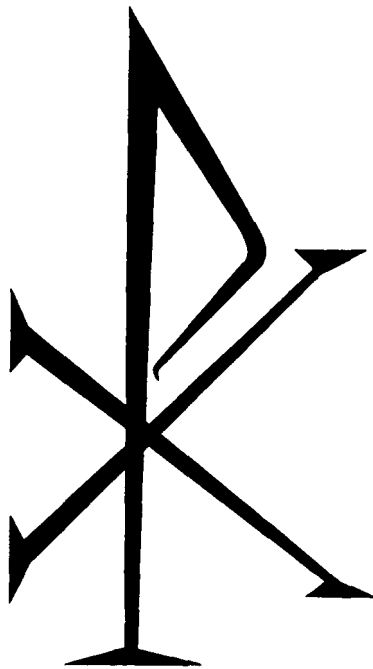


CREATION RESEARCH SOCIETY

QUARTERLY



Haec credimus:

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

CREATION RESEARCH SOCIETY

QUARTERLY

VOLUME 4

DECEMBER, 1967

NUMBER 3

EDITORIAL BOARD

Walter E. Lammerts, Editor

P. O. Box 496

Freedom, California

John N. Moore, Managing Editor

Department of Natural Science, Michigan State University

East Lansing, Michigan

Henry M. Morris Virginia Polytechnic Institute, Blacksburg, Va.

John W. Klotz Concordia Senior College, Fort Wayne, Indiana

William J. Tinkle Anderson College (retired), Eaton, Indiana

George F. Howe Westmont College, Santa Barbara, Calif.

Thomas G. Barnes Texas Western College,
El Paso, Texas

Donald O. Acrey, Geophysicist Amarillo, Texas

John C. Whitcomb Grace Theological Seminary,
Winona Lake, Indiana

TABLE OF CONTENTS

(Contents, or parts thereof, may not be reproduced in any form without
permission of the Editors or author of an article.)

	Page
Editorial Comments	87
Announced Research Committee and Research Proposal	87
Style Format	88
Sedimentation and the Fossil Record: A Study in Hydraulic Engineering	89
Henry M. Morris	
The Origin of the Blue-green Algae	100
George F. Howe	
A Summary of the Monera Fallacy	106
N. A. Rupke	
Comments on Scientific News and Views	114
Harold Armstrong	

EDITORIAL COMMENTS

Our concept of the Flood as being world-wide in its geologic, geographic, and biologic effects is subject to research verification regarding many of its implications. The article by Henry Morris on hydraulic principles related to processes of sedimentation suggests a number of research projects worthy of our combined efforts.

One project involves investigation of "wrong order" formations in the Empire Range near Tucson, Arizona. Here an "older" Permian formation rests on "younger" Cretaceous rocks. Our research committee, of which George Howe is chairman, presents a research proposal about this supposed overthrust for your consideration. We solicit the help of *all* members in order to get this project underway in the spring of 1968.

N. A. Rupke's article is of much historical interest in that it shows how evolutionary concepts led to serious errors by many otherwise competent biologists in the era of 1850-1900. This well-documented paper should be a warning for all of us to be alert to much that is wishful thinking by modern evolutionists.

Could it be, for example, that there really are no truly "good" mutations; i.e., genetic changes which confer a selective advantage under the range of environmental conditions normal to the species? A careful survey of the literature might indeed show that the ratio of occurrence of such good mutations is far less than the 1 in 1000 postulated on page 613 of the *Biological*

(Continued on page 113)

ANNOUNCEMENT OF RESEARCH COMMITTEE APPOINTMENT AND RESEARCH PROPOSAL REQUIRING FUNDS

Among the many purposes of the founders of the Creation Research Society were two goals: (1) establishment of a creationist journal, and (2) stimulation of research projects that support the creationist model of origins.

The first goal has been accomplished admirably through regular publication of the *Creation Research Society Annual* and *Quarterly*. The second goal has been mentioned from time to time, and some funds ear-marked especially for research have been deposited by the Treasurer (\$235.00 as of March, 1967).

Research Committee Appointment

Several new and exciting steps have been taken toward a functional research program:

1. A research committee of the following members has been appointed by the President: George F. Howe (Chairman, and Vice Pres. of C.R.S.), Harold Slusher, John Grebe, Henry Morris (*ex officio* member and Pres. of C.R.S.), and Walter Lammerts (*ex officio* member, and Editor of C.R.S. *Quarterly*). As in the case of all C.R.S. offices, these members receive no pay for their services.

The committee is presently inviting potential research projects for the Society to sponsor. If you have a research project that you believe might contribute to a better understanding of scientific creationism, but which you cannot otherwise finance, we invite you to submit a brief summary of your project and an estimate of the budget required. Members of the Research Committee may submit proposals, but in such cases the particular member will not vote or deliberate on the status of his own project.

The Research Committee will act on these proposals, approving those that, in the opinion of the members, look most promising. After a project is approved, an abstract of the project along with the proposed budget will be published. Then, interested parties will be invited to contribute as they wish to any particular project. We invite you to designate on your check or money order which research effort you wish to support.

Only those gifts ear-marked for research projects will be used for such purposes. As always with C.R.S., a donor has the choice of which ministry he wishes to support—textbook project, research project, or general fund. Money from dues will not be used in support of the research projects.

When research money is spent on a project, an itemized expense record will be kept by the project director, and submitted to the Treasurer at regular intervals. Regular progress reports (six month intervals) are to be sent by project directors to the chairman of the Research Committee.

Of course, those who use research funds will be expected eventually to submit their findings by way of a research paper to the Editor of the *Quarterly* when the project has been completed. Through this means we hope to establish a truly positive and productive approach to study of origins from the creationist position. Please send research proposals to George F. Howe, Research Chairman, 801 Cold Spring Rd., Santa Barbara, California 93103.

Proposal Requiring Funds

2. A research project has already been approved for funding and is herewith described for your interest and possible support. Mr. Clifford Burdick (consulting geologist of Tucson, Arizona), and Mr. Harold Slusher (geophysicist of Texas Western College, El Paso, Texas) have submitted the following resume' and budget:

a. In the Empire Range near Tucson, Arizona, is a supposed "overthrust" where Permian formations rest on Cretaceous rocks.

b. From the study, it is hoped to determine indications of the usual physical changes present that are known in cases of thrust faulting.

c. Gravity readings will be taken at various positions in the vicinity of the supposed fault. From these it should be possible to deduce the physical structure under the rock and to come to a definite conclusion about the presence or absence of faulting.

d. A surveyor will determine the exact positions and elevations of the gravity stations and outside help will be enlisted to verify the "Permian" and "Cretaceous" character of the strata under question.

Those who contribute to this project should realize in advance that the findings MAY point toward a thrust faulting in the past as the basis for the "wrong order" now seen. On the other

BUDGET

Surveying	\$ 250.00
Gravity meter rental (about one month)	440.00
Travel, food, and employment expense for Slusher and Burdick (approximately two weeks)	600.00
Mapping and report materials	10.00
Total	\$1,300.00

hand, it may be that there is no evidence to suggest thrust faulting. If such is the case, the study would indicate that the supposed "wrong order" is actually RIGHT and that geologic theory must be revised.

