications engineer prefers to "code" the message in such a way as to eliminate redundant material. He may reduce sounds or shorten words, but today various sophisticated electronic coding techniques are available to him as well.

The point of special interest is that the formula for the amount of information actually contained in a given message using symbols x where the probability of any symbol occurring in normal usage is P(x), is:

$$H(x) = -\sum_{x} P(x).\log_2 P(x)$$

which resembles closely the usual entropy formula of thermodynamics.

Since, with electrical circuitry or human physiology, we are faced continually with bi-stable elements (on or off), it is convenient to work in logarithms to base two. In this case the practical unit of information is the binary digit, or "bit."

Consider a closed vessel of gas. The gas quickly takes up an equilibrium in which its

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pressure and temperature are constant throughout. The entropy and disorder of the system are at a maximum, and this, by the Second Law of Thermodynamics, is irreversible.

Suppose, however, we stationed a "Maxwell demon" at a little door in the side of the vessel, with instructions to let molecules of gas of a certain velocity range through into another compartment. He would, by this sorting process, make them available to do work and decrease the thermodynamic entropy of the system of which he was himself a part. We will return to this system later.

Theoretical investigation of mono-molecular engines has shown that the relationship between information and thermodynamic entropy is: one binary digit is equivalent to approx. 2×10^{-16} erg/degree Cent. (This relationship occurs in mimeographed lecture notes issued to the writer during a course on information theory fourteen years ago).

Information has been called "comentropy" for the sake of the comparison, though it is opposite in sign from thermodynamic entropy. This means that if a message corrupts, its comentropy decreases. This equivalence gives the first lead to a "Law of Biological Conservation."

Chromosomes, the D.N.A. Molecule and Genes

Biological life begins with a division of a single cell into two identical cells, or with a fusion of male and female cells in such a way that each contributes exactly half the necessary number of chromosomes to the new individual. Cellular division under the control of the chromosomes follows, and the new individual forms.

The elements of a chromosome are its genes, and each human chromosome might possess some twenty thousand of them. The genes determine the genetic characteristics of the new individual by control, at the molecular level, of its development. The number of possible combinations of characteristics is so vast that the possibility of two identical individuals occurring is remote.

Each gene includes a very large and complex molecule called D.N.A., which has the characteristic that it divides along its entire length (like a zip fastener), at the same time picking up components from its environment in a way which duplicates exactly the original molecule, leaving virtually no scope for change, normally.

We have only begun to "crack" the genetic code. Nonetheless it is certain that a single cell which has a part in biological reproduction contains an enormous amount of information. This might be measured if we knew how to do it.

Since genes are transmitted to new generations in different combinations *but without change* from those of the parent, it follows that all genes which presently exist have always existed, unless something changed them while they were carried by the parent. This fact gives the second lead to a "Law of Biological Conservation."

Energy, Entropy and "Evolution" of Life

Every living cell contains the individual's D.N.A. "master tapes" and produces from them, R.N.A. "working tapes" which in turn "program" some 15,000 ribosome "factories" to manufacture, on a sort of "assembly line," the protein and amino-acid components of a growing creature. The slightest change in the D.N.A. "master tape" effectively destroys the component it specifies, just as a mistake in a computer program produces nonsense at the output stage.

Irradiation (e.g. by atomic particles or by X-rays) and a relatively tiny number of D.N.A. duplication mistakes destroy a few individual genes permanently. Such changes, called *mutations*, may be transmitted to subsequent generations. It is thought possible, for example, that each human individual carries one mutated gene not present in its parents, though it does not necessarily pass on this mutated gene to its offspring. Mutation reduces comentropy by corrupting the D.N.A. message, i.e. it decreases the information coded upon the chromosomes. It simplifies, but cannot improve the chromosome.

Some people feel that, given vast opportunity for mutations to occur, occasionally chromosomes *must* be improved, on the assumption that a legion of monkeys playing with typewriters for a very long time *must* type out all Shakespeare's sonnets correctly . . . but this is *not so.* In practice, such achievement would simply never happen.

Thus mutation is not a satisfactory mechanism with which to support a theory of the evolution of life from "simple" to "complex" forms. Any living creature is incredibly complex, and man is the most complex of all. To describe a man fully (i.e. to the extent that he might be precisely duplicated, if only by the description) would require an enormous amount of information in "bits" of any man-made code.

Nonetheless, since life began on our planet, more than a million species have populated it extensively, transforming less organized food into highly organized biological components. All this is *contrary to what we have come to expect from our extension of the Second Law of Thermodynamics* if we look upon it as a chance process, This contradiction is cited commonly to be opposed to the theory of evolution of life from disorder to order. Order cannot arise spontaneously from disorder.

Knowledge

The human race possesses extensive ability to obtain and store scientific knowledge, and to use that knowledge to modify the natural environment from a state of comparative disorder to a state of comparative order.

Yet man, for all his growing knowledge, cannot yet reverse the Second Law of Thermodynamics in its strictly thermodynamic form. He cannot use his knowledge to sort out the hotter molecules of a vessel of gas and put them to work. But the writer cannot prove that he will not be able to do it eventually.

Nonetheless man can, and does, increase the comentropy of his environment. This also, at first sight, is contrary to what we have come to expect from our extension of the Second Law.

A "Law of Biological Conservation"

Will the increasing numbers, ability, complexity and knowledge of our human race lead to the overthrow of the Second Law of Thermodynamics? The writer frames the following "Law of Biological Conservation" and its corollaries to rationalize the whole position.

The Law:

The total information implicit in all the bodies (excluding the total information coded upon the genes which they carry) of all creatures which are alive upon our planet at any given instant, cannot exceed the total information coded upon all the genes which they carry.

"Information" here means information in the sense used in this paper, measured quantitatively and expressed in units of comentropy.

"Bodies" includes brains, and the total information includes the measure of instinctive knowledge handed down biologically, but excludes knowledge gained from the environment subsequent to birth.

In practice, the total information implicit in the bodies excluding the genes, will be very much less than the total information coded upon the genes. It would take a very long time for the human race to produce all the individuals made possible by its total gene reserves.

Corollary No. 1:

The total information implicit in all the bodies (including the total information coded upon the genes which they carry) of all creatures which have lived since the original creation, live now, or ever will live upon our planet, cannot exceed the total information coded upon all the genes of all the creatures which came into being at the original creation.

The information loss is by destructive mutation, or by extinction of a gene through the death of its last carrier.

Corollary No. 2:

The total information implicit in all the knowledge added to all the brains of all living beings plus the total information implicit in all the order brought into being in their environments through the use of that knowledge, cannot exceed the total amount of information of all kinds which was required to specify the whole of the original creation.

This is a "Law of Conservation of Knowledge" comparable to and here linked with a "Law of Biological Conservation."

Creation Requires a Creator

Since vast amounts of information cannot arise out of nothing, rational laws in the scope of this paper require a starting point, which can be described objectively only for what it is—a creation. It follows uniquely that a Creator outside our closed system necessarily created it.

This is, of course, what the Bible tells us in any case: "In the beginning God created the heaven and the earth" (Genesis 1:1); "God created . . . every living creature that moveth" (Genesis 1:21); "God created man in his own image" (Genesis 1:27).

In addition, we would expect that the "Law of Biological Conservation" applies also to small sub-groups of the total biological creation. Wide variation may occur within sub-groups by selection from combinations of many, different available genes, but not from outside them.

Variation cannot increase the total information. Unlike mutation, variation is reversible by subsequent generations. The Bible says all this quite simply: "Let the earth bring forth the living creature after his kind" (Genesis 1:24).

The Creator may, of course, add knowledge to the system subsequent to creation. We call this special revelation, find it in the Bible, and notice that it is centered upon the Person of our Lord Jesus Christ. All knowledge is a re-thinking of the thoughts of our Creator, God.

Conclusion

The findings of this paper are exactly opposite to what a person who has studied only the theory of evolution of life would expect. Any such person who reads this paper should face and consider its implications.

If, as the writer has attempted to show, special creation is the only conceivable alternative to evolution and the "Law of Biological Conservation" herein expressed is true, had we not better look more closely at the practical implications of special creation?

COMETS AND A YOUNG SOLAR SYSTEM

HAROLD ARMSTRONG*

Comets cause great difficulty for any uniformitarian theory of the Solar System. This is especially true for those comets of fairly short periods, say no more than two hundred years or so. For at each encounter with the Sun the comet loses some of its material; some have broken up completely into a swarm of meteorites.

Now if the Solar System were as old as the uniformitarian theorists would have it, these comets would have encountered the Sun so many times that they should all have long since been destroyed. It has been suggested, to save the situation, that there is a sort of reservoir of comets somewhere out beyond the orbit of Pluto; but there is no evidence for any such thing, and some evidence against it.

Incidentally, is it not noteworthy that there are no comets, of any brilliance at all, with quite short periods, say ten years or so? Is the reason that, if there ever were any, they have been destroyed, even in a few thousand years?

This consideration might provide another argument against the "reservoir"; if comets were being brought in from storage, surely some of them would end up in orbits giving them a quite short period, and would survive long enough to have several encounters with the Sun. But nothing of the sort is observed.

There are also some comets with very long periods, as much as hundreds of thousands of years. Of course, these figures are calculated; from the viewpoint of man these comets have not yet completed one time around. The greater the period, the greater the orbit; thus such comets have orbits extending to vast distances from the Sun.

It will be recalled that the orbit of a body around the Sun is a conic section, an ellipse or an hyperbola. (Or the limiting case between these is a parabola.) The ellipse is a closed curve; a comet in an elliptical orbit would (in enough time), return to the vicinity of the Sun again and again. The hyperbola, on the other hand, is an unlimited open curve; a comet in a hyperbolic orbit would approach the Sun once, go around, and depart for ever.

Support for Vectorial Treatment

May I commend, at this point, the vectorial treatment of this problem of orbits, over what is usually presented in the books; especially to anyone who may want to teach it? There are several books,[1-3] none of which, I fear, is as well known as it deserves to be, in which this method is set forth.

While comets are influenced mainly by the Sun, their motion is "perturbed" to a certain extent by the attraction of the planets, especially of Jupiter, the most massive planet. To a first approximation, the comet, during its encounter with the planet which perturbs its motion, can be considered as if it were moving under the influence of the planet alone.

(Just as in considering the orbit of the Moon one can consider the effect only of the Earth, although the attraction of the Sun is easily calculated to be greater. The reason for this is that, to a good approximation, the attraction of the Sun is balanced by the centrifugal effect of the motion of the planet around the Sun approximately in a circle. Then the motion of the smaller body, the comet or the Moon, can be considered separately with respect to the larger, as if only the two were present.)

Again, then, the comet will move in a conic section, which will be an hyperbola, with respect to the planet, during its encounter with the planet. So the comet will approach the planet, at a certain velocity relative to the planet, approximately along one asymptote of the hyperbola just mentioned. It will leave the planet, at the same velocity with respect to the planet, along the other asymptote. Thus the direction of its motion is changed.

Moreover, while the speed with respect to the planet is left the same, the speed with respect to the Sun and the fixed stars, which seems to be what matters for mechanics as expressed in Newton's laws, is changed, in general. For this velocity is the resultant, in the usual manner of vectors, of the velocity of the planet, and that of the comet with respect to the planet. While these are the same in magnitude before and after, their directions will generally be different; they might, e.g., be at right angles before, in the same direction after. The result of the change in magnitude and direction of the velocity is to give the comet a different orbit.

Comets Should Die or Disappear

Now the way in which the comet encounters the planet is a chance thing. (I am using the word as a convenient one, with no intention of thereby denying that there is purpose in the universe. It is interesting to notice, in fact, that the problem here is something like the kinetic theory of gases; but the "gas" concerned is made up of planets and comets.) It is possible to make statistical calculations (again as in kinetic

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theory), and the calculations show that, more often than not, the effect is to speed up the comet, and likely to make it escape from the Solar System.[4]

Indeed, it would seem that no calculation is needed to show that this must happen in the long run. For an encounter either sends the comet out of the System or it does not. If it does, that is the end of the story. If not, the comet goes around again, and there will be another encounter with the planets. There can be but one ending.

It is just the same as the way in which children, splashing in a wading pool, are sure eventually to empty it. For water which is splashed out is lost. That which is splashed, but lands back in the pool, is splashed again and again; until it is thrown out.

The conclusion to be drawn from all this is plain. If the Solar System were as old as it is claimed to be, how could any long-period comets be left? They would all have been thrown out of the System long ago. Again, there is no evidence for any reservoir. In fact, the very presence of comets, whatever be their periods, is thus good evidence for a young Solar System.

References

[1]Brand. L. 1930. Vectorial mechanics. Wiley, New York. pp: 401-404.
[2]Gibbs. W. J., and E. B. Wilson. 1901 and 1929. Vector analysis. Yale University Press. pp. 135-136. (I believe that this book has been reprinted, with a paper back, by Dover.)
[3]Milne, E. A. 1948. Vectorial mechanics. Methuen, London. pp. 235-240.
[4]Brady, J. L. 1970. Influence of the planetary system on 143 long-period comets, *The Astronomical Journal*, 75 (9):1052-1065.

NOTE AND QUOTES ON LINGUISTICS AND THE GIFT OF SPEECH

GEORGE F. HOWE*

In conversation some months ago with Mr. Robert Escudero (linguistics expert of La Canada, California) I learned that linguists hold two quite different positions about the origin and nature of human language — *empiricist* and *rationalist*. Empiricists believe that language is largely a learned or acquired response. They assert that the human has no special capacity for language as such but only a general ability to learn.

Rationalists, on the other hand, suggest that man has an inborn capability for language which makes him qualitatively different than the other creatures. Rationalists maintain that language is the outworking of what they call an "innate specification." The evidence favors the rationalist view.

Mr. Escudero further demonstrated that the language concepts of the rationalists fit closely with the creationist's understanding of man formed separate from the animals and biblically, "In the image of God." To demonstrate this, he forwarded a valuable quotation from the literature. Harcourt, Brace, and World, Inc., has permitted re-publication of the following excerpt. It is presented here without further comment as strong linguistic evidence favoring the special creation of man apart from any animal ancestry.

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EXCERPT FROM

Language and Its Structure, by Ronald W. Langacker, © 1967, 1968, by Harcourt, Brace & World, Inc., New York, pp. 237-239, reprinted with the publisher's permission.

The Evidence for Innate Specification

The evidence for the rationalist claim is very strong. Consider first the uniformity of language acquisition throughout the human race. We have seen that every human child learns a language unless he is the victim of extreme mental deficiency or isolation from language use.

There are all sorts of physical and intellectual skills that children can fail to master despite a considerable amount of instruction, but talking is not among them. This is precisely what one would expect on the basis of the assumption that language is innately specified almost fully, with linguistic experience serving mainly to activate the genetically specified system.

While the species uniformity of language acquisition fits in perfectly with the rationalist position, it conflicts with what we would expect on the basis of the empiricist viewpoint. If the acquisition of language depended mainly on the training the child receives, we would expect differences in training to correlate directly with differences in language acquisition (if general intelligence is held constant.)

In fact, however, this expectation turns out to be false. A child learns to talk regardless of whether or not his parents constantly pursue him, correct him, and put him through linguistic drills. Some parents do this, others do not, and some children don't even have parents—but they all learn to talk.

Despite wide variations in the amount of speech they are exposed to, all children acquire a full-blown linguistic system. There are no cases on record of children who have only learned half a language, who have failed to master any syntactic rules, who lack underlying phonological representations, or who have not picked up any complex lexical items. The vicissitudes of early linguistic experience are not matched by any comparable variations in linguistic structure.

A second argument in favor of the rationalist position is provided by the fact that only human beings learn to talk. The most likely nonhuman candidates, of course, would be the higher apes—chimpanzees, for example. They are anatomically similar to humans and are also reasonably intelligent; they can learn to use tools and to solve simple problems. The difference in intelligence between apes and human beings is thus not absolute, but only a matter of degree.

When we consider language, however, we find an absolute distinction. The progress that apes can make toward mastering a human language is not proportional to their intelligence—in fact, they can make no progress whatsoever. Experiment has shown that a chimpanzee, even when raised exactly like a child, acquires nothing that bears even the faintest resemblance to the linguistic systems that human children learn so easily.

Language is therefore peculiar to our species. Moreover, it is not directly tied to intelligence. These observations are perfectly compatible with the view that language develops in the human child because of a special, inborn linguistic capacity. Apes cannot learn to talk because they do not possess this innate structure.

This simple and natural explanation is not available if one adheres to the empiricist position. If language is a function of general intelligence and not of any special linguistic capacity, then other animals should, given proper training, succeed in acquiring language to a degree proportional to their intelligence. Experiment has shown that this is not the case.

There is absolutely no evidence to indicate that anything even remotely resembling the complex system of rules and abstract underlying representations of a human language can arise in other species.

The relative perfection of language acquisition is a third argument for innate specification. If language reflected general intelligence and not a special linguistic capacity, we would expect differences in intelligence to correlate directly with differences in language acquisition (if training is held constant). We would expect bright children to do better than stupid ones in mastering a linguistic system. We would also expect some children to fail miserably at acquiring language, just as many children fail to learn geography or the procedure for extracting square roots. We would expect some children to wind up with linguistic systems so deficient or so distorted as to be unrecognizable.

These expectations are not borne out, however. Bright children, average children, and stupid children all learn to talk. They are all successful at mastering a linguistic system that is virtually identical to that of their models, one which is neither distorted nor deficient.

Regardless of general intelligence, a child succeeds in mastering a complex system of rules and underlying representations that specifies an infinite set of sentences. Children may vary on minor points such as volubility or size of vocabulary, but they do not vary with respect to the significant structural features of linguistic organization. If the role of learning is minimal, serving only to activate the innate system and to fill in some details at the structural fringes, it is impossible for radical structural errors to arise.

The abstractness and structural complexity of languages is a fourth strong argument in favor of the rationalist view. We know a great deal about language, but despite centuries of serious investigation, we would be at a complete loss to describe exhaustively the structure of any language, even the most intensively studied.

But this is essentially what the child does. He masters the entire set of lexical items and structural principles that constitutes a linguistic system. He does this on the basis of indirect and fragmentary evidence, and at an age when he is not yet capable of logical, analytical thought. This remarkable phenomenon can be explained in terms of the rationalist view, but hardly in terms of the empiricist position.

ANOTHER EXCERPT FROM

Who Taught Adam to Speak? Doorway Paper No. 1 by Arthur C. Custance. Circa 1958. Box 291, Brockville, Ontario, Canada, pp. 12-15, reprinted with author-publisher's permission.

The question still remains for us, as we consider this extraordinary and long overlooked or minimized trait of human nature, Where and how did it all begin? . . . Reverting back to the very first pair, whom we may most reasonably refer to as Adam and Eve for purposes of identification, who or what first induced them to talk to one another?

Names stand for processes, and knowing the name seems to deceive us into thinking we understand the process. Those committed to the evolutionary origin of man must fall back upon the use of a magic word for the appearance of the special kind of brain man has which makes speech possible for him. They tell us it was a "mutation" of some sort! And there we have the whole "explanation."

But even if a name were an explanation, they still have not told us who spoke first to start the process off, nor are we told what kind of a conversation would be most probable . . . though we might have guessed by now that the one who began the process must be one who was other than Adam and Eve, and prior to them . . . and must already have been a speaking person. And we might have guessed too that the first words would have to be a list of the names of things.

In the first chapter of Genesis we are constantly told that "God said . . .", and not merely that God did.[31] Moreover in the creation of man a peculiar change takes place in the narrative, for having noted the recurrent phrase, "Let the sea bring forth," or "Let the earth bring forth," as though directions were given to that which is inanimate to obey the word thus spoken, when the creation of Man is in view, we are immediately presented with a conversation in heaven.[32]

That God was not speaking to the Heavenly Host of Angels when He said, "Let us make man," is clear from the fact that MAN was to be made in HIS image, and after His likeness. This surely means that man was made in the likeness of God, and not in the likeness of the angels.

When God therefore said, "Let us make man in our image . . .", He was not addressing Himself to the angels at all. This conversation was therefore originated and carried on within the Godhead. He Who first spake *to* Adam was God, Who had already been conversing about him.

What follows in the story is of real importance.

Any thoughtful reader must surely be struck by the frequency with which the idea of "naming" things occurs in this early record. In some books one finds the glossary of terms at the end. Although they are needed at the beginning, it is discouraging to find oneself faced with such a list before some interest has been aroused in the subject matter. But in this instance, and for reasons which are obvious in the light of what we now know of the faculty of speech which man was given, the meaning of the first words and the names of the ordinary phenomena about which God wished to inform Adam, were given to him in some detail.

Thus a name is given to the heavens, and to the earth, making more specific the general reference to them in Genesis 1:1. It is as though God had said,

> Now I wish to tell you about these phenomena; and henceforth therefore we will refer to the sky as heaven, and to the soil upon which you stand as earth, to the light as day and the darkness as night, to the waters as sea, the atmosphere as the firmament, and we will name the rivers, and the sun and moon, and even the stars.

Then two trees are singled out and given compound names, the tree of Life and the tree of the knowledge of good and evil.

Then Adam received his own name. But there is a break in the narrative at this point. Having established a frame of reference, Adam was now invited to speak for himself.[33] Most of us like to name our own pets. Part of the commission given to Adam was that he should govern the animals, and it was natural therefore that he should be invited to name them for himself. None of them *had* any name up till then, and thus with artless simplicity the record says that whatever Adam called any creature, that was henceforth its name.

Now we are not told how he named them. We do not know whether he was guided by their colour, size, shape, or the cries they made. But what followed this naming ceremony seems to imply that there was a more significant reason for giving him the task. There are some who believe that Adam was merely one of many such representatives of manlike creatures, perhaps a special *Homo sapiens* singled out by the Creator who had then given him the benefit of a unique spirit. But the record seems to go out of its way in a remarkable manner to make it clear that Adam was the only man alive at that time.

In Genesis 2:5, we are told that "there was not a man to till the ground." In Genesis 2:18, we are told that God had remarked, "It was not good that man should be alone." In Genesis 2:20, we are told that "there was not found a companion for him." And finally in Genesis 3:20, it is stated that Eve became the mother of *all* living.

It seems clear from the wording of Genesis 2:18-23, that God wanted Adam to discover for himself that he could never find among the lower forms of life a suitable companion in his loneliness. It seems manifest too, that if Adam had been a slouching half-ape creature, God might well have brought to him other creatures little different from himself of the primate stock, which might have sufficed for his half-intelligent mind as an appropriate mate. However, with proper insight, Adam gave to each animal brought to him, a name by which he signified in some way his reaction and his evaluation of its relative position with respect to himself.

That this is so, seems clear when one reads what followed this naming process for, removed into a state of unconsciousness, perhaps tired by the exercise of judgment in such a critical matter, he is "divided" and from himself is taken a true help-meet. Awakening from this sleep, and quite probably still supposing that the process of naming must continue, he is presented with this creature in whom he instantly recognizes a true help-meet, and a very part of himself.

The whole story is so simply written and so profound in its insight into the nature of speech and the forms which it first takes in childhood, and the true significance of the use of names for things, that it is almost as though God had cast the records in such a form deliberately that it might shed its own light on one of the profoundest of all mysteries. At any rate it is the only light we have. There is no other from any other source.

Susanne Langer makes a significant admission therefore when she writes,

> Language though normally learned in infancy without compulsion or formal training, is none the less a product of sheer learning, an art handed down from generation to generation, and where there is no teacher there is no learning. . . .
>
> This throws us back upon an old and mystifying problem. If we find no prototype of speech in the highest animals, and man will not say even the first word by instinct, then how did all his tribes acquire their various languages? Who began the art which now we have to learn? And why is it not restricted to the cultured races, but possessed by every primitive family from darkest Africa to the loneliness of the polar ice? Even the simplest of practical arts, such as clothing, cooking, or pottery, is found wanting on one human group or another, or at least found to be very rudimentary. Language is neither absent nor archaic in any of them.
>
> The problem is so baffling that it is no longer considered respectable.[34]

Revelation is all that remains to us, and that revelation has been set forth in clear simple terms. God spoke to Adam first. And in due time Adam learned to speak with God. This is the unique relationship which man has with God, the capacity for conscious fellowship and communication, and all that these imply.

For this fellowship he was created, and without it he is like a feral child, an orphan and terribly alone. To communicate with others is necessary for the generation of a soul in the personal sense of the term. To communicate with God is necessary for that soul to be truly alive, and this kind of communication involves a fellowship based upon a true reconciliation between God and man.

References

[31]Genesis 1, verses 3, 5, 6, 8, 9, 10, 14, 20, 22, and 24.
[32]Genesis 1:26.
[33]Genesis 2:19.
[34]Susanne Langer. 1952. Philosophy in a new key. Mentor Books, New York. pp. 87, 88.

NEW PUBLICATION

Scientific Studies in Special Creation. 1971. Edited by Walter E. Lammerts. Baker Book House, Grand Rapids, Mich. 49506. 343 pp. $6.95.

This volume deals with basic questions in the area of special creation. It is a companion volume to the previously published book, *Why Not Creation?,* also edited by Walter E. Lammerts (Baker Book House, 1970).

Those who are convinced of the fact of special creation rather than evolutionary origin will discover strong support for their position in the chapters of these books. Those whose convictions are wavering will *discover* here comforting reassurance.

Authors for the 31 chapters were carefully selected upon the basis of their knowledge and competence on such topics as: premises of evolutionary thought, problems in absolute age determination and radiological dating, science versus scientism in historical geology, world population and Bible chronology, evolution and the problem of man, remarkable adaptations, history and potential of DNA, spontaneous generation of life, and social Darwinism.

COMMENTS ON SCIENTIFIC NEWS AND VIEWS

HAROLD ARMSTRONG*

Binocular Vision in Frogs

Apparently tadpoles have no binocular vision, the fields of vision of the two eyes not overlapping.[1] During metamorphosis, the eyes rotate upwards to give the adults some overlap. The transition seems to be determined genetically.

This is a very fine example of teleology. The tadpoles, apparently, have no need of binocular vision, and it would seem that many fish likewise have no overlap. But the adults need it; they live at least partly by catching insects and need some sense of depth. So they are given it.

But how could such a state of affairs have evolved? A creature either has or has not binocular vision. How could such an ability ever be introduced gradually, by tiny random changes? Like so many other abilities, binocular vision would have to be about perfect to be of any use at all; so it simply could not have been introduced gradually by "survival of the fittest."

Springs and Knees—Design

A problem in many mechanisms is to design a linkage such that the force of a spring (which follows Hooke's law: the force being proportional to the extension or compression) causes at the other end of the linkage a force which varies with position in some specified way.

It appears[2] that the same problem has been encountered in the design of the human knee joint. Here, instead of a spring, is the muscle. The "force at the other end of the linkage" is commonly one's weight, with modifications according to a variety of situations.

Now the knee joint is so designed, mainly by the shapes of parts that slide over each other, that the tension in the muscle is proportional to the "force at the other end" over quite a wide range of situations. Such an arrangement seems to be advantageous, in making it easy to adjust to a wide variety of situations.

Is it necessary to ask how such a design could possibly have evolved? Surely here is a very good engineering design, and, as usual, the design shows something of the skill of the Designer.

Identity of Eel—A Slippery Problem

A remark in *Nature* reminds us that there are still unsolved problems in the mere identification of creatures.[3] This concerns the giant *Leptocephalus*, a larva of an eel, which was once called a distinct kind of fish. It is not yet possible, we are told, to suggest which species develops from the giant leptocephalus, "if, indeed, the adult form is yet known to science."

Suppose, now, that we were dealing with fossils of these creatures. How much more chance for confusion there would be! And what about creatures which undergo metamorphoses, or in which the males and females are widely different? If there were such creatures in the past (and it is likely that there were), is it not also very likely that their fossils are being entirely misinterpreted?

For that matter, how certain can we be about the cases which seem more straightforward? How certain can we be, for instance, that the dinosaurs were really reptiles? (I am not denying that they were. My position here is as if someone had asked: "Is the Emperor really wearing anything?")

From the skeleton only, can we be all that certain, say, of the distinction between a kangaroo and a small dinosaur? If we go by teeth, should one who maintains that everything else has changed not admit that long ago kangaroo-like animals might have had the kind of teeth which we now associate with reptiles?

Is it possible that this whole subject of the interpretation of fossils is discussed repeatedly in a circular argument of the kind which is noted very frequently in presentations of uniformitarian and evolutionary dogma?

Stability in Variation

More and more, "molecular biology," which was supposed to provide a basis to explain the processes of evolution, is really making more trouble for that dogma. The author of a recent article, in fact, admits that ". . . the results of some applications of biochemical techniques to population genetics apparently contradict certain basic tenets of evolutionary theory. . . ."[4]

The findings, which are said to be "difficult to interpret," seem to show that there is more genetic variability than the stability of kinds would indicate. This, put into other words, would seem to say that "genetic variability" does not necessarily mean all-over change in the creature concerned.

Fossilization versus Flotation

A remark about hippopotamus fossils, in an article mainly on another topic[5], may help to make a point that creationists have been urging for a long time. The author comments on the ". . . well preserved state of the hippos . . . one skeleton was almost intact." He continued:

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> Observations on modern dead hippo have shown that the gases produced by bacterial. action after death cause the carcass to float. Subsequent rotting, attack by fish and current action result in individual bones being dispersed over a wide area. Only rapid burial . . . would explain the preservation of more or less complete skeletons.

Which is just what creationists have been saying: that fossils by their very existence testify to catastrophe, not to uniform conditions.

Another point seems apropos here. Bodies, which float eventually, would not likely leave fossils, as is remarked. And many of the bodies of the animals killed by the Flood might have been afloat afterward. Is it possible that some kind of sorting occurred?

It is possible, for instance, that bodies of mammals are more likely to float than those of reptiles, and those of large mammals more so than those of small animals? Such sorting, if it occurred, might do much to explain the distribution of fossils.

Those which floated would be scarce, and gathered in a few places such that those that still remained afloat were washed up onto shores as the water began to recede. Those that sank, on the other hand, would be common and widely distributed. Research directed at this question would be profitable.

Fossil Pine Pollen—Why Not Needles?

Last June, I was working in my garden, and happened to be digging under a small pine tree nearby. Then I thought of pine forests through which I have walked, and the thick carpet of needles which lies on the ground under the trees.

This set me wondering: there are certainly fossils of pine and other coniferous trees. Indeed, there is more and more evidence that they extend lower in the "geological column" than many people would have expected; pollen of such trees is reported to have been found in rocks which are considered to be very ancient.

But have the thick carpets of needles ever been found fossilized? As far as I can determine, the answer is: "No." For that matter, I can not recall that I have ever heard of fossilized layers of leaf mould. Why are these things not found? Is it because most of the fossils were formed under catastrophic conditions? During a flood, for instance, a layer of leaves or needles would be completely dispersed.

The question of "autochthonous" versus "allochthonous," *i.e.,* whether a fossil originated where it is found, has been debated especially concerning coal, but it could be asked about any fossils. The considerations just mentioned, about needles and leaves, suggest that at least some fossils of trees are allochthonous. More light might be thrown on this by noticing the positions in which fossil trees are found. Any found upside-down, e.g., are surely allochothonous.

Anyway, allochthonous fossils have certainly been moved, and what better agent could there be for moving them than a great Flood?

Ocean Sediments Bear Testimony

Some recent drilling and dredging at the bottom of the ocean has brought to light interesting results.[6,7] In connection with the JOIDES Deep Sea Drilling Project, it has been found that the discontinuity between the Cretaceous and Tertiary exists in deep ocean basins as well as on land, and it appears that ". . . a transitional sequence will probably never be found. . . ." In other words, there was a catastrophe.