We cannot guarantee the outcome of this project, but as a committee we feel that it is the kind of *bona fide* science project which we wish to recommend for Society support. If you wish to send gifts that will make this research possible, please designate your check to the Slusher-Burdick Project and mail it to our Treasurer, Prof. Wilbert Rusch, Sr., 2717 Cranbrook Road, Ann Arbor, Michigan 48104.

Respectfully submitted,
GEORGE F. HOWE, *Chairman*
Research Committee

STYLE FORMAT

Editors of Creation Research Society publications wish to establish a few style guidelines to help all future authors. It is our goal to keep such restrictions to a minimum thereby insuring a freedom of expression not often found in scientific writing. Specifications given at this time deal with abstracts and bibliographic references only, as follows:

1. Manuscripts (with lines double spaced) submitted for publication should include an abstract of from 100 to 200 words in length. The abstract should summarize the entire article briefly, giving representative coverage to such possible areas as data presented, concepts discussed, conclusions established, etc. Letters, book reviews, or articles less than one journal page in length need not contain an abstract.

2. Literature citations in the text should be designated by consecutive numbers only. Each number will refer to the appropriately numbered source in a reference list placed at the end of the paper. The first reference to any source should include complete bibliographic information such as: author (or possibly editor); date; title of book or article (and title of symposium volume if such); volume, number, and pages (if an article); publisher; city.

Two or more consecutively numbered references in the body of the article to the same source can be handled in the reference list by use of *Ibid.*, with new pages given. Later references to that same work (not in direct sequence) should be designated by Author, *Op. cit.*, and new pages cited.

This system avoids injecting bibliographic material into the text, but localizes it in the reference list at the end. It also guarantees a complete citation for interested readers. Several typical forms follow by way of example:

References

¹Smith, G. M. 1950. The fresh-water algae of the United States. Second Edition. McGraw-Hill Book Co., Inc., N.Y. p. 434.

²*Ibid.*, p. 436.

³*Ibid.*, p. 307.

⁴Ris, H., and R. N. Singh. 1961. Electron microscope studies on blue-green algae, *Journal of Biophysical and Biochemical Cytology*, 9:63-80.

⁵Smith, G. M. *Op. cit.* p. 482.

⁶Corner, E. J. H. 1961, Evolution (in) Contemporary botanical thought. Edited by Anna M. MacLead and L. S. Copley. Quadrangle Books, Chicago, Ill. p. 417.

⁷A "clone" of plants is a group of adult plants originally derived from one parent plant by means of vegetative reproduction.

⁸Ris, H., and R. N. Singh. *Op. cit.*, p. 69.

SEDIMENTATION AND THE FOSSIL RECORD: A STUDY IN HYDRAULIC ENGINEERING¹

HENRY M. MORRIS*

Since the fossil record in sedimentary rocks of the earth's crust supposedly provides documentary evidence of organic evolution throughout geologic time, it is of considerable importance to know how these fossil-bearing sediments were originally deposited. A study of these phenomena in light of modern knowledge of sediment hydraulics and fluid mechanics indicates that the sediments must have been laid down very rapidly, even catastrophically, rather than slowly over long ages. Furthermore, the evidence favors one single major depositional epoch rather than a large number of individual and localized sedimentary catastrophes spread over great expanses of time.

Introduction

The relationship of the field of hydraulic engineering to the evolution-creation question at first may seem somewhat tenuous. There is, nevertheless, a very real and significant connection.

Hydraulic engineering is that profession which seeks to devise and build systems and structures for the most effective control and utilization of the earth's water resources. It is necessarily based on a thorough understanding of the sciences of hydrology and hydraulics.

Hydrology is the science dealing with the earth's natural waters and their distribution, especially in the forms of precipitation, streamflow and groundwater. Hydraulics deals with the forces, velocities, and frictional resistances associated with flowing fluids.

One of the most important functions of the earth's natural waters is that of erosion, transportation and deposition of sediments. Mechanics of sedimentation phenomena control formation and development of river systems. Rivers not only carry the waters back to the ocean from whence they came, but also serve to carry off large quantities of sediment eroded from their drainage basins, depositing them finally along their flood plains or in deltas near their mouths. Deltaic sediments are gradually re-worked by wave action and by littoral currents until finally deposited more or less permanently along the continental shelves and slopes. Thus land surfaces are gradually being cut down and ocean basins filled.

These sedimentation processes are highly important to both the geologist and the hydraulic engineer. Most geologic processes involve water in one way or another, but the processes of sedimentation are by far the most important, since most of the earth's land surface consists of sediments, either still loose and unconsolidated or else compacted and hardened into sedimen-

tary rocks. In order to understand and explain geologic formations and phenomena, therefore, the geologist should have a thorough understanding of the processes of sedimentation.

The hydraulic engineer has a more immediate and practical need for such knowledge. He is concerned with the silting-up of canals, reservoirs and harbors, with the stability of structures built along river channels, with erosion of valuable lands, with bank-caving and channel-shifting in alluvial rivers, and with numerous other practical and costly problems associated with the hydraulics of sedimentation as connected with the design of hydraulic structures and systems.²

Hydraulic engineers, therefore, have been engaged for the past four decades, especially, in intensive laboratory and analytical studies dealing with the processes of sedimentation. These phenomena are extremely complex, but much has been learned and will continue to be learned concerning them.

Geologists, on the other hand, with a few noteworthy exceptions, have continued to favor a qualitative and descriptive, rather than quantitative and mathematical, approach to sedimentation. It should be obvious, however, that the degree of confidence that can be placed in their interpretations of sedimentary deposits of the past is directly dependent upon their understanding of sedimentary processes in the present. The present state of knowledge of sedimentation mechanics, even of those hydraulic engineers who are most actively involved in such studies, is certainly not such as to warrant placing overmuch confidence in interpretations of the sedimentary deposits of the past by anyone, and especially by anyone not thoroughly conversant with modern studies in sediment hydraulics.

Now the bearing of this discussion on the subject of evolution is simply that the sedimentary rocks laid down in the past constitute the repository for the fossilized remains of former living plants and animals. And this fossil record of life during earth's past history is really the *only* non-circumstantial, historical evidence supporting the theory of organic evolution.

The question, therefore, of *how* the fossil-bearing sediments were originally laid down is

*Henry M. Morris is Professor of Hydraulic Engineering and Head of the Department of Civil Engineering at Virginia Polytechnic Institute, Blacksburg, Virginia 24060. He holds the Ph.D. degree from the University of Minnesota.

thus of extreme significance to the evolution-creation controversy. Can the sedimentary processes of the earth as now constituted adequately explain them? Were they deposited very slowly, over long ages, or rapidly and violently? Under what circumstances, and in what kinds of environments, were they originally eroded, transported and deposited?

Such questions can never be fully resolved scientifically, for the simple reason that events of the past are not reproducible. However, the goal of obtaining the most reasonable and probable answer clearly requires, as a minimum prerequisite, a thorough understanding of all sedimentation phenomena, environments and processes as they exist at present. And until paleontologists and historical geologists have acquired such knowledge and have demonstrated its consistency with their uniformitarian and evolutionary interpretation of the fossil record, we are fully warranted in rejecting the entire concept of organic evolution.

The various contentions in the foregoing general discussion will now be discussed and documented in somewhat more detail.