In an attempt to fit this in with uniformitarianism, a mechanism is suggested which has to do with phytoplankton and the deposition of chalk in the ocean, and the removal of carbon dioxide from the air. Thus, it is proposed, that the greenhouse effect of the air was partly eliminated, the world became cooler, the difference of temperature between equator and poles became greater, and such changes happened.

Investigation of sediments from the bottom of the Atlantic, in a region from 19° N to 23° N and 34° W to 57° W is stated to show that ". . . changes over the past 200,000 years . . . have had no significant effect on the clay mineralogy of Atlantic sediments. . . ." The time was apparently estimated by assuming rates of sedimentation. We know the tendency to inflate such estimates of age. The results are stated to be a: ". . . surprise with no apparent explanation . . . ," and it is suggested that some of the clay, at least, might be from local sources, not from the continents.

Flood geologists can explain all this. For there was a catastrophe, which left a discontinuity, if (as more and more evidence seems to suggest), we identify the end of the Cretaceous with the Flood. (Incidentally, I agree with the suggestion that has been made, that Creationists should avoid using the uniformitarian names of periods, etc., as much as possible. But here it seems necessary to use the opposition's language in order to disagree.)

The sediments, likewise, might have been produced at one time (in fact, it is the appearance of just such a thing that is the difficulty, from the uniformitarian viewpoint), during or at the end of the Flood. Here, as in other cases, the attempt to work in vast ages only causes needless difficulties.

Life Elsewhere?

A recent publication of the Astronomical Society of the Pacific may be of some interest.[8] It tells how Lowell, about 1895, having convinced himself that there must be living beings on Mars, even intelligent ones, established an observatory at Flagstaff, Arizona, and began looking for evidence to support his opinions.

It is said that his writings and speeches on the subject were very popular. Scientific men, though, objected for the most part that he had already made up his mind what the facts were, and that that was no spirit in which to conduct a scientific investigation.

Is it not strange that now the shoe is on the other foot? Men of science, many of them anyway, seem to have decided, quite apart from the evidence, that there must be life elsewhere than on Earth, and they are devoting much effort to looking for it, or even some hints of it. Whereas the evidence that is available now indicates, much more strongly than what was known in Lowell's time, that there are no living beings outside the earth.

The "man in the street," on the other hand, having given up the "men from Mars," does not care at all about the lichens or such rudimentary kinds of life which seem to be all that anyone hopes to find on other planets.

Uniqueness of Life Unexplained

The official scientific view seems to be that there is nothing unique about living things, that they are just mechanical, chemical, and electrical systems of considerable complexity. Nevertheless, such a proposition is rarely expressed; for that very reason it is not so easy to attack the notions; but it is there in the background.

It is easy to think of objections to such a thesis; it is not always so easy to get a hearing for them. In passing, it may be noted that it is really not an argument for this mechanistic view to say, as is sometimes done, that it is the complexity of the organization that makes the difference in living things. For the complexity is precisely one of the things that needs to be explained; any appeal to it as an explanation is clearly circular.

In two articles, considering this and related matters, authors have about admitted that the simple mechanistic view is inadequate. One author suggests that ". . . the laws of physics, adaptable for inanimate matter, will have to be modified when dealing with more general situations in which life and consciousness play significant roles."[9]

If this is admitted, it follows that all the attempts to devise, in terms of physics and chemistry, some way in which life originated spontaneously, are likely futile. For as soon as the life start to form, the laws, assumed in the discussion, would be inadequate.

The other author suggests that there is something like consciousness, and other vital properties, associated to some extent with atoms, electrons, and other things commonly thought of as inorganic.[10] The peculiarities of wave mechanics and quantum theory, it is suggested, are manifestations of these (quasi?) vital characteristics. It is noted, moreover, that the "quantum" features are most prominent in those elements that are most important in living beings, and that this makes those elements suitable.

Notions of this sort, it is true, have been proposed before. They may help to give creationists a weapon against the old mechanistic viewpoint, which is really a relic of the last century, but which is still encountered occasionally. On the other hand, such notions might lead to pantheism, which likewise must be attacked.

One weakness of the appeal to individual "consciousness" in individual atoms, for instance, is that it does nothing about the ordering together of the whole world. On the other hand, the ordering is what would be expected from one First Cause—God. If one holds that not only did God create the world, but that He also sustains and conserves it (and I take it that most Christians would hold that doctrine), there seems to be much less need to ascribe individual consciousness to all the building blocks.

For historical reasons, creationists have been concerned especially with God's Creation of the world. A fruitful field of study might be found in His conservation of the world, and one that could have a great effect on all of the sciences.

In that connection, consider our Lord's stilling of the storm. Why did He speak to the wind and the waves? Was there something in, or having to do with, them that could hear and obey? If He did it just to impress His disciples, as has been suggested, was He being candid with them? Here is a field of inquiry which could yield most interesting results.

Time and Probability

One of the stock arguments of evolutionists is that given long enough time anything, no matter how unlikely, will happen. However, there is really a fallacy in the argument, because the meaning of "unlikely" is changed in the middle.

If the word means "happening once in a million years," well, then, it would happen in a million years. But that is not what is meant at the beginning of the argument; to do so would be to beg the question. At first, in fact, it means something like "such that one does not expect it to happen at all"; then in the course of the argument the meaning is quietly shifted.

As Chesterton pointed out in *The Everlasting Man*, as I recall, the usual evolutionary argument amounts to saying that a thing such that it is incredible that it should happen quickly is quite believable if only it happens slowly enough. But "quickly" and "slowly" are relative to us. So really such an appeal to long times amounts to saying that it would be easy to believe that a reptile could change into a bird, if only our bodily and mental processes were much slower.

The statement that anything happens, given enough time, is sometimes encountered in statistical mechanics. (Indeed, it might be worthwhile to consider sometime whether, from a Christian viewpoint, statistical mechanics needs some revision, so as not to say, or seem to say, that everything comes about by chance.)

Anyway, Dingle, the noted philosopher of science, has recently discussed this matter.[11] He wrote, in part

> . . . the view that all . . . (happenings) . . . have a definite probability . . . of being realized . . . cannot be disproved. Nevertheless, I doubt whether, in his heart of hearts, anyone believes it. It implies that . . . if we continue for an indefinite time to put kettles of water on the fire, it is certain that the water in one of them will freeze. . . . My own conviction is that it would never occur, and while of course I cannot prove this, I should look with some curiosity at anyone who assured me that he was convinced that it would. Eddington . . . admitted . . . that if he should ever experience such an event he would think it more probable that the scheme which required it was wrong than that it had proved itself right.

. . . "The scheme which required it was wrong." Is this not just what creationists have been saying? The evolutionary scheme requires dead chemicals to arrange themselves into living cells. Then, reptiles' eggs must hatch into birds. And so on. But the scheme which requires such things is wrong.

Psychology and Christian Faith

Creationists are now concerned especially with biology and geology, because it is in connection with those studies that attacks on Scriptural Christianity arise. It has not always been thus.

In the thirteenth century the menace was from metaphysics, in the form of the Averroist doctrine while St. Thomas Aquinas and others defended the orthodox position. In the eighteenth century, the attack came from mathematics (or, rather, mathematical physics). Then Berkeley upheld the Christian position. It is worthwhile to notice these facts, because we may at any time have to meet some attack on new grounds.

These thoughts were started by an article having to do with certain aspects of psychiatry.[12] The author was not concerned about Christian doctrine (except in so far as certain notions of liberty, due process of law, etc., have Christian roots); but it was concerned with the way in which psychiatry could be used, and, the author maintained, is used, to manipulate people.

T. S. Szasz, a professor of psychiatry at the State University of New York, maintained, "Psychiatrists are inquisitors." His concern is that people may be, and likely have been certified insane, not because there is all that much wrong with them, but really for the convenience of relatives, or of the state.

The trouble, Prof. Szasz maintained, is that the concept of mental illness is fundamentally faulty. It is not analogous to physical illness at all. Szasz has written a book, *The Manufacture of Madness*, on these matters.

There is another matter related to this, not contained in the article, but about which many people have been concerned. We all know that, whenever anyone has committed a particularly nefarious crime, it is likely to be claimed that he was insane. Many have suspected that those who make such pronouncements really do not wish criminals to be punished for their crimes, and take the opportunity to help them to avoid punishment.

In any event, these and other considerations make it clear that psychiatry, and along with it psychology, could be helped much by a real Scriptural Christian influence. Creation Research Society members propose to work at Christianizing all the sciences. Would now be the time to try to start something of the sort in psychology?

Perhaps it has not much to do with Creation; but, then, members are creationists because we are Christians, not vice versa. So it would seem legitimate and useful for those who can to try to restore a Christian viewpoint to psychology. Moreover, it would be for the good of the science.

Christians, we are told, are to be the salt of the Earth. Just so, Christians, working as Christians in the various sciences, can, and, I suggest, should, be the salt of those sciences. And there are few who are concerned at all with the sciences who would deny that they could use a little salt.

Incidentally, since there was occasion above to mention matters of law, would it not be in order to suggest that a real Scriptural Christian view of law is needed? This was considered in the Middle Ages, of course; and there has been scattered work since; but it would seem that there is yet much to be done.

Psychic Investigation

A certain amount of "psychic investigation" has been carried out in the name of science for the past 100 years or more; the results seem to have been inconclusive. It is said that there is now great interest in such matters in Russia, apparently with some official approval.

Investigations are mentioned into telepathy, telekinesis, healing by the laying on of hands, etc.[13] Whether the laying on of hands has anything to do with, or resembles, the laying on of hands by the Apostles, and by other Christians since, is not stated.

Some statements are very strange. There is talk of an "aura," apparently something like a halo, around people; and someone was looking for ways of making the aura visible, or photographing it. Connected with the aura, somehow, was supposedly ". . . another body, a quasi-physical duplicate. . . ."

It may be that something of the same kind is happening on this continent. We know that astrology is now very popular, that there are actually groups practicing witchcraft, and perhaps other occult manifestations. Wherever such things happen, is the reason not the same? If people turn away from God, it will not be long before they will turn to the devil.

Ancient Writing

The "critics" of 100 years or a little more ago seem to have doubted that there was writing in Moses time of about 1400 B.C. Of course we know better now; but it is odd that the critics' conclusions seem to be held still in many places, even though the evidence used has been negated.

The more we investigate, the farther back we seem to find some kind of writing. It is reported that in the Balkans pottery, earthenware discs, etc., have been found, with marks which are believed to be some kind of writing.[14] These remains are dated about 4,000 B.C.

The dating seems to have been by carbon 14, perhaps by using some materials found along with the earthenware. We know that such dates tend to be too old. Nevertheless, there seems to be no doubt that these relics are very old.

This is of interest to creationists because the older writing is, the more likely our accounts of first things are likely to have come down through written records. To say this is not to deny inspiration, but merely to notice that in giving us a history, as in other things, God often works through ordinary means as much as possible. So it is not surprising to find that there may well have been written records almost from the beginning.

Ancient Travel

Prof. A. von Wuthenau, of the University of the Americas, Mexico City, has concluded, on the basis of evidence including a Maya Stele, that there were Mediterranean people in Mexico as long ago as 700 A.D.[15] Among the markings which were found was a Star of David.

There seems to be more and more evidence that the trip by Columbus to the New World was not the first; and likely the Norse were not first either. While all this, of course, has no direct bearing on Creation, it does show that our remote ancestors were likely much better informed than might have been supposed at one time. So we should be very careful before we dismiss any accounts that have come down from them; and these accounts, of course, can include the one about Creation.

Stonehenge and Babel

Readers may have noticed some new interest in the last few years in the megalithic structures in Europe, such as Stonehenge. Books have been written on the matter, and a recent review[16] is worthy of some comment.

It is suggested that the stone structures, either alone or in conjunction with distant landmarks, were lunar observatories, and gave enough precision to allow the study of some of the fine points of the Moon's motion. The design of these structures seems to show that the builders had a considerable knowledge of geometry; and that a standard unit of length, the "megalithic yard" (about 2.72 feet), was used in widely different places. (This seems not much different from two cubits. It is possible that the builders liked even numbers?)

A suggestion comes to mind. Is it possible that the megalithic structures are really built in imitation of the Tower of Babel, by people who were dispersed over Europe after the events at Babel? The tower was not necessarily something high; the Hebrew word really means "a greatening" or something like that.

The Hebrew says literally something like "and the top of it the heavens." That is, not necessarily "reach unto the heavens," but something to do with the heavens. Use as an observatory might meet such a definition. The people, dispersed from Babel into Europe, tried to build copies of the tower, as they remembered it, but used stone, which they found ready to hand.

Nevertheless, there are two possible conclusions. First, megalithic structures are more proof that ancient men were not ignorant; so we should study their records which have come down to us with attention. In the second place, the thought that these megalithic monuments may have to do with events that happened not so long after the Flood shows that, just as Flood geology is a subject upon which work must be done, so is post-Flood archaeology.

Physics Freaks

It has been remarked often recently that many people are feeling some disillusionment with science. One letter, last May, expressed such a feeling rather vividly.[17] The author spoke of "physics freaks," arguing that people can become addicted to physics, just as much as to drugs; and that teachers do wrong to encourage such a state of affairs.

What should we creationists say about such accusations? Must we not admit that there is some truth in them? But we can say more. We can say:

> Of course physics, or another science; if it is unregenerate, can go bad, and very likely will. But the fault is not in the science, it is in the physicists. Just as a living tissue, if it dies—if it is cut off from life, so to speak—will go bad, so will any activity of living beings, if it is cut off from Him Who is the way, the truth, and the life. The cure is not in giving up science completely; by the same argument we should have to give up every other activity. Rather, the thing to do is to bring it, along with the other activities of our lives, under God's control.

Incidentally, is the analogy of the drugs not to the point in another way? In research, in schooling, in how many other things, do we find the means becoming ends? Addiction, presumably, is sometimes what happens when means become ends; and we can see the same confusion, causing its ill effects in many of the aspects of life.

Condensation of Nebulae

For a long time attempts have been made to use nebulae in evolutionary cosmogonies. At first some men asserted that nebulae condensed into systems of suns and planets. The others claimed that some of what had been taken for nebulae were, in fact, clusters of stars. In other cases, the nebulae appeared to be the remains of former stars, destroyed, maybe, by explosions into novae, rather than the material from which stars were to come.

Besides, the mechanics of the hypothetical condensations always seemed difficult; and the introduction of a separate stage, initial condensation into planetesimals, did not really remove the difficulty.

A recent author has considered something about the process of such a hypothetical condensation.[18] He was interested especially in the effects of radiation pressure. (Which, it should be noted, involves the assumption that there is already something radiating.)

The idea is that two particles, e.g., would partly shield each other from radiation on the sides facing each other. The uneven radiation pressure would then cause them to approach each other.

The author concluded, however, that, in the nebulae, ". . . ionized regions are stable against . . . condensation . . . conditions in the neutral parts of young planetary nebulae are probably unfavorable to . . . condensation. . . ." There will, of course, be gravitation between the parts, but ". . . it is doubtful if gravitational instability could be responsible for the small-scale structure of planetary nebulae."

Ratios, Not Necessarily Ages

Many attempts have been made to determine the ages of rocks by calculating the relative amounts of various radioactive elements, which decay one into another in a series. Variations on this method work with the ratios of the isotopes of some element.

It is apparent that there are many uncertainties. The methods have been criticised frequently in this Quarterly, and it has been shown that there are many reasons why false results might be obtained by these methods.

Some direct investigation into the ratios of isotopes has shown that, indeed, the ratios of the isotopes may vary, and may be rather different from what would have been expected.[19] The cause suggested here is something having to do with fractional crystallization.

Specifically, whenever rock, or anything else, hardens from the molten state (or, more generally, solidifies from the liquid state), the composition of the solid is not necessarily (one might say "not usually"), the same as that of the liquid. There is preferential solidification.

If salt water freezes, e.g., (at a lower temperature, granted), the salt mostly remains in the water. It is said that men adrift in small boats have been saved by melting ice into fresh water.

In semiconductor electronics, the method by which germanium or silicon can be brought to a fantastic purity by solidifying from the melt (the impurities remaining behind in the molten material) is well known.

Is this not a curious conclusion? The very process which can remove salt from water is one reason why the ages alleged to have been determined by the amounts of isotopes or of radioactive elements must be taken with a grain of salt.

Problems in Paleomagnetism

During experiments on material brought back from the Moon, it has been found that the coercivity (difficulty of demagnetizing) of various materials is affected by bombardment with neutrons. As is pointed out, this brings up the possibility that . . . what the paleomagnetist

might interpret as a magnetization produced by cooling in a field of given strength could have a completely different origin."[20,21]

This could be of interest, because the magnetization of old materials has been used to draw conclusions in such fields as archaeology and geology. Now there would seem to be the possibility that such methods may be subject to error, just as variations have been noted in radioactive decay rates.

Lunar "Ages" Vary

One of the purposes of samples taken recently from the Moon was to try to find out something about age of the Moon. In point of fact, however, results have been contradictory, both from sample to sample and when compared with other evidence. A recent author reports, "Uranium-lead and thorium-lead ages for Apollo 11 and Apollo 12 lunar samples do not match and, furthermore, the dust samples seem to be older than the rocks."

It is suggested that the emanation of radon may have changed the distribution of radioactivity in the materials, and thus produced contradictions.[22]

In any event, this would seem to be more evidence to show that many sources of error can affect the determination of ages by those methods that depend on radioactive decay. So the large ages that are quoted do not rule out the possibility of a young universe; there is reason to believe that the determinations may be subject to very large systematic errors.

Present May Not Be Key to Past

Pronouncements of cosmologists, or cosmogonists, that the universe started so many billions of years ago, are commonly heard. Many who hear them do not realize what a "molehill" of fact has been made into a "mountain" of speculation.

Indeed, it could be argued that these speculations are not science at all. For science has to do with what happens always or for the most part. Now surely nobody would say, "always or for the most part when a universe begins . . .;" for the universe is a unique thing, by definition one of a kind.

No, these ideas are either history or fiction, according as whether or not they are true. Indeed, scientific techniques may be used; but, then, dating by radioactive carbon is used in history, and gravity is involved in "Jack and Jill"; but that does not turn either the history or the Mother Goose into science.

Recently a well-known authority has pointed out the shaky ground on which cosmological speculations rest. He asks whether, ". . . we are justified in the belief that presently accepted laws of nature remain valid on the cosmological scale . . ."; and suggests that ". . . there are grounds for doubting that belief."[23] In other words, the present *may not be* the key to the past. And if so, clearly most speculation is futile.

Note that if it be granted that the laws of Nature have changed, there seems to be no necessity to suppose, as is usually done, that the changes have been slow, over vast periods of time. A sudden, quick change would seem just as possible. Creationists have suggested that such changes may in fact have occurred, at the time of the fall of man.

Second Thoughts on Red Shifts

The huge distances that are quoted in astronomy texts have, many of them, been deduced from studies of red shifts. It is commonly believed that the universe is expanding, that distant stars, etc., are moving away from the Earth at speed proportional to their distances. Thus, by the Doppler effect, their light is changed in frequency, appearing somewhat redder than it otherwise would.

Of course, while the light can be observed easily, it is not so easy to tell the distance. Thus, it is common to calculate distance by means of the red shift. The danger of falling into a circular argument here is obvious.

Recent observations of quasar 3C 279, by radio interferometery over a very long base line, have caused some doubts whether the red shift necessarily indicates distance.[24] (The quasars emit radio waves. The experiment is essentially that in which light, coming through two slits, shows interference fringes. In such studies the slits are several thousand miles apart, and the experiment runs backwards, so to speak.)

The quasar seems to contain two sources, moving apart. If it is as far away as the red shift would make it, the sources must be moving at about ten times the speed of light. That seems unlikely; maybe the red shift is not related to the distance as has been supposed.

It is true that creationists need not worry about having the universe very large indeed. God, Who created it, could create it as large as He wished. But He also created us with "level heads." Therefore, one should remind others occasionally how much speculation, in some of these fields, has been built on very little evidence.

Another Puzzle about Venus

The planet Venus seems never to stop giving surprises. For a long time it was supposed to keep the same side toward the Sun; only recently was it found to be otherwise. Then it was often imagined to be a wet planet; now it appears that there is hardly any water there, and that

temperatures are above the boiling point of water.

Now another surprise has been found. It appears that the atmosphere of Venus, at the higher altitudes, circulates around the planet, moving at maybe 250 miles per hour at the equator, and thus going once around in about four (Earth) days.[25] This is much faster than the rotation of the planet as a whole.

There is some evidence that something of the same kind happens on the Earth, maybe not so spectacularly; and it is speculated that it may happen also on other planets.[26]

Conclusions drawn from this are not yet very clear. However, one might ask whether it is reasonable to think that the present state of affairs on Venus, where the atmosphere is so much "out of step" with the planet, could have continued for the ages which evolutionary theorists discuss. Also, while it is not yet certain how this motion of the air is maintained, anything that can be found out about the method may throw some light on questions about how a canopy of vapour, which many believe existed formerly about the Earth, might have been maintained.

Planetesimal Shortcomings

The present fashion, in many places, is to say that the planets and other bodies were formed from "planetesimals," little pieces of material which stuck together somehow. Indeed, it has been argued that particles would not have adhered, on the average, until the bodies which were supposed to be in the course of formation were already quite large.

Aside from that, we know something about the rate at which meteorites collide with the Earth; we can make some guesses about the rate at which, in the past, they have collided with the Moon. From this information we should be able to deduce something about the formation of the Earth and the Moon, if, indeed, they were so formed as some theorists propose.

What is, in fact, deduced is that ". . . the extrapolation of the observed rate of fall of bodies on the Moon backward in time does not give sufficient material to build the Moon. It falls short by several orders of magnitude. . . ."[27]

Of course, the conclusion is not let stand thus. It is always possible to "doctor up" the assumptions to get more or less what is wanted. But, of course, to do so is to abandon the uniformitarian viewpoint; it is to deny that "the present is the key to the past."

Here, as elsewhere, is Creation not really much more reasonable? Of the huge swarms of planetesimals, which must be supposed, we know nothing. And from nothing comes nothing. But of an all-powerful God we do know something, through His providence.

And from His providence it would be reasonable to deduce His work of creation, even if we did not have His testimony about it. Moreover, anyone who will follow the way set forth may know something of His providence. So on the side of Creation there is some evidence, on the side of evolution none at all. Why should anyone hesitate as to where to put his belief?

Cosmogonic Speculation

Privately, no one doubts that in cosmogony, speculation has "run riot." An author has now said much the same thing publicly.[28] He remarks,

> . . . the difference between solar model calculations, based on the best current parameters, and observation has been . . . increasing . . . at least one part of the theory of stellar interiors is probably wrong . . . the solution . . . may affect other applications . . . such as the dating of old globular and galactic clusters. . . .

He goes on to say that facts can be lost sight of in the mazes of speculation: ". . . we ask . . . whether or not they believe particular hypotheses. We frequently settle important scientific issues by acclamation rather than observation."

These things are mentioned here, and particularly the point about old clusters, to show that the uniformitarian view is not without difficulties. In fact, the creationist view, and the concept of a young universe, really does not present any more difficulties; and, since it is supported by revelation, it is surely what creationists should believe.

More on Continental Drift

Most geophysicists have taken up the notion of continental drift. Yet there is opposition, and it has been summed up rather well: ". . . evidence against drift . . . in five main sections . . . drift is found to be inadequate by itself to account for geophysical data, and may well be mechanically impossible."[29]

Speculation, it is maintained, has exceeded the evidence, especially speculations as to which coast lines once fitted together: "Lyustikh . . . plots a series of random coastlines next to each other, all of which look as if they fit together, but none of which have a drift basis. . . ."

Again, ". . . Axelrod . . . shows that an unbiased examination of fossil floras suggests stable as opposed to drifting continents. . . ."

Other surprises mentioned include the ". . . discovery, by dredging of [presumably, fossil] trilobites in the northleast Atlantic. . . ."

It is concluded that ". . . evidence is being

misinterpreted." With that, I think, we could all agree.

Creationists have, I suppose, no objection to the concept of continental drift in itself. Indeed, whatever happened in Peleg's time could, perhaps, have been something like continental drift. But creationists will not wish to allow the enormous times which are ordinarily assigned for a continent to drift anywhere. On the other hand, creationists can hold that much of what might be assigned to the drifting really comes from the enormous readjustments in the Earth's crust at the end of the Flood.

Educational Impracticalities of BSCS

Education has always been a matter of great interest to creationists, because they are commanded to "train up a child in the way he should go";[30] and the way he should go certainly includes belief in, and respect for the word of Him in Whom "we live. and move. and have our being."[31]

Thus creationists must oppose anything that goes counter to Cod's word, for it is in childhood and youth that the foundations of belief and of character are being laid, and "If the foundations be destroyed, what can the righteous do?"[32] It is especially in connection with the teaching of the dogma of evolution that this arises and that is why the subject of biology is the central one which creationists seek to "reform."

There is another point to all this. Scripture teaches plainly that the responsibility of training up children is primarily that of parents. Others, such as teachers, may be called in to help, but their authority derives from that of parents. Thus it has been said that a teacher stands *"in loco parentis."*

Some years ago, Chesterton had occasion to complain somewhere about teachers who were not functioning *in loco parentis* but rather *contra parentes.* How much more is that the situation if teachers use their position to expound doctrines which are an abomination to the parents!

This is all the more abominable in that teachers are, in fact, being paid by the parents for what they do. These points have been made by creationists before and in view of them it is apparent why so much work has been done in the reformation of curricula.

We find repeatedly that if something is contrary to Scripture it is also objectionable in other ways. It is becoming apparent that such is the case with some of the courses of study which are permeated with evolution. There have been numerous complaints about the BSCS courses in biology on grounds having nothing in particular to do with evolution. A recent writer said:

> These programs . . . do not seem planned to reach the average student. . . . Even the brightest students are not mature enough to appreciate a course like BSCS . . . it is murder to too many youngsters. It seems to me that the students' success in the national BSCS programs is decreasing annually.[33]

It is suggested by some that it would be more reasonable to have physics first, then chemistry, then biology. Such a sequence has been tried at the Rome Free Academy, Rome, N.Y., with fairly encouraging results.

Many creationists have objected to such programs as the BSCS on the same grounds. Being permeated with evolution, they are to that extent false. But they are also unsuitable for other reasons. As for placing physics first in the curriculum, if biology is to be considered as a special part of chemistry, and chemistry a special part of physics, such an arrangement is logical. But is it right, or helpful, to consider things in this way?

A good case can be made for saying that biology transcends chemistry, or that it should. It is precisely the transcendant portion, having to do with whole living creatures, which are of the most interest to beginning students.

Likewise, the physics of atomic structure surely presupposes the evidence provided by chemistry. It may be common to start from the other end, i.e. from atomic structure nowadays; but surely that is to put the cart before the horse, and to reduce instruction to imparting everything on grounds of *ipse dixit.*

It is perhaps of interest that, in the same issue of *The Physics Teacher,* somewhat similar comments were made about the teaching of mathematics in high school.[34] It was asserted that too much time is spent in matters of interest only to the purely professional mathematician; i.e., on sets, on proofs of things that are obvious to ordinary mortals, etc. Indeed, in Ontario at least (and I suspect that matters are much the same in other provinces, and in much of the U.S.), anyone who has children in elementary or high school must wonder what in the world is being attempted these days under "mathematics."

Someone once said that war is too important to be left to generals. Is it not also clear that instruction in mathematics in one sense is too important to be left to mathematicians, physics too important to be left to physicists, and biology too important to be left to biologists?

Is this not an area in which creationists can contribute significantly? Creationists know that, in comparison with eternal matters, supposedly important professions do not matter much, so there is not so much temptation to try to indoctrinate students in them. On the other hand, all professions do contribute to the working of our society, so creationists shall try to impart as much as is helpful. Not only in biology, but in studies generally, creationists should be the salt of the earth, in an academic sense.

References

[1]Binocular connexions, *Nature,* 230(5292):281-282. 1971.

[2]Roberts, T. D. M. 1971. Standing with a bent knee, *Nature,* 230(5295):499-501.

[3]Giant *Leptocephalus*, *Nature*, 230(5292):278. 1971.

[4]O'Brien, S. J. and R. J. MacIntyre. 1971. Transient linkage disequilibrium in *Drosophia, Nature,* 230(5292): 335-336.

[5]Carney, J., A. Hill, J. A. Muller, and A. Walker. 1971. Late Australopithecine from Baringo District, Kenya, *Nature.* 230(5295):509-514.

[6]Worsley, T. R. 1971. Terminal Cretaceous event, *Nature,* 230(5292):318-320.

[7]Why uniform sediments?, *Nature,* 230(5292):278. 1971.

[8]Hetherington, N. S. 1971. Lowell's theory of life on Mars. Astronomical Society of the Pacific, Leaflet No. 501, March,

[9]Wigner, E. P. 1970. Physics and the explanation of life, *Foundations of Physics,* 1(1):35-45.

[10]Cochran, A. A. 1971. Relationships between quantum physics and biology, *Foundations of Physics,* 1(3): 235-250.

[11]Dingle, H. 1970. Causality and statistics in modern physics, *British Journal for the Philosophy of Science,* 21(3):223-248.

[12]Cohen, D. 1971. Heretic among psychiatrists, *The New Scientist.* 50(754):583-585.

[13]Do we possess another body?, *The Kingston Whig-Standard,* Kingston, Ontario, Canada, 14 May 1971, p. 30.

[14]The first script, *Nature,* 230(5296):552. 1971.

[15]*The Kingston Whig-Standard,* Kingston, Ontario, Canada, 5 May 1971, p. 33.

[16]Review of *Megalithilic Lunar Observatories* by A. Thom. *Nature,* 230(5292):299-300. 1971.

[17]Davidson, J. 1971. Physics freaks, *Physics Today,* 24(5):11. May.

[18]Capriotti, E. 1971. The formation of condensations in planetary nebulae, I, *The Astrophysical Journal,* 166(3):563-572.

[19]Garlick, G. D., I. D. MacGregor, and D. E. Vogel. 1971. Oxygen isotope ratios in eclogites from kimberlites, *Science,* 172(3987):1025-1027.

[20]Radiation confuses the history of lunar magnetism,

[21]Butler, R. F. and A. V. Cox. 1971. A mechanism for producing magnetic remanence in meteorites and lunar samples by cosmic ray exposure, *Science,* 172(3986): 939-941.

[22]Adams, J. A. S., P. M. Barretto, R. B. Clark and J. S. Duval. 1971. Radon-22 emanation and the high apparent lead isotope ages in lunar dust, *Nature,* 231 (5299):174-175.

[23]Bergmann, P. G. 1970. Cosmology as a science, *Foundations of Physics,* 1(1):17-22.

[24]Stubbs, P. 1971. Red shift without reason, *The New Scientist,* 50(749):254.

[25]Gold, T. and S. Soter. 1971. Atmospheric tides and the 4-day circulation on Venus, *Icarus,* 14(1):16-20.

[26]Revolutionary activity in the upper atmosphere, *Nature,* 231(5398):79-80. 1971.

[27]Baldwin, R. B. 1971. On the history of lunar impact cratering: the absolute time scale and the origin of the planetesimals, *Icarus,* 14(1):36-52.

[28]Bahcall, J. M. 1971. Some unsolved problems in astrophysics. *The Astronomical Journal,* 76(4):283-289.

[29]Wesson, P. S. 1970. The position against continental shift, *Quarterly Journal of the Royal Astronomical Society,* 11(4):312-340.

[30]Proverbs 22:6.

[31]Acts 17:28.

[32]Psalm 11:3.