Role of Water in Geologic Interpretation

Of all physical factors involved in the study of geology, one of the most obvious and certain facts is that water has been the primary geologic agent in shaping the earth's surface. The planet Earth, uniquely among all bodies in the universe in so far as any real knowledge goes, has been equipped with an abundant supply of water, and this fact is profoundly important in the understanding of earth history.

This water supply is intricately associated with almost all the physical processes and structures of the earth. Approximately 71% of the earth's surface is, in fact, covered with water. Plant and animal life is composed mainly of water; the human body, for example, is more than two-thirds water! Most chemical processes of importance involve water, as do biologic processes. No wonder the Apostle Peter said:

. . . heavens came into existence long ago by the word of God, and an earth also, which was formed out of water and by means of water. (II Peter 3:5b, Amplified Bible).

It is also obvious that even the 29% of the earth's surface which is dry land has in the past been covered with water, and that most of the rocks on the surface were originally laid down by moving water. Rock formations are usually classified as igneous, metamorphic or sedimentary, with the latter formed primarily by deposition of sediments out of water after transportation from some source area. It is significant that most surface rocks are sedimentary rocks.

By volume, sedimentary rocks are about

one-tenth as abundant as igneous rocks in the earth's crust; but when it comes to the rocks exposed at the earth's surface, sedimentary rocks or sediments, as they are sometimes called, cover nearly three-fourths of the land surface.⁴

Furthermore, many of the igneous rocks at the earth's surface are underlain by sedimentaries, upon which they flowed after eruption through volcanic vents or fissures. Similarly, many of the metamorphic rocks at the surface represent rocks which once were sedimentary rocks (e. g., marble, transformed from limestone by processes of metamorphism).

Thus it is evident that probably all of the earth's surface either now is, or has been, at some time or times, completely submerged by water, and that these waters have been profoundly effective in the very formation of the rocks themselves, as well as the surface features of the earth's physiography.

Of course, this is not surprising to the student of scripture. According to Biblical revelation, there have been two periods in earth history when the surface of the earth was completely submerged by water. The first was immediately after the Creation of heaven and earth, when the earth is said to have been covered with water (Genesis 1:2,3). Second, the earth was again fully inundated at the time of the Great Flood, in the days of Noah (Genesis 6-9). In both cases, it is certain that much geological work must have been accomplished on the earth's crust by the waters (as affirmed in II Peter 3:5,6).

But modern geologists have been unwilling to accept so simple an explanation for the earth's sedimentary rocks, especially since it involves a worldwide catastrophe with supernatural overtones. Instead, it has, for more than a hundred years, been assumed more "scientific" to explain the great masses of sedimentary rocks, sometimes several miles in thickness, in terms of the ordinary processes of sedimentation which are in operation in the present world.

Biblical and other ancient literature of the Middle East is dominated by a tradition of universal deluge. Characteristic of this view is an extremely short time scale for the duration of our planet—measured in thousands rather than in billions of years. One flood during this period sufficed to explain all evidences of former seas on land Little by little, the excrescences of the Middle Ages were shaken off by the developing science of geology. . . . By the end of the nineteenth century, only religious fundamentalists . . . refused to accept the overwhelming evidence that not once but many times the seas have crossed where land lies now.⁵

Uniformitarian versus Catastrophic Sedimentation

There thus seem to be two possible types of explanations for the fact that essentially all of the earth's surface has been, at some time or times in the past, beneath the sea. One is that of catastrophism, the other that of uniformitarianism.

In the one, a tremendous cataclysm of water, pouring down from the skies and up from the subterranean deeps, produced a year-long debacle of erosion and deposition of sediments that could have accounted for at least most of the sedimentary deposits in the earth's crust.

In the other, the very slow processes of weathering, denudation, river flow, delta deposition, land subsidence and emergence, and similar geomorphologic processes, acting over many hundreds of millions of years, have combined to produce these formations.

In both cases, the amount of geologic work accomplished is the same, but the power required—the time-rate of work accomplished—is vastly different. It is a question of whether great forces and energies were at work during a short period of time, or small energies operating over great expanses of time.

In either case, the bulk of the work was accomplished prior to recorded human history, and therefore the process is not subject to scientific examination. It is completely impossible to *prove* scientifically, whether catastrophism or uniformitarianism provides the true explanation.

The best that can be done is to examine the ancient sediments and compare them with modern processes of sedimentation, to see whether the latter are producing deposits which are comparable in character to those of the geologic column, and also, on the basis of what we know about hydraulics, to try to estimate the possible type and extent of sedimentation that could occur in a world flood, in order to evaluate the sedimentary rocks in terms of this possibility.

The decision between the two alternatives will very likely be, to some extent, subjective. This kind of study is necessarily bound up with probabilities and presuppositions. The very same deposit will seem to one student to give overwhelming evidence of rapid deposition, and to another it will seem to have been laid down very slowly and gradually. The true explanation is not necessarily determined by majority vote!

It is salutary to keep constantly before us, in deciphering geologic history, the fact that we are outside the domain of true science. The viewpoint favored here, of course, is that of catastrophism. The deposits can be understood quite adequately in this context, but this is not the same as saying that catastrophism can be proved scientifically (which means, experimen-

tally). By the same token, it should be clearly recognized that neither can uniformitarianism be proved scientifically.

Our purpose here, therefore, is simply to show that aqueous catastrophism provides a possible and reasonable explanation for the sedimentary rocks, and that uniformitarianism is beset with serious difficulties. The conclusions one may draw from this fact will depend largely upon his own philosophic preferences, or perhaps prejudices.

Sedimentation, Paleontology and Evolution

The importance of the study of the processes of sedimentation as related to the geological record lies mainly in its contribution to the theory of evolution. The fossil record, as preserved in the sedimentary rocks of the earth's crust, is by all odds the most important of the so-called evidences for evolution. As Kerkut has said:

The most important evidence for the theory of Evolution is that obtained from the study of paleontology. Though the study of other branches of zoology, such as Comparative Anatomy or Embryology, might lead one to suspect that animals are all inter-related, it was the discovery of various fossils and their correct placing in relative strata and age that provided the main factual basis for the modern view of evolution.⁶

That is, the earth's vast areas and thickness of sedimentary rocks, comprising as they do about three-fourths of the earth's land surface, are supposed to have been laid down over aeons of geologic time, each layer in turn containing fossils typical of the life of the period of its own deposition. Older rocks contain only primitive forms of life, and the fossils become increasingly complex and modern in more and more recent deposits. Thus, although other evidences of evolution are circumstantial in nature, and may be explained either in terms of evolutionary kinship or in terms of direct creation, the fossil record purports to provide an actual documentary history of organic evolution.

But at the same time, the rock layers themselves are dated as to their relative antiquity by the fossils they contain!

Vertebrate paleontologists have relied upon 'stage-of-evolution' as the criterion for determining the chronologic relationships of faunas. Before the establishment of physical dates, evolutionary progression was the best method for dating fossiliferous strata.⁷

Rocks containing simple fossils are thus assumed to be old and those with complex fossils are young. The physical dates referred to are not by any means as yet considered determinative in establishing geologic age, since any radioactive dating which appeared to contradict the pre-

viously determined geologic age would be discarded immediately as erroneous.