[33]Palomki, J. 1971. The illogic of teaching bio before chem and physics, *The Physics Teacher,* 9(1):39-40.

[34]Anderson, R. 1971. A request, *Ibid.*

NEW PUBLICATION

Symposium on Creation III. 1971. Edited by Donald W. Patten. Baker Book House, Grand Rapids, Mich. 49506. Paperback, 150 pp. $2.95.

This book is the third contribution in a series designed for anyone searching for truth at a time when many scientists are questioning the theory of evolution, and are once again looking to the doctrine of creation for an explanation. A fourth volume is expected in this series.

Authors who have contributed to this volume have afforded readers a firm foundation for belief in creation. Each has contributed specifics from their broad knowledge that can be used by readers wishing to turn from the "air castle" of evolutionary theory. Chapters and contributors are as follows:

"Theories about Life and Its Origin" by W. Hewitt Tier, "Stratigraphic Evidences for the Flood" by Stuart Nevins, "The Alleged Evolution of the Horse" and "The Alleged Evolution of Birds *(Archaeopteyx)"* by Frank W. Cousins, "The Scopes Trial" by Bolton Davidheiser, "Fossil Man" by R. Daniel Shaw, and "The Cell" by David Tilney.

BOOK REVIEWS

Nomogenesis or Evolution Determined by Law by Leo S. Berg. (Translated from the Russian by J. N. Rostovtsov; Foreword by Theodosius Dobzhansky; Introduction by D'Arcy Wentworth Thompson.) 1969. The M.I.T. Press, Cambridge, Massachusetts 02142. 477 pp., paperback, $3.95.

Reviewed by Wayne Frair.*

This book is significant for its polyphyletic thrust, its anti-chance and anti-natural selection stance, and its emphasis upon development guided by law (nomogenesis). The same laws for development of the individual organism (ontogeny) are presented as. effective in phylogeny. The author humbly confesses that his ideas may not be new; but on the other hand, in 1971 neither is the book.

The original Russian edition was produced in 1922 and the English translation published in England, 1926. The recent paperback edition was copyrighted in 1969 by the Massachusetts Institute of Technology.

The author, Leo S. Berg, was born in 1876 in southwestern Russia and died December 24, 1950, in Leningrad. He possessed a doctor's degree both in geography and in zoology, his specialty being the systematics of fishes. Dr. Theodosius Dobzhansky, who wrote the foreword for the recent paperback edition, knew Dr. Berg personally and writes of him as follows:

> Berg was one of the outstanding intellects among Russian scientists. The breadth of his interests and the depth as well as the amplitude of his scholarship were remarkable. He had the reputation of being a "walking library," because of the amount of information he could produce from his memory. (p. xi)

Berg deals with a multitude of facts from the realm of science, and he says that he has made an effort to avoid trespassing into the realm of the metaphysical. He places a great deal of importance on convergence and three of his ten chapters deal with this topic.

Other topics considered in the book are: the struggle for existence, natural selection, phylogenetic acceleration, evolution determined by law, the geographical landscape, mimicry, polyphyletic origin of similar forms and the formation of new species. There is a compact conclusion of the work at the end followed by a very extensive bibliography. Berg expresses his position as follows:

> The evolutionary process should be imagined in the following manner. A considerable quantity, possibly tens of thousands, of primitive organisms have developed on parallel lines, convergently experiencing approximately the same transformations and effecting that process at various rates, some more rapidly, others more slowly. Thus, mammals consist of several branches, every one of which has independently passed through the (assumed) worm-, fish-, amphibian-, reptile-

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TABLE 1

Darwinism	Nomogenesis
1. All organisms have developed from one or a few primary forms, *i.e.* in a mono- or oligophyletic manner.	1. Organisms have developed from tens of thousands of primary forms, *i.e.* polyphyletically.
2. Subsequent evolution was divergent,	2. Subsequent evolution was chiefly convergent (partly divergent),
3. based on chance variations,	3. based upon laws,
4. to which single and solitary individuals are subject,	4. affecting a vast number of individuals throughout an extensive territory,
5. by means of slow; scarcely perceptible, continuous variations.	5. by leaps, paroxysms, mutations.
6. Hereditary variations are numerous, and they develop in all directions.	6. Hereditary variations are restricted in number, and they develop in determined direction.
7. The struggle for existence and natural selection are progressive agencies.	7. The struggle for existence and natural selection are not progressive agencies, but being, on the contrary, conservative, maintain the standard.
8. Species arising through divergence are connected by transitions.	8. Species arising through mutations are sharply distinguished one from another.
9. Evolution implies the formation of new characters.	9. Evolution is in a great measure an unfolding of preexisting rudiments.
10. The extinction of organisms is due to external causes, the struggle for existence and the survival of the fittest.	10. The extinction of organisms is due to inner (autonomic) and external (choronomic) causes. (pp. 406-407)

like stages. The organic world thus develops polyphyletically.

It may be seen from the foregoing that evolution proceeds in accordance with laws, that it is based upon *nomogenesis.* (p. 404)

Berg contrasts the Darwinian view of evolution with that of nomogenesis in the schematic abstract provided in Table 1.

The organic world is shown to have developed in accord with certain laws rather than chance. Various forms of life merely unfold their built-in characteristics. Where what is called phylogenetic acceleration is observed, there exist in "lowly" organisms characteristics displayed only by the much "higher." For instance, on the Bennettitales, an extinct gymnosperm, are found floral structures corresponding to the androecium and gynoecium (perianth) of angiosperms. Further, he points out that there were no transitions between organisms—the gaps of Darwin are reconfirmed. He talks about new forms originating "epidemically." He indicates that saltation is not a new view; for Geoffrey St. Hilaire and Cuvier entertained it.

Because of its polyphyletic presentation the book may be thought of as belonging in the tradition of *The New Evolution: Zoogenesis,* by Austin H. Clark, in 1930; *Synthetische Artbildung,* by Heribert Nilsson, in 1958; and *Implications of Evolution,* by Kerkut, in 1960. Even though *Nomogenesis* preceded them all, it does not appear to have been referred to in these three publications. Although allusions to *Nomogenesis* have not been abundant, they are not scarce. I have encountered them in review treatises, for example, in discussions of orthogenesis.

Many of the facts in the book have been augmented by modern discoveries, but generally Berg's 1920 reasoning probably will be accepted now by those having similar presuppositions. The book certainly is deserving of the attention of those concerned about the topic of evolution and it is especially pertinent for scientists endeavoring to construct dendrograms of living organisms based on a creation concept of limited relationships.

* * *

The Creation of Life, by A. E. Wilder Smith. 1970. Harold Shaw Publishers, Wheaton, Ill. Hard cover, 269 pages, $5.95.

Reviewed by Bolton Davidheiser.*

Dr. Smith has his degree and experience in the field of organic chemistry and thus writes with authority in this area. He does a valuable service in showing that the world of living things could not have come about without being planned by an intelligent Being external to living things. Through the use of modern computers and a consideration of the nature of the relevant chemical reactions, neo-Darwinism is shown to be utterly inadequate.

Amino acids are rather readily synthesized under conditions presumed to represent the earth's early environment. Evolutionists assume that similar processes continued and resulted in the production of genetic codes and living organisms, but Dr. Smith shows that this could not happen. By analogy, molecules can organize themselves into crystals, but crystals cannot organize themselves into building blocks and then further organize themselves into houses.

With the development of high-speed "super computers" it has become possible for the first time to submit for analysis evolutionary problems simulating circumstances which supposedly would have prevailed at some time in the earth's history. The result is that the computer jams! The conclusion is that the probability of evolutionary progress under such circumstances is less than one chance in 10^{1000}.

The author says,

The difficulties incurred in denying intelligence as the basis of code-order realization are certainly greater than those of assuming intelligence as the author. One is always finally reduced to assuming that randomness gave spontaneous birth to order (the Darwinian position), which amounts to a denial of the laws of thermodynamics and indeed of all laws—for randomness is not subject to laws. But to get around and to avoid the necessity of assuming exogenous intelligence (or Deity), scientists have been willing to commit even this type of scientific hara-kiri, for to deny law is to kill all science. (p. 228)

On the following page he says that if we assume an intelligence behind the codes and order of the universe we are more or less inevitably forced to recognize this intelligence as transmaterial or transcendent. We think it is unfortunate that he then says, "This position has the great advantage of destroying that ancient bugbear of the past which has hindered so many intellectuals in dealing with the Christian position—an anthropomorphic deity, an 'old man in the sky'."

The weak portion of the book is the part which discusses "artificial consciousness." This leads from science into philosophy. Even the great Professor Jeans is quoted as saying that the universe can be pictured as consisting of pure thought.

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As in Dr. Smith's previous work, we cannot understand why he takes so seriously the writing of Teilhard de Chardin. In the next to last paragraph of the book Smith says, "May it not be, as Teilhard de Chardin thought it was, that the whole purpose of material life culminates in intelligence up to point Omega?" To Teilhard, Omega is comparable to God and all things are culminating there—rocks, nails, animals, and men, good, bad, and indifferent.

We believe the value of this book is that it gathers and presents what amounts essentially to a scientific proof that evolution is impossible and that intelligence was necessary in the creation of the world. This is important not only in answering the evolutionist but also those creationists who insist that there has to be a "scientific" explanation of creation.

* * *

The Creation of Life: A Cybernetic Approach to Evolution by A. E. Wilder Smith. 1970. Harold Shaw Publishers, Wheaton, Illinois. 269 pp.

Reviewed by John C. Whitcomb, Jr.,*

For those who are still convinced that evolutionary materialism is a truly *scientific* approach to reality, this book will prove to be a shattering intellectual experience. Dr. A. E. Wilder Smith, widely known for his brilliant lectures and two previous books *(Man's Origin, Man's Destiny* and *The Drug Users),* successfully demonstrates the total fallacy of Neo-Darwinian concepts of the origin of life and also the "biochemical predestination" theories of Chardin and Whitehead (p. 132).

Leading mathematicians, such as Eden, Weisskopf, and Schützenberger, now admit that random changes in material particles selected by nature could never have brought about the incredible complexities of living cells, and therefore *new,* natural laws must be discovered (pp. 30, 37-40, 220-223). But Dr. Smith points out that we do not need new laws so much as a recognition of long-recognized basic principles, namely, that *complexity in nature* presupposes *Intelligence behind nature!*

So, the old argument from design to a Designer (classically presented by William Paley) has been fully vindicated once again, through experiments with super-computers and "intelligent" robots (pp. 229-38). No longer, says Smith, do we need to think of God as an "old man in the sky," for now, "for the first time in history, intelligence has been experimentally separated from biology," and the idea that God would have to possess biological nervous tissue and oxyhemoglobin in order to *think* has been "finally and completely overcome by quite recent advances in cybernetic science" (pp. 31, 161, 229). Thus, "there is no longer any need for the Christian or the believer in God to hide, intellectually speaking, in the catacombs" (p. 19).

But why don't evolutionists see the clear implication of these experiments? Because human "thought-mills" have been hopelessly damaged by "stones" (indigestible thought objects, like maintaining that codes and order arose spontaneously out of randomness) since the days of Darwin (p. 234). And what is the solution to this problem? "First, we must recognize the designer-design relationship; and second, we must honor and serve the designer" (p. 235).

It is at this point that we must face a basic limitation of, the book. Evolutionism is effectively crushed by natural theology; but the sinful heart of man must be convicted and illumined by the Holy Spirit through the Gospel to be saved from the dream-worlds of Neo-Darwinism and "biochemical predestinationism."

Smith does not clearly present God's solution (except in a symbolic way, p. 248). He really offers no explanation for the obvious fact that even *before* Darwin destroyed Paley's arguments from design, people rejected God! Smith can only say:

> The rub is that, although this relationship (design demands a Designer) had been known since the dawn of man, *many had not taken the time to work out the further consequences* — that we *ought* to spend our lives honoring and serving the designer to the best of our ability (p. 235)!

This is exactly why the Book of Romans does not end with man's depravity (3:20), but moves *onward* to God's gracious provision in Christ (3:21-8:30)!

Dr. Wilder Smith tacitly admits the limitations of his efforts when he states, "it is the purpose of this series of books to supply intellectual weapons for those who feel they need them and who wish to fight for their faith and intellectual honesty" (p. 20). Thus, the reader is brought, as by a schoolmaster, up to Christ (cf. Gal. 3:24); but must look for someone else to bring him *into* Christ.

To the extent that such a "schoolmaster ministry" is needed in our rebellious and dying world, this book will provide some very painful discipline for the high priests of modern scientism who constantly drink "diluted intellectual soup" (p. 85), indulge in "pious bunk" (pp. 37, 94), exhibit "incredible showmanship" (p. 97), "mumble" pseudo-scientific absurdities (p. 141), commit "scientific hari-kiri" (p. 228), and feed "their

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biological students on intellectual, philosophical and scientific rubbish" (p. 237). But it will take more than a revival of the cosmological argument to transform such men!

Only the pure Gospel of Christ can do the work (Rom. 1:16, Eph. 2:1-11, Heb. 4:12). Through personal acquaintance with Dr. Smith, the reviewer is confident that he would heartily agree with these observations.

Certain parts of the books are difficult reading for one not trained in chemistry; but interspersed throughout are masterful illustrations for which Dr. Smith has received rightful acclaim. One good illustration, they say, is worth the price of a book. If so, consider these: (1) entropy holes and entropy mountains (pp. 56-57); (2) recopied manuscripts and stray dots in the Morse code (pp. 69, 246); (3) growing blotters (p. 34); (4) soap bubbles and statues (pp. 98-99); (5) human languages and the Second Law (pp. 111, 207); (6) mice and maze-running (p. 127), (7) stones and thought mills (p. 234). In the reviewer's opinion, the most spectacular illustration points up the impossibility of a chance build-up of large, coded macromolecules that are essential to life.

> Amino acids and other biomonomers, the smaller polypeptides together with the simpler proteins, are relatively easy to conceive of from the energetic point of view, just as are waves in a moderately choppy sea. But larger, sequenced, coded macromolecules are just as different a synthetic proposition as tall, thin, spiral columns of sea water (with a piece of seaweed of a specified kind at intervals of fifteen inches, projecting exactly three inches from the column and representing a code used in navigation by mariners!), would be, compared to ordinary surf waves (pp. 106-107).

Such illustrations and arguments should go a long way, under God, to dispel the smog of theistic evolution from the thinking of evangelical Christians. Wilder Smith certainly hits the nail on the head when he states: "Theologians and (other) Christians should be wary of modifying their faith to fit in with views of biology and abiogenesis which are overripe for changes" (p. 245). May our great God be pleased to use this volume toward that end in our generation!

* * *

The Second Genesis: The Coming Control of Life by Albert Rosenfeld. 1969. Prentice Hall. 314 pages, $6.95.

Reviewed by John W. Robbins.*

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Albert Rosenfeld, Science Editor of *Life* magazine, has written a thoroughly frightening book. Both a history and a prognostication, it weaves together that which has already been done with what one can expect to be done in the life-sciences in the future into a grisly tapestry. Whether he intended to do so or not, Rosenfeld has made George Orwell's *1984* look more like a child's fairy tale of a blissful fantasyland by comparison.

Which is more frightening: a society in which there is a continuous need to rewrite history because the beings still think, or one in which independent thought is impossible? Which is more depraved, mind control through torture or mind control through electrochemical stimulation, in which the controlled is unaware of the control? Which is more portentous, the brainwashing of POWs or the feat performed in a Japanese medical college of restoring a cat's brain to near normal electrical activity after seven months in the deep freeze? For more examples the reader is referred to Rosenfeld's book.

Over 20 years ago C. S. Lewis wrote a little book, *The Abolition of Man,* a title Rosenfeld might have appended to his own. In the last chapter of that book Lewis points out the two-pronged nature of scientific knowledge: that it may be used for good or evil; that "From [one] point of view, what we call Man's power over Nature turns out to be a power exercised by some men over other men with Nature as its instrument." Anticipating progress in the life-sciences, Lewis wrote:

> The final stage is come when Man by eugenics, by prenatal conditioning, and by an education and propaganda based on a perfect applied psychology, has obtained full control over himself. *Human* nature will be the last part of Nature to surrender to man. The battle will then be won. . . . But who, precisely, will have won it? For the power of Man to make himself what he pleases means, as we have seen, the power of some men to make other men what *they* please.

We are now entering Lewis' "final stage." The battle is being won, and *they* are winning it.

But the trouble is, we cannot stop, even if it were desirable, the research in the life-sciences, as Professor Burgers of the University of Maryland has proposed. No agency on earth possesses the power to halt the growth of this knowledge; one of the most evil agencies on earth is spurring the research on, viz., the Soviet government. We may even follow suit, and make the "creation of life in the laboratory a national goal, comparable to sending astronauts to the moon,"

as Dr. Charles C. Price of the University of Pennsylvania has advocated. (p. 9)

Whatever the path our nation follows, some of "our" scientists have already decided upon the general path they will follow. Dr. Harlow Shapley anticipates with almost audible lip-smacking "a growth of social wisdom and glorious survival—toward the evolution of a kind of superman." (As quoted on p. 153) Dr. F. H. C. Crick of Cambridge is concerned with more immediate matters and proposes a solution to the "population problem": add a chemical to food supplies to eliminate procreation, and then dispense a second chemical to counteract the first to those who are licensed to bear children. He concludes by saying, ". . . if we can get across to people the idea that their children are not entirely their own business and that it is not a private matter, it would be an enormous step forward." (As quoted on p. 172)

In the midst of these gnostic sentiments, there is recognizable scientific nonsense, *e.g.,* the grinding up of trained planarians to feed untrained, which then, allegedly, either "know" the trick they just swallowed or may learn it more rapidly. Every cannibal who ever ate an enemy knows that this is so. Yet even this bit of nonsense is unsettling: when savages and scientists agree on something, one may be quite sure that it is not the savages who have progressed.

One hopes that there are other bits of nonsense in this book, e.g., the disembodying of human brains and the connecting of them to a computer in a geistly alliance; or, The Ettinger Way—freezing the body just before or after death (?) so that it may be resurrected when the "trump" of the Gnostic shall sound, and in a hideous parody of the Resurrection, the dead in liquid nitrogen shall rise first.

In the Afterword, Rosenfeld has included some indications of his own thought on the future, and these are no less disturbing than the scientists quoted earlier. On page 301 he writes:

> . . . one major obstacle to a more sanguine outlook is our stubborn reiteration of defeatist clichés: there have always been wars, you can't change human nature, etc., etc. If we believe that the human nature which can't be changed is a nature already fundamentally flawed, then our hopes are doubly crippled.

Ergo, we cannot believe it because it conflicts with our gnostic hopes and dreams. "I believe it a false image . . .", concludes Rosenfeld. The true image, of course, is that painted by the second oldest religion which parades under a variety of names, the one which Rosenfeld mentions; that is, Evolutionary Humanism, whose prophets are Pere Teilhard de Chardin and Dr. Julian Huxley. Rosenfeld then affirms his faith:

> We are in a very real sense the products of our total cultural environment. We know from experience and from experiment that people and their surroundings are both alterable, and that altering one can alter the other. We *can* change human nature. (p. 302)

This change of human nature is, of course, the emergence of "a kind of superman," of which Dr. Shapley has already spoken. But, "Man cannot transform himself into a superman; the attempt to create a superman is an attempt to murder man . . . the murder of God is not followed by the superman, but by the murder of man: the deicide of the gnostic theoreticians is followed by the homicide of the revolutionary practitioners." (See E. Voegelin, *Science, Politics and Gnosticism,* p. 64)

The gnosis needed to radically immanentize the eschaton, to perform not only mass homicide, but also mass menticide, is at hand. The question is not *if,* as Rosenfeld notes, but *when* we will finally know all we need. The question is not *if* the gnostic immanentization is to be thorough-going and world-wide, but *when,* unless, like Faust, we are rescued from Hell by the intervention of Heaven.

* * *

Long Day of Joshua by C. A. L. Totten. 1941. Destiny Publishers, Haverhill, Mass. 225 pp. Paperback. $1.95.

Reviewed by V. L. Westberg.*

In this book C. A. L. Totten computed the year, month, day and even the hour of Joshua's long day, including the sequel event of the 40 minute longer day of Hezekiah, and the Creation year.

This tremendous mathematical work was completed and published in 1890, years before the computer was even a dream. Totten's fantastic calculations were based on counting lunations and moon eclipses. His figures show 3333 years elapsed between Joshua's Long Day and his book in 1890, and 2555 years between Creation and the 23 1/3 hour slow-down.

If we add 80 years to up-date from 1890 to 1970 we obtain a Creation date of 5971. This figure of 3293 years from Creation to Hezekiah's 2/3 hour slow-down indicates 738 years separating these two events which completed the full 24 hour slow-down. Considerable calculations by this reviewer were required to even sort out these essential dates.

Mr. Totten's Foreword points up the most remarkable timing in these events. As he writes,

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"Such precision in timing is inconceivable to the mind of man." We find in Joshua Chap. 10:11 how the "Lord cast down great stones from Heaven killing more of the enemy than did the swords of the Israelites." These stones or asteroids were started on their lethal mission perhaps 2555 years earlier at Creation, timed to strike the earth at the exact day, and hour to kill *only the enemy* as they were being chased by the Israelites.

While we were recently amazed in the return of our astronauts within 5 miles of target after one week shoot-off, it is hardly comparable to hitting a moving target by stones sent out 2555 years earlier. The vertical distance time-wise between Gibeon and Valley of Ajalon is only 16 minutes (Josh. 10:12) so the moon would not be seen.

While Mr. Totten suggests an intervening comet perhaps caused the slow day by cutting off actinic rays, I feel a more realistic theory, which I developed in 1969, is to examine the possibility of a huge meteor or asteroid plunging into the earth's mantle slowing it down about one revolution while the inner molten core continued to rotate and eventually pull the mantle back in speed.

Mr. Totten recounted how Newton demonstrated that the earth could be suddenly slowed down without appreciable shock to people. Perhaps the lethal rocks in the preceding paragraph were chips from this same supposed asteroid.

I have examined several maps of the Pacific Ocean which lend support to this theory. The October, 1969 map in *National Geographic Magazine* shows a large sink area between Hawaii and Philippines with long fracture lines in the ocean bottom radiating outward to the continents. The effect of such a crash would be maximum at the equator on slowing the earth and would result in huge tidal waves.

The size of the asteroid needed to slow down the earth one revolution could be calculated if mantle thickness were known. It could have been as large as Ceres—480 miles diameter. The August, 1970 *National Geographic Magazine* notes this and Hermes asteroid which approached within 500,000 miles of the earth in 1937.

A map in the September, 1969 *Scientific American* describes magnetic deviations which generally all point to this depressed area and reflects known magnetic reorientation on iron bearing materials when subjected to impact blows. Inspection of these maps is essential before rejecting this theory.

The 40 minute slow-down at the sun dial of Ahaz could very well be caused by a smaller asteroid impact as seen on the moon's surface during the TV showing of U. S. moon walkers.

Mr. Totten deserves the highest commendation of our newer generation not only for his tremendous mathematical genius, but for the finest description of the purpose of his work, as he wrote, "As the study of prophesy was impressively recommended by the Saviour, we must study it, and do so until we understand it; but in no wise may we dare alter it in jot or tittle."

* * *

The Biological Time Bomb by Gordon Rattray Taylor. World Publishing Company, New York. 1968. 240 pages with index.

Reviewed by John W. Robbins.*

> They [the clergy] believe that any portion of power confided to me will be exerted in opposition to their schemes. And they believe truly, for I have sworn upon the altar of God eternal hostility against every form of tyranny over the mind of man.
>
> Thomas Jefferson (1800)

We are faced in 1971 with a secular clergy, if I may be permitted the oxymoron, who have the Gospel unto Salvation, who preach this Gospel, and who, moreover, are quite willing to use the "temporal powers" to achieve salvation, as once Christians were wont to do. Lucifer has achieved his masterpiece, the Materialist-Magician, as C. S. Lewis once called him, the man who believes not in supernatural beings, but invokes them in any event, calling them Forces (with an upper case F), yet always natural, of course.

In the last century and well into the present, salvation was to be achieved through the logical and necessary operation of natural laws: (a) dialectical and historical materialism; (b) the self-overcoming of the world-spirit; (c) the progressive development of human consciousness; (d) evolution. Karl Kautsky, interpreter of Marx before Lenin, held that in socialist society "a new type of man will arise . . . a superman . . . an exalted man." Leon Trotsky, comrade of Lenin and Stalin, killed by an axe in the hands of a Stalinist superman, wrote:

> Man will become incomparably stronger, wiser, finer. His body more harmonious, his movements more rhythmical, his voice more musical. . . . The human average will rise to the level of an Aristotle, a Goethe, a Marx. Above these other heights new peaks will rise.

If the Millenium was not to be achieved through the operation of natural law, it could be achieved by human effort: Godwin, the quasi-anarchist of the last century, thought men might

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become immortal after property had been abolished.[1] Marx, contradictory as usual, may be placed in the salvation-by-works school, too, with many others too numerous to mention. Renan, though, is somewhat special:

> A far-reaching application of physiology and of the principle of selection might lead to the creation of a superior race, whose right to govern would reside not only in its science, but in the very superiority of its blood, its brain, its nervous system, [for such creatures would be] incarnations of the divine.[2]

In 1971, however, we are not dealing with impotent scribblers (if scribblers may ever be said to be impotent), but with powers, with spiritual wickedness in high places. We are confronted by Materialist-Magicians in possession of fusion, chemical, and biological weapons—and I am not necessarily speaking of the Russians and Chinese.[3] And the biological tools, as Taylor shows, are perhaps the most potent of all: ". . . in the coming century, we shall achieve biological control: the power to say how much life, of what sort, shall exist where. We shall even be able to create forms of life which never existed before." (p. 16)

I shall not here list the awful achievements in the bio-sciences of the last few years, nor shall I attempt to deal with the ethical problems raised by them. I trust the reader has had the opportunity to acquaint himself with some of the former; as for the latter, that undertaking would require several books. Taylor's book presents the facts, although he does touch on ethical, political, and social implications of them.

It is, on the whole, a level-headed book, but it has two drawbacks, which, in my view, vitiate its usefulness: (1) the book was written four to five years ago in a field in which periodicals become so rapidly out-of-date; and (2) discussions of the implications of advances are quite unhelpful, despite dust-cover recommendations by Koestler and Conquest.[4]

From reading Taylor's work I have drawn several conclusions:

(1) Men (I mean "men," not the abstract "man"), now have or soon will have the power to alter life radically, to manipulate emotive and cognitive states, and to select inherited characteristics.

(2) Governments, i.e., men in possession of a legal monopoly of the use of force within a given territory, have access to such men and their knowledge (if, indeed, they do not already possess it and them.)

(3) It is therefore quite useless to engage in an equivalent of "nuclear disarmament"—a halt to scientific investigation[5]—for the simple reason that someone will cheat. The only achievement of pacifism is to turn the world over to the violent non-pacifists.

(4) It is too much to hope that the scientists concerned are morally strong enough to refuse to turn over their knowledge to governments (or, for that matter, to any individuals or organizations lusting after power, including the scientists themselves).[6]

Looking at these conclusions, the most tempting, and the least responsible, reaction would be to side with the Christian anti-scientists of the past and have a glorious time chanting "we-told-you-so." But at this point in history we must think, not chortle.

Let us begin at the beginning, in the Book of Genesis, and perhaps we may find out where we are. Adam, the first human sinner, was addressed by God in Genesis 3: 17:

> Because thou hast hearkened unto the voice of thy wife and hast eaten of the tree, of which I commanded thee saying: Thou shalt not eat of it: cursed is the ground for thy sake; in sorrow shalt thou eat of it all the days of thy life. . . .

We may observe: (1) Labor is not the curse, nor the cursed; Adam was to dress and keep the Garden from the beginning. (2) Nor is bread the curse, nor the cursed. (3) The ground is cursed for "thy [man's] sake." The curse, then, was on the ground (nature) not on man, and it was placed for man's benefit. (4) Nature is to yield her fruits only through drudgery, i.e., with great effort on man's part.

I would like to here suggest that "nature's" fruits include not only bread, but also secrets; that is, our scientific knowledge. While it may be possible (and even preferable) to interpret the curse only literally, it is also possible to make this interpretation. The curse was a divine device that was to hinder the accumulation of knowledge (which is not *per se* bad, just as bread is not bad, in the hands of fallen man) *for man's own sake.*

I believe the current state of the biological sciences illuminates that phrase. In Genesis 8:21, the Lord says: "I will not again curse the ground any more for man's sake; for the imagination of man's heart is evil from his youth. . . ." That is, man was to be given no more such help. Much attention has been paid to God's promise not to destroy the earth again by water; hardly any has been paid to this refusal of help.

Perhaps it is presumptuous to conclude that the time that has been "bought" by the cursing has been sufficient for the unfolding of Divine history; that we have reached the point where we can no longer act in man's interest, a point we would not yet have reached had a second curse been pronounced; that, in some sense, the

curse has been overridden, that *there is nothing protecting man from himself;* but I think not. As Christians, our only hope is that the God who pronounced the curse "for man's sake," who gave His Son for man's sake, will soon intervene in history, for man's sake.

References

[1]See Ludwig von Mises. 1989. *Socialism.* London: Jonathan Cape. p. 164.
[2]Cited by Taylor, p. 180.
[3]Witness rationalist Robert McNamara's contribution to aid construction of the occult Temple of Understanding.
[4]For instance, on pages 213-214 Taylor urges government action to provide scarce life-saving machines. On page 115 he speaks favorably of a "national health service." He seems unable or unwilling to grasp the essential role of the free market in medicine. "Some readers may feel that this problem [the need for prosthetics] can be left to solve itself; that, as the demand develops, the production machinery will adopt accordingly. Such complacency, if it exists, is unjustified." (p. 209) Hence in Britain where there already exists a "national health service," "Whole categories of people, notably those over a certain age, were automatically excluded from resuscitation treatment." and, "Dr. Donald Gould suggests a decree barring use of some equipment be made prohibiting its use beyond 'some statutory age'." (pp. 116-117)
[5]"I am therefore forced to the conclusion that society will have to control the pace of research, if it can, and will certainly have to regulate the release of these new powers. There will have to be a biological 'ice-box' in which the new techniques can be placed until society is ready for them. This is not a conclusion to my taste at all . . ." writes Taylor. It is not even a conclusion. It is the sort of solution a Communist provides when asked who shall run the factories of the future and he replies: the workers. Who is "society"? Who runs the "ice-box"? How can techniques (ideas) be placed in an "ice-box"? Who decides when "society" is "'ready for them"? By what criteria? And so forth.
[6]"The scientist sees a living organism simply as a machine. . . . He holds this to be just as true of man as of less highly evolved animals. Man is no longer seen . . . as having a special place in nature and being uniquely distinguished from all other living things." (p. 189)

* * *

African Genesis by Robert Ardrey. 1962. Atheneum, New York. Dell Publishing Co., New York City. 380 pp. $6.95. Also in 1970, Dell Publishing Co., N. Y.

Reviewed by Samuel T. Wolfe.*

This is a disquieting book. The author was originally an American playwrite. On a trip to Africa he collaborated with Dr. Louis Leakey and others in archeological work in the East African highlands. He apparently is putting into words what they all felt but had difficulty expressing: that man first evolved in Kenya as a result of successive mutations after the herbivorous ape left the trees and developed a new physique in line with new carnivorous habits.

Baldly stated, this may sound fairly grotesque, but Ardrey is a past master at what he himself calls the "properly enchanting mixture of poppycock and pragmatism" to captivate the American mind. Hence the magazine, *The Nation,* called this work "the most enjoyable and stimulating book on the evolution of man . . . that has been published for some time."