The standard time scale is derived directly from the standard column and from no other source, except for late Pleistocene details. The fossils of the units in the standard column and of other units in other columns are still our principal guides in stratigraphic correlation, although we cordially welcome the statistical calibration of the standard column, in years, from radiometric data.⁸

There is thus clearly a very subtle circle of reasoning involved in the stratigraphic interpretation of the sedimentary rocks of the earth's crust. The basis for their relative dating is entirely paleontological, on the assumption of evolutionary progression over the geologic ages.

But then, the only real evidence for this evolutionary progression is the fossil record. And, as a matter of fact, even this is only true in small part. Dating is accomplished not by the fossil assemblages as a whole, but only by certain "index fossils," which are supposed to be sure criteria of the various specific stages in evolutionary history.

The best example of how *qualitative* and *non-statistical* paleontological correlation is, is provided by the already-mentioned fact that only a minority of fossils of most faunas (and this often amounts to the minority of one fossil species or genus only!) are reliable time indices or index fossils. The great majority of fossils are, conversely, either inferior (parachronological) time indices or have little or no practical biochronological value (ecostratigraphical indices). Any single, readily identifiable specimen or fragment of a known diagnostic ammonite, belemnite, planktonic foraminifera, graptolite, trilobite, etc., is, therefore, often more significant for the dating and correlation of the rock units concerned than all the rest of their faunas taken together.⁹

The most trustworthy indicators of evolution and geologic age, therefore, seem to be a relatively restricted number of simple marine organisms. These were presumably of worldwide provenance, so that they can be used for correlation on a worldwide basis, and are found in rather clearly distinguishable vertical series, with the simpler and less specialized forms in the lower layers, and the more complex and differentiated forms in the upper layers.

And these marine indicators, of course, are all found in stratified rocks, which originally were deposited as sediments by moving water, most probably in fairly shallow marine environments. This latter is confirmed by Krumbein and Sloss:

Taken as whole, the sublittoral environment is perhaps the most important from the viewpoint of stratigraphic analysis. Twenhofel (1950) estimated that about 80 per cent of the sediments in the geologic column were deposited in water less than 600 feet deep.¹⁰

Dr. Walter E. Lammerts, in a personal communication, has called attention to an important example of a specific index fossil and how its occurrence might well be better interpreted in terms of sedimentary sorting during deposition rather than in terms of its unique occurrence during a particular geologic age. He says:

The foraminifera group called fusulinids are considered excellent index fossils indicating the middle Pennsylvanian in distinction from the schwagerinids which are indicative of the Permian. But these schwagerinids, such as the genus *Schwagerina*, *Pseudoschwagerina* and *Parafusulina*, are quite different in both wall structure and shape. Accordingly one would expect them to be segregated into different strata strictly on this basis alone! Furthermore they may well have occupied ecologically distinctive niches and thus been buried in different places.

Many of the foraminifera are arenaceous and so would not in general be found mixed with the calcareous forms. Though unfortunately the fusulinids and schwagerinids seem to be extinct, it would be most interesting if tests could be run on the comparative rapidity with which these various genera sink in water. It is very likely, if not certain, that they would show different rates of settling, which is thus an obvious reason why they should now be found segregated into distinctive strata.

The reasonableness of this suggestion is pointed up by the fact that decanting is, right today, used as an effective method for sorting out different foraminifera specimens. Joseph Cushman, probably the greatest authority on "forams," says:

Another method by which rough sorting can be done is by decanting. If the material is shaken up in a tall vessel of some sort, the lighter specimens will stay in suspension for a short period and can be poured off, leaving the heavier ones on the bottom. Successive stages will separate most of the calcareous tests from the sand and heavier foraminifera.¹¹

The effectiveness and significance of hydrodynamic sorting, as a mechanism for producing particular assemblages which seem superficially to be chronological markers or index fossils will be discussed further in a later section. Here we merely note that even those relatively few organisms which have served as index fossils

may themselves really have a hydraulic basis, rather than genuine evolutionary or chronologic significance.

In summary, the real basis for the theory of evolution seems to consist mainly of the series of marine index fossils found in the geologic column. These are found in hardened, stratified sediments deposited originally in shallow epicontinental seas, supposedly over hundreds of millions of years of geologic time, and then uplifted in more recent times to form in many cases our present mountainous regions. The processes of sedimentation by which these great fossiliferous beds were originally formed thus become of great interest and significance.

Inadequacy of Uniformitarianism

For over a hundred years, the dogma of uniformity has been the pride and backbone of geologic interpretation. Geologic processes in operation in the present era —*especially those of sedimentation*, which are obviously the most important of all geologic processes since they have produced the rocks whose fossils form the basis of geologic analysis—are supposedly capable of accounting for all these sediments in the geologic column. In the familiar catch phrase of James Hutton, “the present is the key to the past.”

However, the principle of uniformity turns out to be entirely inadequate right at this most important aspect of geologic interpretation. Modern processes of sedimentation are in general quite incapable of accounting for the sedimentary rocks of the geologic column. This is true whether the environment of deposition is thought to be geosynclinal, deltaic, lagoonal, or some other.

As a matter of fact, it is increasingly being recognized by modern geologists that uniformitarianism has failed. It is, of course, still tenaciously held in opposition to any form of Biblical catastrophism or creationism, but it is widely acknowledged that it is not at all adequate when it comes to correlating the geologic formations with modern processes and their rates. In a recent article, a California geologist has said, for example:

The doctrine of uniformitarianism has been vigorously disputed in recent years. A number of writers, although approaching the subject from different directions, have agreed that this doctrine is composed partly of meaningless and erroneous components and some have suggested that it be discarded as a formal assumption of geologic science.¹²

Similarly, David Kitts, of the University of Oklahoma, has noted this problem:

There is widespread agreement among geologists that some special principle of uni-

formity is a fundamental ingredient of all geologic inference. . . . Despite this general agreement about the importance of the principle, geologists hold widely divergent views as to its meaning. So divergent are these views, in fact, that one is led to conclude that there has been little or no resolution of the problems which gave rise to the famous controversies between the ‘uniformitarians’ and the ‘catastrophists’ in the nineteenth century. Though the problems have not been solved, the controversy has subsided.¹³

It is thus admitted that, although uniformitarianism has not proved adequate to account for the strata, and that catastrophism has not been proved false, yet nevertheless “the controversy has subsided.” Of course, this is because the forces of naturalism and evolutionism have attained essentially universal dominance in science and any form of supernatural catastrophism is excluded from further discussion. As Valentine says:

Frequently the doctrine of uniformitarianism is used fruitfully to explain the anti-catastrophist viewpoint of history, and to illuminate the practical working method of consulting nature for clues to natural history.¹⁴

Or, as George Gaylord Simpson has put it:

It is a necessary condition and indeed part of the definition of science in the modern sense that only natural explanations of material phenomena are to be sought or can be considered scientifically tenable. It is interesting and significant that general acceptance of this principle (or limitation, if you like) came much later in the historical than in the non-historical sciences. In historical geology it was the most important outcome of the uniformitarian-catastrophism controversy. In historical biology it was the still later outcome of the Darwinian controversy and was hardly settled until our own day. (It is still far from settled among non-scientists.)¹⁵

One might note, in passing, the self-serving assumption by Professor Simpson that all who might disagree with his naturalistic presuppositions are “non-scientists,” especially since it is certainly true that neither catastrophism nor creationism can possibly be disproved “scientifically.” One can invent his own definition of “science,” of course, and frame it so as to exclude any possibility of teleological explanation, and this is what Simpson and others have done. It still remains true that uniformitarianism has proved sterile as far as much of historical geology is concerned:

It seems unfortunate that uniformitarianism, a doctrine which has so important a place

in the history of geology, should continue to be misrepresented in contemporary texts and courses by 'the present is the key to the past,' a maxim without much credit.¹⁶

The Biblical creationist, of course, has no objection whatever to the concept of the uniformity of *natural law*, as prevalent in the present cosmos. It is the assumption that present *processes* (which operate within the framework of uniform natural law) must always operate at the same rates as at present with which he takes issue. This latter assumption is even bold enough to claim that the processes, and even the laws, produced themselves, by means of themselves!