Ardrey's skills are many. For one thing, he is an excellent nature writer. Some of his propositions taken by themselves are simply good; for example, his thesis of the "territorial imperative"—that observation of nature in the raw shows the deepest male drive in the animal kingdom is not for sex but for private property. This theme is cleverly developed to show an antecedent in nature for Capitalism, and that Socialism, etc., on this analogy, would simply mean reversion to a "barnyard pecking order."

Further building a dramatic case for evolution, Ardrey develops Darwin's claim in *Origin of Species* that nature in the raw favors not so much the brutal and cunning as those animals which obey the Golden Rule! However questionable this thesis, note how it would support a claim that evolution satisfies the highest of ethical considerations.

Thus a picture emerges of Ardrey the Great Crusader for True Conservatism. This was not dimmed by the personal courage he showed (about mid-1970) in "telling off" unruly hippies who tried to disrupt a TV show on which he appeared. The above may indicate some of Ardrey's expertise. So let us not faint with surprise that the prestigeously conservative *Reader's Digest* should approvingly print the political manifesto in which Ardrey derides the "myth" that mankind is a fallen angel and proudly presents the first "glorious" Social Contract for "man the risen ape." (See "Is Man Naturally Violent?," *Reader's Digest,* December, 1970.)

Now we are in position to get something of the context of the opening lines: "not in innocence and not in Asia was mankind born. The home of our fathers was that African highland reaching north from the Cape of the Lakes to the Nile. . . . Our ancestry is firmly rooted in the animal world . . . most significant of all our gifts, as things turned out, was the legacy bequeathed us by those killer apes, our immediate forbearers."

Refuting Ardrey in detail is beyond the scope of this review, but basic principles leading thereto can be indicated. There is a great air in this book as if some last depth of hidden truth were finally being exhumed from the heart of Africa. But the Bible believer can rejoice that the riches

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of Christ are as unsearchable today as in any other age and cannot be supplemented.

Since Ardrey has attempted to give us a dramatic "Constitution for Risen Apes," it might be pointed out likewise that the eminent Dutch jurist and philosopher Herman Dooyeweerd has given us an equally dramatic "Constitution for God-Conscious Humanity" in his *New Critique of Theoretical Thought*. As one man Dooyeweerd, expresses what every believer ought to realize through the Spirit—that God has his law for every sphere of being and that true wisdom lies in discerning this.

Actually, the serious pursuit of truth is outside the realm of those who concoct mixtures of "poppycock and pragmatism" as well as those who are satisfied with the same. However, Ardrey's book should challenge serious students to clarify their thinking about degeneration (devolution), and the spreading out of humanity after the Flood from an original habitat in the Near East (see article by Custance in *Why Not Creation?* Presbyterian and Reformed Publishing Co., Box 185, Nutley, N. J. 07110).

As a final subject, let it be noted that Ardrey for all his materialism is definitely not anti-supernatural. For example, his belief in "lucky stars" has definite religious connotations. In one place he describes mutation as "a gift from the stars." And the book closes with a description, probably existential, of "a *new* star in the heavens."

Notice should also be taken of how Ardrey repeatedly tells the reader about his traumatic experiences as one of a gang of kids in the basement of a Chicago church who carried on like a bunch of baboons. This apparently has something to do with his veneration for killer apes, which approaches ancestor worship.

In one of his most inspired fancies, Ardrey pictures Leakey (in an awesome moment of flashing stars) unearthing the missing link in Olduvai Gorge. I don't believe this will ever happen. But it would be more wonderful, if (in an awesome moment of flashing stars) Robert Ardrey would see the glory of God in the face of Jesus Christ, and be redeemed from the bestiality to which he would consign the entire human race.

* * *

Who Was Adam? by E. K. Victor Pearce. 1970. Paternoster Press, London, England. 152 pp. $3.00. (£ 1.25).

Reviewed by David C. C. Watson.*

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The author of this book is a convinced Christian, and an anthropologist. As such, his thesis invites our respect and deserves our attention. But in the opinion of this reviewer he has failed to answer the question posed.

Regarding the *Second* Adam, our Lord Jesus Christ, his views are orthodox, and he presents a fairly convincing harmony of modern biology with traditional theology, as others have done before. But it cannot be said that he has been as successful in reconciling modern anthropology with Genesis.

Briefly, Pearce identifies the "man" of Genesis 1 with Old Stone Age Man, who "disappeared"; whereas "Adam," from whom we are descended, is New Stone Age Man. Pearce overlooks the numerous passages which firmly unite Genesis 1 and 2 and prove that Scripture makes no such distinction as he does. For instance, Genesis 5:1-5 obviously refers back to Gen. 1, and states beyond all possible doubt that it was the Genesis 1 Adam who lived 930 years and was the progenitor of our race.

Similarly Paul in I Corinthians 11:7 quotes Genesis 1:27; and the crowning proof is Christ's own interpretation of the Creation story in Matthew 19:4 and 5: "He who made them male and female (Genesis 1) said . . . 'the two shall be one flesh' (Genesis 2)."

What sense would these words make as an argument against divorce if the first words refer to an extinct race having no physical connection with our own?

Another example of Pearce's curious interpretation is this: "A careful examination of the text of Genesis 1:26-31 gives us a picture of the hunter-gatherer. . . ." (p. 34) It is remarkable that 1800 years of Christian scholarship (which cannot all be designated *careless)* has produced no such interpretation of this passage, but rather the exact opposite—namely, that the first man was a *vegetarian!* According to Pearce, "Let them have dominion . . ." means "let them eat. . . ."

But in Psalm 8 David, who knew the Law of Moses prohibiting the eating of a wide range of beasts, fish and fowl, does not say, "Thou hast put all things into his [man's] mouth": he does say, "Thou hast put all things *under his feet"* (Emphasis added). This would seem to refer to man's ability to *tame* lions, rather than to eat them! Also, Pearce has missed the mark because he fails to reckon with the disastrous physical results of the Fall (Genesis 3:14-19).

Thirdly, Pearce follows certain critical scholars in forcing a discrepancy where none exists—between Genesis 1:29 and Genesis 2:16-17. In

reply it may be pointed out that any author in any language is entitled to give a general picture by using the word ALL before he makes particular exceptions (even Genesis 2:16-17 does just this). As the older commentators have taught us, Genesis 1 gives a general view of man in the setting of God's whole Creation; Genesis 2 gives us a close-up picture of his special environment and moral responsibility.

A parallel may be found in Exodus 9:25 compared with 10:15: "The hail smote every herb of the field and brake every tree"; yet "the locusts did eat every herb of the land and all the fruit trees *which the hail had left."* This reminds us of a fact we tend to forget: that God intends the Bible to be read as an organic whole, like any other book, with the parts qualifying and modifying each other: not as a collection of isolated proof-texts.

But the strongest argument against Pearce's thesis is this: the word translated "man" in Genesis 1 is ADAM, exactly the same as the word translated "Man" in Genesis 2, and transliterated "Adam" in Genesis 3:17, and the rest of the Bible. Thus, when Pearce speaks of Genesis 1 man as "pre-Adamite" he is calling Adam a pre-Adamite, and man a pre-Man! His determination to prove a new idea from his own branch of science has led Pearce, we fear, to "bulldoze" through all principles of grammar and sound exegesis.

On the vital question of the Flood, Pearce goes so far as to say:

> . . . early neoloithic farmers had their habitat in the heights of these plateau lands stretching from Turkey to India. . . . The average height was 5000 ft. with mountains rising to 17,000 ft. . . . It was this plateau system of which the Bible must be speaking when it says the mountains and high hills were covered by the Flood. (p. 80)

It is a pity that the author did not press the point that Noah's Flood must have been universal, if it covered such mountains. Also, it is surprising that Pearce nowhere refers to *The Genesis Flood* by Whitcomb and Morris, which by any account must be rated one of the most important contemporary books touching on his own subject.

It is rather like a Harley Street surgeon writing a book on heart transplants without any reference to the work of Professor Christian Barnard. Pearce's reading in American scientific literature seems to be rather limited: out of 67 books listed in the Bibliography, only 10 are by American authors. And this in spite of the fact that scores of books have been written on "Genesis and Science" by highly qualified American scholars and scientists.

In a chapter entitled, "Short-Lived Age of Innocence," Pearce suggests that the Danubians who first moved through central Europe were "innocent" because they apparently used no weapons. But this theory does not fit with the Bible account that *only* Adam and Eve were innocent, and *only* in the Garden of Eden.

The murder of Abel and Lamech's speech in Genesis 4 suggest that all too soon violence became endemic to the human race. Even Homer (900 B.C.) distinguishes between warlike and unwarlike races; but this, I suggest, has nothing to do with the "Age of Innocence." Likewise the ancient Roman religion inculcated chastity and morality of a high order; but we do not necessarily infer that Aeneas was Enoch.

Let's face it: the Bible is our only authentic record of the Innocence and Fall of Man, and we must deduce therefrom that *all* Adam's descendants have been sinners, though not all equally sinful, nor all sinning in the same way or to the same degree.

To sum up. This book is a well-meaning attempt at modern Christian apologetics, but it fails because the author is too highly impressed with theories current in his own academic discipline, and has studied too little the Bible text. Theology is still Queen of the Sciences, and anthropology but one of her thousand handmaidens.

When an anthropological theory clashes with the plain teaching of Scripture, we may safely conclude that the theorists are wrong. Most of us will continue to believe that there was one Adam, not two, before Christ; that the apparent differences between Old and New Stone Age Man can be otherwise explained (see several articles by Arthur Custance and others in the *C.R.S. Quarterly);* that the Fall of man and the Flood brought catastrophe upon the earth to an extent far greater than modern anthropologists are prepared to admit.

We may hope that Mr. Pearce will have some second thoughts, allow himself to be guided by researches of transatlantic Christians, and use his valuable specialist skills to write another book-which may confirm and not confuse our interpretation of Genesis.

* * *

Getting Acquainted With the Old Testament, Volume I by Charles Pledge. 1970. 319 pp, $5.95. Pledge Publications, 4197 Parkchester, Memphis, Tenn. 38118.

Reviewed by Darrel P. Kautz.*

This volume will be of interest to readers of the *Creation Research Society Quarterly* since the author deals with ultimate origins from a viewpoint consistent with that espoused by the Society. At one point the writer quotes at great length from the September, 1968 *Quarterly* on the topics of Radiocarbon and Historical Ages, Radiocarbon Dating and Genesis, and Radiocarbon Age and Farming.

In this book, Charles Pledge, a faculty member of the Memphis School of Preaching, devotes nearly half his space to such matters of *General Introduction* as inspiration, the Canon, the Apocrypha, archaeology, Biblical Criticism, and methods of fruitful Bible study. The remainder of the space is given to a treatment of Genesis, Exodus, Leviticus, Numbers, and Deuteronomy with special attention accorded to creation, and to the authorship of the Pentateuch. The book concludes with a glossary, a table of weights, measures, and money, and bibliography and index. Volume II, when published, will treat the remainder of the Old Testament books.

Volume I, says the author in his Foreword, "is offered in the hope that faith in God and confidence in his word will be strengthened in the hearts of many." Again; "This book is written, not for the scholar, but for the student of God's word." The theological posture of Charles Pledge is one which is faithful to historic Christianity. He is sensitive to prevailing attacks on the Bible, however, and reacts to them at great length and with arguments which are mixed with strong emotions.

Pledge's treatment of matters relating to *General Introduction* is rather traditional. There are facts about the word, "Bible," and about the Bible as such. The word, "Covenant," is often used, rightly so, in place of "Testament." There is a conscious effort to view the Old Testament in terms of its fulfillment in Christ and through the eyes of the New Testament. For the benefit of the less experienced Bible student, there is a suggested plan for reading the Old Testament.

Such literary devices used in the Bible as parable, simile, synecdoche, personification, and parallelism come in for treatment. The author deals with the various theories of inspiration, with Christ's view of the Old Testament, and with Messianic prophecies; he concludes that the Bible is "the word of the Living God."

In his chapter on the Canon, Pledge delineates the tests commonly employed in determining how certain writings came to be considered as having "religious authority for the community of believers." Under the heading "Biblical Criticism," the author surveys at length various hypotheses, past and present, which militate against the Mosaic authorship of the Pentateuch. Pledge acknowledges the need for scholarship in biblical studies; he vigorously denounces, however, scholarship which is predicated upon principles hostile to revealed religion.

The method employed for expounding the first five books of the Old Testament is that of the Outline. These outlines are usually extremely lengthy, in some cases six pages with type smaller than used elsewhere. The exposition which follows is usually in the form of commentary paralleling the outlines.

In his treatment of creation, Pledge rejects the "gap theory" sometimes associated with Genesis 1:1-3. He gives eight reasons why the days of creation are to be regarded as literal days of 24 hours each. In connection with his commentary on Genesis 1, the author upholds geologic catastrophism rather than uniformitarianism. Heavy stress is placed upon the historicity of Adam and Eve.

In the whole matter of ultimate origins, the choice, says author Pledge, is that of taking a position for or against supernaturalism. If the historicity of Genesis 1-3 is denied, "then the rest of the Bible will have no meaning, and one might as well fold it closed forever."

Although the author frequently sees the biblical events in relationship to Christ and the New Testament, the reviewer feels that the themes of sin and grace could have been developed more than what the reader finds. Moral guilt before God and divine forgiveness are topics which deserve high priority when treating the Pentateuchal books.

The reviewer wonders why the author did not develop the Flood portion of Genesis more than he did, and why he omitted commentary on the Joseph stories. Certain information in the book such as pointing out the middle chapter of the Bible, the middle verse of the Bible, etc. (p. 24) is trivial and could have been omitted. Nevertheless, *Getting Acquainted With the Old Testament,* Volume I, will prove helpful to lay people who wish to widen and deepen their background on the Bible as a whole, and who want help in defending those portions of the Old Testament which are perennially, under attack.

* * *

*Darrel P. Kautz, M.A., is author of *The Contemporary Bible—Study Guides* for adult classes, reviewed in C.R.S. 6(4):196-197, March, 1970. 10025 West Nash, Milwaukee, Wisc. 53222.

Creation and Law by Gustaf Wingren. (Translated by Ross Mackenzie.) 1961. Oliver and Boyd, Edinburgh and London. Hardback (21s), 210 pp.

Reviewed by T. Robert Ingram.*

This is an important book because, first, it once again puts the fundamental proposition that Creation is the foundation of all law, and, secondly, it lays bare the bankruptcy of prevailing popular divinity with its tacit disavowal of Creation and assumption of evolution.

While the author rightly understands that there can be no true law except as decree of the Creator, he radically distorts the very meaning of Creation and with it supports a fantastic concept of law.

For him Creation is human birth, and law is to satisfy one's neighbor's needs.

Professor Wingren seems to be making something of a mark in Continental circles and is sharply critical of the schools of thought associated with Barth, Cullman and Bultmann. He points up their failures as being largely due to their complete neglect of the doctrine of Creation. This has manifested itself in attempts to single out a confession of faith in the Lordship of Jesus Christ as being not only primary but sufficient for erection of a system of theology. Surely this neglect of Creation comes from assuming the truth of evolution.

Present day European theologians who have attempted to define the content of theology, he says, have fallen into grave errors because "the belief in Creation has no part in the basis on which the systematic theologian works, and that the universal Law creates a problem for any theological ethic that seeks a specifically Christian ethos."

Despite the many penetrating insights he offers into the nature and operation of the eternal law of God and the laws of nations which are derived from it, Professor Wingren, like so many of his evolutionary thinkers before him in other fields, fails utterly in trying to extricate himself from the morass he criticizes in others.

The occasional flashes of common sense are overwhelmed by the general esoteric preoccupation to which all evolutionary speculators are driven, and he gets lost with his own rather startling and fallacious meaning of Creation. Again and again he asserts that Creation is the birth of every man, and that thus creation is a continuing process. He expressly rejects the historical Creation of Heaven and Earth *ex nihilo* as understood in common sense.