The basic distinction between the laws of nature and the processes which operate within the framework of those laws, and between a valid and a fallacious uniformitarianism, have been discussed in a previous article.¹⁷ In general it can be argued quite persuasively that the very existence of natural laws presupposes a Creator by Whom such laws were brought into existence. Since this is so, the permanence and inviolability of such laws is dependent upon the will of the Creator, and our knowledge of these characteristics is contingent upon His revelation to us concerning them.

Even within the framework of the semi-permanence of natural law and basic cosmic processes which has been established and revealed by God (Genesis 8:22), it is still true that process rates may and do vary tremendously. Each process, and the rate at which it operates, is found to depend upon many different parameters, and a change in conditions for even one of these may materially change the process rate.

For example (and this is obviously the example most pertinent to our present discussion), sediment erosion, transportation and deposition is a process that may take place very slowly or exceedingly rapidly. A very large number of variables go into the determination of sedimentation rates. An incomplete list would include:

(a) **hydraulic factors**, such as channel slope, shape and size; quantity of water available; roughness of channel bed and sides; variability of water flow; and water temperature;

(b) **topographic factors**, such as shape and size of watershed, slope and aspect of the terrain, nature of the soil and its vegetal cover, tributary network and groundwater conditions;

(c) **meteorological factors**, such as frequency and intensity of storm rainfall, direction of air mass movements, and duration of rainfall;

(d) **sedimentary factors**, such as size, shape, variability, specific gravity, and chemical character of the sediment being transported.

Other influences could be added, but even this list will indicate how futile it would be to try

to establish any kind of *average rate* of sedimentation, and then to extrapolate such a rate for hundreds of millions of years into the past to try to explain the immense sedimentary formations of the earth's crust! There is no *a priori* reason whatever why rapid (or catastrophic) formation of these beds would not provide as satisfactory an explanation—and as fully in accord with the assumption of uniform natural law—as would slow deposition over millions of years.

Mechanics of Sedimentation

In principle, it should be possible by induction to examine the character of a given sedimentary deposit; and, therefrom, to determine (1) the nature of the source area from which the sediment had been eroded initially, (2) the magnitude and nature of the water flow which had transported it, and (3) the character and extent of the basin into which it had finally been dropped. In actuality, however, owing to the excessive number of variables which may have contributed to the phenomenon, as above enumerated, it is normally quite impossible to make such extrapolations with any degree of assurance.

It is customary to consider sedimentation under the three stages of erosion, transportation and deposition. Since the first and last of these necessarily involve non-uniform conditions (either degradation or aggradation), it is easiest to consider the transportation phase first, as an equilibrium, or quasi-equilibrium, state. That is, it is assumed that the sediment transported by the flow is constant with time and distance, with any localized erosion being offset by localized deposition. Non-equilibrium conditions are then characterized either by a net erosion or a net deposition of sediment.

A great many studies have been made in laboratory flumes, and a smaller number in actual streams, of rates of sediment transport. Numerous empirical formulas have been derived and some have been employed with fair success in engineering problems. Typical of these formulas is the following,¹⁸ attributed to M. L. Albertson and R. L. Garde, of Colorado State University:

$$G_s = \frac{1.36 W V^4 n^3}{k^3 d^{1.5} D (10^{15})}$$

In this formula, G_s represents the total number of pounds of sediment being transported each second past any given point in the stream. W is the stream width, V is the velocity of flow in feet per second, and n is a channel "roughness coefficient," which measures the hydraulic resistance to flow. The depth of flow, in feet, is D , and the diameter of sediment particles is d , also in feet. The effect of temperature is measured by the "kinematic viscosity" of the water, k . Typical values of k and n might be, respectively,

about 0.00001 square feet per second, and 0.035, although they can vary over a wide range.

The formula applies only to a uniform channel, with flow at constant velocity, for sediment composed predominantly of sand grains of only one size. Even with these limitations it is able to give only very approximate answers. Many formulas attempt to distinguish between the suspended sediment load, the saltational (rolling and bouncing) load, and the bed load. Also, depending upon the velocity and other factors, the form of dunes on the bed may change materially, thus changing the hydraulic roughness and modifying the flow.

The problem of course is compounded if any of the factors become non-uniform. If there is a change in the channel cross-section, velocity, or roughness, or if the sediment is of varying sizes, then it becomes almost impossible to make calculations of sediment transport which are quantitatively accurate, although it may be possible to determine whether there will be scour or deposition.

And calculations become necessarily still more complex if non-equilibrium conditions exist—that is, if material is being eroded or deposited, instead of simply transported. It is thus quite clear that any truly quantitative understanding of the processes and rates of sediment deposition, even in the environments of the present, is still far from being attained. Consequently, the idea that the sedimentary rocks of the earth's crust, with their fossil contents, can be explained in terms of present processes of sedimentation on the application of uniformitarian principles is nothing but wishful thinking.

The Necessity of Catastrophism

Since we have no scientific basis for quantitative evaluation of ancient sedimentary processes, it is obvious that the question of catastrophism versus uniformitarianism in sedimentary interpretation is still very much an open question. If it then begins to appear that many of the present geologic formations could not have been formed at all by modern, slow, rates of deposition, the presumptive evidence for catastrophism as the most likely explanation is rendered all the stronger.

As a matter of fact, even most modern sedimentary phenomena must be attributed to brief, intense periods of sedimentation, rather than normal, slow, uniform periods. More than half of all sediments transported and deposited by modern rivers, are carried during flood periods, when the river is overflowing its banks.

There are a number of remarkable phenomena characterizing the sedimentary rocks of the earth's crust that seem to be clear evidences of catastrophic deposition and which thus belie

the evolutionist's assumption of uniformitarianism. These include among them the following:

(1) **Fossil Graveyards** It is well known that when a living organism dies, especially one of the larger animals, its remains soon disappear, because of the efficiency of scavenger organisms and the decay processes which immediately go to work on it. Yet, in the earth's sedimentary rocks, there are buried vast numbers of plants and animals of all kinds, often in great fossil "cemeteries," where thousands, even millions, of organisms may be found crushed together and buried by the sediments. Even after centuries of collecting great quantities of fossils all over the world, new "graveyards" continue to be found.¹⁹

It is a matter of the most elementary scientific logic to recognize that phenomena such as these must be attributed to very rapid burial, or otherwise they could never have been preserved. And since most such fossil graveyards have been buried in water-laid sediments, they clearly give witness to the fact of aqueous catastrophism.

(2) **Polystrate Fossils** Stratification (or layered sequence) is a universal characteristic of sedimentary rocks. A stratum of sediment is formed by deposition under essentially continuous and uniform hydraulic conditions. When the sedimentation stops for a while before another period of deposition, the new stratum will be visibly distinguishable from the earlier by a stratification line (actually a surface). Distinct strata also result when there is a change in the velocity of flow or other hydraulic characteristics. Sedimentary beds as now found are typically composed of many "strata," and it is in such beds that most fossils are found.

Not infrequently, large fossils²⁰ of animals and plants—especially tree trunks—are found which extend through several strata, often 20 feet or more in thickness. A young Dutch geologist, N. A. Rupke, has suggested that these be called "polystrate fossils" and has documented²¹ numerous remarkable examples of this phenomenon. (See Figure 1.)

It is beyond question that this type of fossil must have been buried quickly or it would not have been preserved intact while the strata gradually accumulated around it. And since the strata entombing these polystrate fossils are no different in appearance or composition from other strata, it is probable that neither was there any significant difference in the rapidity of deposition.

(3) **Ephemeral Markings** Another evidence of very rapid deposition is the preservation of what Rupke²² calls "ephemeral markings." These constitute a special type of fossil originally formed as a transient marking on the surface of a re-



Figure 1. Polystrate tree-trunk near Essen-Kupferdreh (Germany). (Photo by Klusemann).

cently deposited layer of sediment. These include such phenomena as: (a) ripple marks; (b) rain prints; (c) worm trails, and (d) bird and reptile tracks.

It is a matter of common observation that such fragile structures, once formed, are very quickly obliterated by subsequent wind or air currents or by later erosion and sedimentation. The only way they could be preserved is by means of abnormally rapid burial (without concurrent erosion), plus abnormally rapid lithification.

It would indeed be difficult, if not impossible, to point to examples of such fossils in the process of formation at present. Sudden burial by turbidity currents is frequently suggested. For example, Adolf Seilacher, Geologisches Institut University of Frankfurt, Germany, says:

The post-depositional sole trails of *Flysch psammites* occur only in thinner beds up to a thickness particular to each species. This proves instantaneous deposition of the in-

dividual beds, as postulated by the turbidity-current theory. The majority of the sole trails are predepositional mud burrows washed out and sand cast by turbidity currents. Thus erosion of an unusual type must have preceded every turbidite sedimentation.²³

But the remarkable fact is that "ephemeral markings" of this type are found in great abundance in the ancient sedimentary rocks of practically all geologic "ages," including the most ancient. Furthermore, they appear equally fresh, when exposed in the present time, regardless of what the particular geologic age is supposed to be, whether Proterozoic or Tertiary or anywhere in between. It seems quite clear that only some kind of overwhelming catastrophic sedimentary phenomenon can really account for these markings and their preservation.

(4) **Preservation of Soft Parts** Numerous instances are known where the fossil remains do not consist of petrification or molds or the like, but where the actual soft tissues of the organism have been preserved. This is true even in very "ancient" strata, and often such fossils are found massed together in large numbers.²⁴ Not only do these deposits speak plainly of very rapid burial by the sediments, but they also make the contention that they have remained unaffected by decay, erosion, etc., for many millions of years exceedingly difficult to believe.

(5) **Phenomena of Stratification** Not only do the fossils contained in the sedimentary strata demonstrate the necessity of catastrophic deposition, but the very strata themselves indicate this. As already noted, most of the earth's surface is covered with sediments or sedimentary rocks, originally deposited under moving water. This in itself is *prima facie* evidence that powerful waters once covered the earth. Furthermore, as already mentioned, even under modern conditions most sedimentary deposits are the result of brief, intense periods of flood run-off, rather than slow, uniform silting.

Laboratory evidence that a typical sedimentary deposit may form quite rapidly is found in the work of Alan Jopling at Harvard, who made a long series of studies on delta-type deposition in a laboratory flume and then applied the results to the analysis of a small delta outwash deposit, supposedly formed about 13,000 years ago. His conclusion was as follows:

It may be concluded therefore that the time required for the deposition of the entire delta deposit amounted to several days . . . Based on the computed rate of delta advance and the thickness of individual laminae, the average time for the deposition of a lamina must have been several minutes.²⁵

The fact that many sedimentary formations in the stratigraphic column consist of gravels or conglomerates, or even boulders, is further testimony to hydraulic activity of high intensity, as is the frequent occurrence of "cross-bedding" phenomena, indicating rapidly changing current directions.

(6) Alluvial Valleys Practically all modern rivers course through valleys that once carried far greater volumes of water than they do now. This is indicated not only by the universal presence of old river terraces high on the valley walls but even more by the vast amounts of sands and gravels lying beneath the present flood plains, which now fill what were formerly the stream channels.

Subsurface explorations of meandering valleys in the Driftless Area of Wisconsin, by means of a refraction seismograph, reveal large filled channels similar to those previously determined in English rivers where the augering technique was used. The channels are asymmetrical in cross profile and attain their greatest depths at valley bends. In cross-sectional area at probable bankfull they are some 25 times as large as the present stream channels.²⁶

This sort of thing is practically universal. The Mississippi Valley, for example, consists of alluvial deposits extending to depths of 600 feet! All of this indicates that the rivers of the world, in very recent times (probably during and after the continental uplifts terminating the year of the Great Flood) carried tremendous volumes of water and sediment.

(7) Incised Meanders Another universal characteristic of alluvial streams is the phenomenon of meandering. Many analytical and experimental studies have been made to determine the cause and mechanics of meandering, but these have only been partially successful. It is well accepted, however, that stream meandering requires relatively mild stream gradients and easily eroded banks. If the slopes are steep and the sides resistant, then erosion will occur primarily at the beds and the stream will cut down essentially vertically, forming a canyon section.

Most remarkable, therefore, are the intricate meandering patterns found frequently incised in deep gorges in high plateau and mountainous areas. These would seem to defy any explanation in terms of the ordinary hydraulics of rivers, and geologists' suggestions (superposed meanders, for example!) seem to be oblivious of such hydraulics.

Clearly some kind of catastrophic origin is indicated. Great regions of horizontal sedimentary beds, still relatively soft and erodible when uplifted following the Deluge, riven by great fis-

tures during the uplift process, possibly provide a realistic model of conditions suitable for formation of these structures. The initial cracks could have been rapidly widened and deepened into the present meandering gorges as great volumes of water were being rapidly drained off the rising plateaus.

Evidence of a Single Depositional Epoch

The above is not of course a complete, but only a representative, list of evidence of aqueous catastrophism. Neither does the scope of this paper allow for discussion of various types of formations which superficially may seem to require very slow process rates. This has already been done to some extent elsewhere.²⁷

It can be said that in general catastrophism provides a very adequate framework of interpretation for most, and probably all, the features of the known geologic column. Uniformitarianism, on the other hand, while satisfactory as a framework for some parts of the data, seems utterly inadequate to account for most of them.