Although he does not expressly deny Creation as ordinarily understood among men, he certainly gives it no importance in systematic theology. The fallacy of the common understanding of Creation, he holds, lies in "confining God's work of Creation to a particular point in the past" thus ruling out an "understanding of God as continuing to create in the present, or of life itself as God's continuing Creation."

This is a surprising notion in view of the author's emphasis on the Apostles' and Nicene Creeds, the latter of which expressly speaks of life not as "created" but as "given." He is understandably silent about Providence in view of his strange identification of birth with creation, but seems to reject the traditional doctrines of Providence as belonging only to such a distorted view of it as is found in Deism.

It is hoped that Creationists will take note of the truth set out by Professor Wingren, namely that there can be no doctrine of law—nay, no law—which does not rest on the Biblical account of Creation, just as there can be no Gospel without both Creation and Law. Law here is to be understood in its proper sense of eternal moral principles set forth for the general welfare of mankind and of nations.

The alarming world wide degeneration into lawlessness (which is St. Paul's description of the ultimate in evil) undoubtedly results from the earlier world wide rejection of the truth of Creation and the espousal of "evolution." Evolutionary thinking has no place for law, and can find no ground for it, in spite of the fact that the approach of chaos is terrifying even to evolutionists.

Professor Wingren's scorn for Natural Theology, which assumes the universal and eternal law of God, can hardly be explained in view of his position, except that Natural Theology assumes the truth of Creation. His attempt to recover law by postulating creation as birth is a heroic *tour de force* but is altogether unconvincing and uninspiring. In fact it is beclouded in what some irreverent laymen have decried as theological smog.

On the other hand he is keenly aware of the centrality of authority to any consideration of law, even taking note of the importance of God's command to Adam and to Noah to have dominion; yet he is silent about the ultimate authority which is God's authorship of all things in Heaven and earth at a "particular point in the past."

The question of evolution, of course, is never mentioned any more than it is by the other con-

*T. Robert Ingram is rector of St. Thomas' Episcopal Church and School, P. O. Box 35096, Houston, Texas 77035. He is active in Christian education and coordinates the annual Christian Schools Conference in Houston.

tinental divines. But Wingren's position is betrayed by his categorical statement that the Genesis account of Creation was composed by the Prophetical writers in Israel—that is, at least 3,500 years after the events they describe. One is entitled to wonder how he can attach such importance to the doctrine of Creation when he assumes it to be a pious fraud. Perhaps that assumption makes it easy for him to state that creation means what it plainly does not mean, namely, birth.

When Creation is believed in the sense of what it plainly means, the modern vexation about both law and Gospel resolves into the glorious harmony of the whole of God's Word written.

It seems high time to extend the implications of Creation from science to law, and return to the universal understanding of law as the eternal decree of the Creator revealed to all men.

* * *

The Creation vs. Evolution Handbook by Thomas Heinze. 1970. Baker Book House, Grand Rapids. 80 pages. Paperback. $1.50.

Reviewed by Peter A. Steveson.*

This book has been prepared specifically to help young people face the theory of evolution. To this end, it is written in a non-technical manner.

After introducing the philosophical basis for evolution, the author presents a summary of evidence which has been interpreted to prove evolution, taking care in each case to point out the creation alternative. Such traditional arguments as comparative anatomy, embryology, vestigial organs, fossils, and age-dating of the earth are discussed. Special emphasis is given to the occurrence of supposed "young" fossils, e.g., evidence of man, in "old" strata, to the fossil record of the horse, and to the difficulty of drawing valid conclusions based on the scant amount of human fossil evidence available.

In a separate chapter, some of the problems of evolution are summarized. Included are the Laws of Thermodynamics, statistical arguments against evolution, and the lack of an explanation for the origin of life or for the existence of matter. Theories of the method whereby evolution has occurred supposedly are discussed and shown to be inadequate.

The concluding chapter of the book is devoted to explanations of various questions which relate to evolution. The place of "natural selection" is shown to be real in justifying change but minor as far as explaining any major evolution. The influence of evolution upon society in general, e.g., in religion and morality, is shown to be significant. Theistic evolution is discussed and shown to be a weak position. The six days of creation are discussed and arguments for a literal interpretation vs. a day-age interpretation are presented. Finally, the importance of the world-wide flood is summarized.

Recognizing limitations inherent in a brief handbook, this book still should prove helpful for young people who are interested in a beginning study of the theory of evolution. It is very readable and suitable for young people of junior high school age up through college. The book should find wide use by parents and youth workers who wish to guide young people as they face the problem of evolution.

*Peter A. Steveson is the Principal of the Christian High School of San Diego, 2716 Madison Ave., San Diego, California 92116.

NEW PUBLICATION

The Bible Has the Answer (Practical Discussions of 100 Frequent Questions). 1971. By Henry M. Morris. Baker Book House, Grand Rapids, Mich. 49506. Paperback, 256 pp. $4.50.

This book will prove a handy reference book for years to come. It is highly practical in that it covers the most commonly asked questions confronting people today, such as: What about Joshua's long day?, Is evolution a scientific fact?

Two of the 17 chapters center on "The Bible and Science" and "Creation and Evolution." In the former chapter, Morris discusses: Has modern science discredited the Bible?, Where did the races come from?, and Is there life on other planets?, plus other questions.

In the latter chapter, the author covers: Should a Christian believe in evolution?, Is the creation story literal or allegorical?, Can evolution be harmonized with the Second Law of Thermodynamics?, When did Adam live?, Is there a gap between the first two verses of Genesis?, and Can the days of Genesis be the ages of geology?

LETTERS TO THE EDITOR

On Old Testament Dates

I was greatly interested in the June, 1970 issue of the *Quarterly*. One article that was especially interesting to me, as an Old Testament professor, was Robert L. Whitelaw's article, "Time, Life, and History in the Light of 15,000 Radiocarbon Dates." The distribution of samples seems to be what one would expect if the Bible account of Creation and the Flood is real history.

I thought his Table V on Biblical Chronology might have been improved somewhat. Edwin R. Thiele in "Mysterious Numbers of the Hebrew Kings" has shown that the kingdom was divided at the close of Solomon's reign in 931 B.C. From that date the following chart may be constructed:

Years From 1970 Back to Creation:		*Date B.C.*
A.D. years	1970	
B.C. years to division of kingdom	931	931
Division to founding of temple	36	967
Temple foundation to Exodus	480	1447 I Ki. 6:1
Israel in Egypt	430	1877 Ex. 12:41
Jacob's life to the migration	130	2007 Gen. 47:9
Isaac's life to birth of Jacob	60	2067 Gen. 25:26
Abraham's life to birth of Isaac	100	2167 Gen. 21:5
Flood to birth of Abraham	352*	2519 Gen. 11
Adam to Flood	1656*	4175 Gen. 5
Total	6145	

***These figures from Genesis 5 and 11 may be capable of expansion, according to the known habit of the Hebrew scribes to omit names in genealogies without comment. My total of 6145 is less than 800 years different from Prof. Whitelaw's figure, Several generations omitted from the genealogies could readily account for this.**

I have used figures from the Hebrew text, because I feel it is more reliable than the Septuagint. I have followed the long chronology in Genesis-Exodus, because I believe it is right. Thus we have an accurate chronology back to Abraham, and a conjectural chronology from Abraham back to Creation. While the latter may be expanded some, it would probably be unreasonable to more than double the 2008 years, thus giving circa 6,000 B.C. as an outside figure for Creation.

Your Brother in Christ,
WM. HARVEY BEARD
Prof. of Old Testament & Greek
Pacific Christian College
4835 E. Anaheim St.
Long Beach, Calif. 90804

* * *

Magnetism, Creation, and the Flood

We are deeply indebted to Dr. Thomas G. Barnes for bringing together in concise understandable form the viewpoints and large amount of pertinent data presented in "Decay of the earth's magnetic moment and the geochronological implications" (C.R.S. *Quarterly*, June, 1971, pp. 24-29).

While it was not explicitly so stated in Dr. Barnes' paper, inferences which may be drawn from the available data concerning geomagnetism presumably apply to the history of our planet since the beginning of the Flood episode. We may presume that at the close of Creation week the human race was provided with a home which infinite wisdom and infinite love could describe as good and perfect, and which would remain so throughout aeons and aeons as long as man maintained an appropriate faith relationship with the Creator.

The extent to which the initial ideal conditions prevailed during the period between the entrance of sin and the global destruction associated with the flood is a matter for conjecture. The absence of radioactive carbon in fossil material which can firmly be identified as a Flood deposit suggests maintenance of a strong geomagnetic field up until the Flood.

Paleomagnetic data indicate that severe fluctuations in the magnitude and direction of the geomagnetic field occurred during the Flood episode. The considerations so ably presented by Dr. Barnes provide additional assurance concerning the trustworthiness of the limitations given in Genesis on the time which has elapsed since the Flood.

Yours in the fellowship of Christian service,

R. H. BROWN, President
Union College
Lincoln, Nebraska 68506

* * *

The Genesis Flood

I heartedly second Mr. Watson's comments (June, 1971, pp. 54, 80) on Filby's recent attempt to reply to *The Genesis Flood* (TGF).

Neglect to adequately deal with II Peter 3, since TGF, is a scholarly blunder of first magnitude.

Watson might also have mentioned two papers critical of any such catastrophic inundation of Mesopotamia: M. E. L. Mallowan. 1964. Noah's flood reconsidered, *Iraq,* 26:62-82, and Lee, G. M. and N. L. Falcon. 1952. The geographical history of the Mesopotamian plains, *Geographical Journal,* 118:24-39.

Significant criticisms brought forth in these papers include: (1) Noah's ark could not have grounded in the Persian-Caucasus range for this would have involved *upstream motion* against any river-flood of dimensions less than global; (2) no flood was ever of sufficient magnitude to interrupt the contiguity of the Mesopotamian civilization; and (3) floods in Mesopotamia are endemic rather than exceptional.

It is a pity that Christians continue to waste precious time and effort through ignorance of the last two centuries of discussion on the topic.

Sincerely in Christ,

CHARLES A. CLOUGH, Pastor
Lubbock Bible Church
Lubbock, Texas 79410

* * *

Poor Bill's Almanac

"Poor Bill's Almanac" in the June, 1971, Annual Issue was certainly enlightening. Prof. Rusch has incomplete data, however, with respect to Murphy. Murphy is actually credited with six (6) laws as follows:

1. In any field of scientific endeavor, anything that can go wrong *will* go wrong.
2. Left to themselves, things always go from bad to worse.
3. If there is a possibility of several things going wrong, the one that will go wrong is the one that will do the most damage.
4. Nature always sides with the hidden flaws.
5. Mother Nature is a shrew.
6. If everything seems to be going well, you have obviously overlooked something.

I trust that these laws will be of practical use to *Quarterly* readers.

Sincerely,

WILLIAM J. CAIRNEY, Capt., USAF
USAF School of Aerospace Medicine
Brooks Air Force Base, Texas 78235

* * *

A Gap in Genesis 1:1-2?

As a new sustaining member of the Creation Research Society, I thoroughly enjoyed reading your 1971 Annual Issue of the *Creation Research Society Quarterly*. I especially enjoyed reading the article, "Paleoecology and the Flood," by Harold W. Clark; however, I am a little confused by his apparent inclusion of the dinosaurs among the victims of the Noachian Flood.

I have read previously articles by creationists who claim that there are two floods, universal and violent in nature, which were responsible for the fossil deposits around the world: 1) the first flood is said to have destroyed the world of the dinosaurs, and 2) the second flood, said to be the Noachian Flood, is said to have destroyed the many different varieties of mammals now extinct, such as the mastodons, giant bisons and saber-toothed tigers.

Such creationists argue that there is an indefinite time gap between Genesis 1:1 and Genesis 1:2, that the world of the dinosaurs rose and fell between the events recorded in these two Bible verses and that our modern mammal-filled world was created after the world of the dinosaurs had been destroyed by a worldwide flood. They then assert that the many now extinct mammal groups were later destroyed by the great Noachian Flood.

Does Dr. Clark mean to convey by his article the belief that dinosaurs, now extinct mammal groups, and mankind before the Noachian Flood all co-existed with each other?

Yours truly,

PAUL NEDWELL
51 Catherine St.
Poughkeepsie, New York 12601

Reply to Mr. Nedwell by Dr. Clark

One of the problems of diluvialists, or "Flood geologists," as they are sometimes called, is that there have been so many theories developed regarding the past history of the earth that it tends to be very confusing. But I believe that conservative creationists, through the efforts of the Creation Research Society and other organizations, are making headway in unifying thinking along these lines.

We, who consider ourselves the most conservative, are trying to establish what I call "Fundamental Creationism," which follows as closely as possible the literal interpretation of the Genesis record.

The idea that there was a world of life that was destroyed before the mammal world came into existence is generally known as the "gap theory." This comes from a rendering of the second verse of Genesis One. Where the KJV reads "And the earth *was* without form," some versions read "And the earth *became* without form," or similar words.

It is assumed that the expression *became* means that it was once perfect, but was destroyed or cursed, and came into a state of chaos. But this interpretation is not a necessary one.

The word *became* is defined by the dictionary to mean "came to be." And this could be perfectly consistent with a statement of original creation as well as with a destruction. That is, when God created the earth, it came to be, or came into being without form, or organization. Then the record of six days tells how it was given organization.

Fundamental creationists hold that there was only one creation, and that took place in six 24-hour days a few thousand years ago. There never was life upon the earth until the third day of creation week. I believe I am in agreement with the most advanced thinkers in this field when I make this assertion. Yes, dinosaurs and mammals and man all lived together! And were all destroyed together, except those that were saved in the Ark.

One question should be asked. If there was a pre-Adamic world, then were there not many kinds of life buried in that epoch of earth history? But nowhere that I know of is there any place you can draw a line and say, these fossils belong to the first epoch, and other fossils above them belong to the epoch that was destroyed by the Noachian Flood. The fossil sequence has only one sequence. We cannot break it up.

All theological questions aside, I am forced by the paleontological evidence to believe that there was only one universal Flood, and that was the one described in Genesis 7 and 8. As I understand the concept of conservative, or fundamental creationism, it is that the earth was created perfect in six 24-hour days, that the fall of man into sin brought in death and degeneracy, and that the world was overwhelmed by a universal catastrophe that destroyed life and broke up the earth's surface.

While we find in the rocks some remnants of antediluvian life, such as fossil reefs, most of the fossils were caused by the burial of the abundant life of the pristine earth. There is evidence that some violent action has occurred since the Flood, but it has been comparatively mild compared to the Flood itself.

I trust these explanations will make my position clear. I suggest that you get a copy of my *Fossils, Flood, and Fire,* (Outdoor Pictures, Box 277, Anacortes, Wa. $5.95), which will give much more details.

Sincerely yours,

HAROLD W. CLARK, President
Life Origins Foundation
600 Edgemont Lane
Angwin, Ca. 94508

CREATION RESEARCH SOCIETY

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are $7.00 (Foreign, $8.00 U. S.) per year and may be sent to Wilbert H. Rusch, Sr., Membership Secretary, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is' available at $7.00 (Foreign, $8.00 U. S.) per year and includes subscription to the Annual Issue and Quarterlies. All others interested in receiving copies of these publications may do so at the rate of the subscription price for all issues for one year: ($10.00 (Foreign, $11.00 U.S.).

Statement of Belief Members of the Creation Research Society, which include research scientists representing various fields of successful scientific accomplishment, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms.

We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity,* through Zondervan Publishing House, Grand Rapids, Michigan 49506. All members of the Society subscribe to the following statement of belief.

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical troths.

2. All basic types of living things, including man, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The great Flood described in Genesis, commonly referred to as the Noachian Flood, was an historic event worldwide in its extent and effect.

4. We are an organization of Christian men of science who accept Jesus Christ as our Lord and Saviour. The account of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Saviour for all mankind. Therefore, salvation can come only through accepting Jesus Christ as our Saviour.