There is one question, however. Even though admitting the validity of the concept of aqueous catastrophism to explain many of the geologic phenomena, as many geologists readily are doing today, there is still almost universal resistance to the idea of one, single, catastrophic epoch such as described in the Bible. Historical geologists still prefer a general framework of uniformitarianism and great ages, even though they are willing to recognize any number of intense and widespread floods and other local catastrophes occurring within that framework.

Thus the question is whether the numerous evidences of catastrophic sedimentation, including those discussed in the preceding pages, were caused by one great cataclysm or by a great number of lesser catastrophes.

If it were not for the religious implications, and were it only a matter of seeking a logical explanation of the actual physical data, the application of the principle of Occam's Razor (which cautions against the unnecessary multiplication of hypotheses) would lead quickly to a decision in favor of the one great cataclysm.

To insist that there have been great numbers of violent geologic catastrophes (in all parts of the world and through all the aeons of geologic time) sufficient to explain the many evidences of catastrophism; and further knowing (a) that many of these catastrophes must have been far greater than anything ever observed in the modern world, and (b) that uniformitarianism is utterly inadequate to incorporate them within any kind of experimentally quantitative framework, would surely seem to suggest a strong religious bias against the concept of the Biblical record of the great Deluge and favoring an evolutionary interpretation of history.

The various evidences for catastrophism cited previously—the fossil graveyards, polystrate fossils, ephemeral markings, and others—are generally found more or less indiscriminately among strata throughout the entire geologic column. There are no evidences of progressive changes in the characteristics of catastrophism throughout the supposed geologic ages, such as should be expected in response to changing climatic and geophysical regimes as postulated throughout the earth's evolution. Sedimentary deposits of the Proterozoic Era have essentially the same physical characteristics as those of the Tertiary, or any others, the only significant difference being the fossil assemblages, especially the index fossils, contained in them.

And of course the fossil assemblages themselves are better explained in terms of aqueous cataclysm than of evolutionary uniformitarianism. They are supposed to show increasing complexity, and therefore evolution, with the passage of geologic time, but this interpretation is belied by the fact of the great gaps which exist between all the major kinds of creatures in the fossil record, which gaps are essentially the same as the gaps between the same kinds of plants and animals in the modern world.

The fact that, in general, the fossils are found segregated into assemblages of similar sizes and shapes is exactly what would be expected as a result of diluvial processes, since turbulent water is a highly effective "sorting" agent. In his flume studies at Harvard, Jopling found, for example, that even when the flows were steady and uniform, and when the sediments transported were randomly mixed to begin with, the flow would sort them out.

Segregation invariably occurs even when uniform conditions of sediment transport prevail, and where the various size grades of the sediment have been thoroughly mixed to begin with. This segregation occurs on either a plane, rippled, or duned bed, and it is evident in both the transverse and longitudinal directions.²⁸

This sorting action is basically produced because the amount of hydrodynamic "lift and drag" forces on immersed objects are directly related to the size and shape of the objects. The same applies, of course, to objects falling vertically through water, so that objects which are simpler in shape (and thus, supposedly, more "primitive") would tend to settle out of a decelerating flow more rapidly and thus be buried more deeply than would objects of complex geometry. This tendency would be further augmented by the fact that these simpler organisms (shells, for example) normally are of somewhat greater specific gravity than "higher" organisms.

It would be reasonable to expect, therefore, that the hydraulic activity of a worldwide Flood would tend to deposit organisms of similar sizes and shapes together, and that the depth of burial would be in order of increasing complexity from the bottom up. Furthermore, this is directly parallel to the elevation of the normal habitat of organisms.

Other things being equal, since the simpler organisms dwell at lower elevations, it would be expected that they would be buried at lower elevations. And still further, the mobility of animals is rather closely related to their complexity, so that higher animals would escape burial for longer periods.

All of these factors would contribute toward the preservation of fossils in the Flood sediments in just the order in which they are now usually found, whereas the usual evolutionary interpretation is obviously inadequate.

These three factors,—hydraulic, ecologic, and physiologic—would of course tend to act only statistically, rather than absolutely, so that the very numerous exceptions to the usual order which have been found are not particularly surprising. They *are* an embarrassment to the evolutionist, however, since fossils in the wrong stratigraphic order would indicate a reversal of evolution and thus completely upset the assignment of geologic ages.

It is typical of evolutionary reasoning that such anomalies and contradictions can never be allowed to bring into question the basic assumption of evolution. Consequently, a further multiplication of hypotheses is employed, invoking the possibility of great earth movements as a means of explaining how the fossiliferous strata have been rearranged into the "wrong" order. Vast horizontal "thrust faults" by which great thicknesses of sedimentary strata have been uplifted and then translated horizontally over the adjacent regions, have typically been offered as mechanisms explaining the many areas where "ancient" fossil-bearing formations have been found on top of "recent" formations.

It is interesting that another hydraulic principle has been employed to explain how such movements are possible, since it is well known that ordinary mechanical sliding, even if the sliding planes were lubricated, would be physically impossible on such a large scale without completely destroying the structural integrity of the sliding formations. The presently accepted explanation is that the thrust block was "floated" into place by abnormally high internal fluid pressures along the thrust plane.

These pressures, in order to be effective, would have to be far higher than in ordinary ground water and are supposedly caused by compres-

sion of water trapped in the sedimentary interstices when the sediments were originally deposited. That is, as the original sediments were gradually compressed and lithified, the "connate water" contained in the soil pores was somehow sealed off from any possible escape channels and was eventually so compressed as to develop elastic pressures capable of actually lifting and "floating" the huge rock overburden above it.

This is indeed a remarkable hypothesis. The "seal" around the sides of the thrust blocks (not infrequently hundreds or thousands of square miles in extent) must have been quite elastic itself, permitting great vertical and horizontal motions of the block and yet preventing any escape of the highly compressed water in the process. In a cogent analysis of this hypothesis, Platt has pointed out:

Obviously an important factor is the quality of the seal that forms in the clay or shale. No matter how small the permeability in the relatively impermeable layer that effectively seals the connate water beneath the thick sequence, some leakage does occur. . . . Hence, if fluid support is to be available to 'float' the rocks, the thrust movement must occur soon (geologically) after the deposition of the final weight of the thick sediments. If the delay is sufficient, the seal of shale becomes very good, but there is no fluid left to seal off.²⁵

This requirement for early flotation of the block, suggested by Platt, of course is at cross purposes with the long period of time supposedly required for compression and lithification of the sediments before the fluid could develop the required pressures. The even more important problem of how the necessary seal could be maintained during the period of thrust action is not mentioned at all.

It is concluded, therefore, that the concept of one great hydraulic cataclysm, accompanied by great volcanic and tectonic activities, on a worldwide scope, provides a much more realistic model to explain the sedimentary strata and the fossil record, than does the philosophy of evolutionary uniformitarianism, with its utterly unscientific multiplication of hypotheses and manipulation of data.

References

- ¹This paper was originally presented at the Christian Schools Conference, held at the St. Thomas Episcopal School, Houston, Texas, April 15-17, 1967.
- ²Committee on Sedimentation, "Sediment Transportation Mechanics: Nature of Sedimentation Problems," *Journal of the Hydraulics Division, American Society of Civil Engineers*, Vol. 91, No. HY2, March 1965, pp. 251-266.
- ³Portions of the following discussion have been taken from an article by the author entitled "Hydraulics, Sedi-

mentation and Catastrophism," *Creation Research Society Quarterly*, Vol. 3, May 1966, pp. 51, 52.

⁴James H. Zumberge, *Elements of Geology*. Second Edition. New York, John Wiley and Sons, 1963, p. 44.

⁵Malcolm C. McKenna, "The Undersea History of America," *Science Digest*, Vol. 57, April 1965, pp. 90-91.

⁶G. A. Kerkut, *Implications of Evolution*. Oxford, Pergamon Press, 1960, p. 134.

⁷J. F. Evernden, D. E. Savage, G. H. Curtis, & G. T. James, "K/A Dates and the Cenozoic Mammalian Chronology of North America," *American Journal of Science*, Vol. 262, February 1964, p. 166.

⁸A. O. Woodford, "Correlation by Fossils," in *The Fabric of Geology*. Edited by C. C. Albritton, Jr. Reading, Mass., Addison-Wesley, 1963, p. 108.

⁹J. A. Jeletzky, "Is it Possible to Qualify Biochronological Correlation?" *Journal of Paleontology*, Vol. 39, January 1965, p. 138.

¹⁰W. C. Krumbein and L. L. Sloss, *Stratigraphy and Sedimentation*. Second Edition. San Francisco, W. H. Freeman Co., 1963, p. 261.

¹¹Joseph A. Cushman, *Foraminifera, Their Classification and Economic Use*. Fourth Edition. Cambridge, Harvard University Press, 1950, p. 27.

¹²James W. Valentine, "The Present Is the Key to the Present," *Journal of Geological Education*, Vol. XIV, April 1966, p. 59.

¹³David B. Kitts, "The Theory of Geology," in *The Fabric of Geology*. 1963, p. 62.

¹⁴James W. Valentine, *Op cit*, p. 60.

¹⁵George G. Simpson, "Historical Science," in *The Fabric of Geology*. 1963, p. 32.

¹⁶James W. Valentine, *Op cit*, p. 60.

¹⁷Henry M. Morris, "Science Versus Scientism in Historical Geology," *Creation Research Society Quarterly*, Vol. 2, July 1965, pp. 19-28.

¹⁸For a discussion of the background of this equation, as well as other methods used in sediment calculations, see *Applied Hydraulics in Engineering* by Henry M. Morris. New York, Ronald Press, 1963, pp. 321-336. This is a standard textbook for senior and graduate courses in hydraulic engineering, currently used at about 75 colleges and universities.

¹⁹A typical recent example is described by W. W. Dalquest and S. H. Marnay, "The remains of 400 or more Permian amphibians were found in a series of siltstone channels confined to an area 50 feet square The fossils are mostly or entirely of heavy-bodied, weak-limbed forms that probably could not walk about on land." in "A Remarkable Concentration of Permian Amphibian Remains in Haskell County, Texas," *Journal of Geology*, Vol. 71, September, 1963, p. 641.

²⁰N. A. Rupke, "Prolegomena to a Study of Cataclysmal Sedimentation," *Creation Research Society Annual*, Vol. 3, May 1966, No. 1, pp. 16-37. Another instance, not described by Rupke, is mentioned by F. M. Broadhurst in an article entitled, "Some Aspects of the Paleogeology of Non-Marine Faunas and Rates of Sedimentation in the Lancashire Coal Measures," *American Journal of Science*, Vol. 262, Summer 1964, pp. 865-6. He says:

In 1959 Broadhurst and Magraw described a fossilized tree, in position of growth, from Coal Measures.
(Continued on page 115)

THE ORIGIN OF THE BLUE-GREEN ALGAE

GEORGE F. HOWE*

Blue-green algae are fascinating microorganisms which have an astounding cellular complexity all of their own. An illustrated discussion of cell structure, spores, and reproduction in blue-green algae is presented.

*Fossil remains of blue-green algae are quite similar to living forms. Arguments from homology or parallelism show that in different aspects blue-green algae variously resemble red algae, green algae, *Zea mays*, or bacteria! Most evolutionists believe, however, that bacteria and blue-green algae have evolved from a close common ancestry. Much evidence is presented here from writings of Pringsheim and other workers to show that there are great differences in spores, pigments, biochemistry, and movement between bacteria and blue-green algae. These differences are strong evidence in support of the view that the various kinds of blue-green algae and bacteria were separately created.*

Introduction

The origin of blue-green algae has been of perennial interest in biology. In this paper, evidences from the fields of paleontology, cytology, taxonomy, and biochemistry will be examined. Before the beginnings of blue-green algae are probed, however, a brief review of their basic structure will be presented.

Blue-green Algae Structure

Blue-green algae exist as single cells or simple multicellular colonies of variable shape. Generally a mucilaginous sheath surrounds the cell or colony of cells. Various photosynthetic pigments are present in the lamellar membrane system that is seen at the peripheral portion of the protoplasm in each cell. Other blue and red pigments are present in the soluble portions of the cytoplasm.

In the central region of the cell and ranging into the entire protoplasm is a nuclear zone that is relatively clear, non-pigmented, and irregularly shaped. Ribosomes and various droplets or granules are seen throughout the cells.

In cell division the new cell wall usually grows inward like a closing diaphragm in a camera. Various cellular inclusions are present and a common photosynthetic storage material in blue-green algal cells is glycogen.

Blue-green algal cells are noteworthy for the cellular structures that they do not possess. They generally have no flagella, no organized chloroplasts, no mitochondria, no endoplasmic reticulum, no nuclear envelope, no nucleolus, no mitotic figures, and no known protoplasmic streaming.^{1,2,3}

Colonies

Colonial blue-green algae exist either in filamentous or non-filamentous colonies. Many of the families have thread-like colonies.

Filamentous threads result from cell division in one plane and may be straight (see *Oscillatoria* in Figure 1, or *Lyngbya* in Figure 2) or spiral

(*Spirulina*). One or more of such threads surrounded by a sheath is known as a "filament." The threads may have nearly the same width for cells throughout the entire colony (as in *Oscillatoria* or *Lyngbya*, Figures 1 and 2), or they may be wider at one end, tapering down to a cylindrical hair at the other end (see *Rivularia*, Figure 4).

The non-filamentous colonies seen in other species of blue-green algae may be in various shapes such as flat plates, cubes, or irregular cell clusters. In some forms spherical shaped colonies are produced.

Blue-green algal cells reproduce by a kind of simple cell division. Entire colonies can also reproduce by chance fracture. Certain cells within a filament may die, creating biconcave "separation discs" (Figure 3).^{4,5,6} The thread then contains several short segments called "hormogonia" that are held together only by the mucilaginous outer sheath (Figure 3).

Fracture of the sheath subsequently liberates the hormogonia each of which may yield a new trichome by repeated cell division. The hormogonia segments possess an amazing degree of motility and thus serve as colonial reproductive units. The basis and mechanism of this movement of hormogonia is still one of the unsolved mysteries of microbiology.

Heterocysts

Although no gametes or flagellated spores have ever been noted among the various blue-green algae, resting spores of a sort have been reported.

Along the threads of certain blue-greens, cells known as "heterocysts" stand out because of their large size, thick wall, clear contents, and so-called "polar granules." Some "terminal heterocysts" (Figures 4 and 5) may arise at the tip of the thread. Others known as "intercalary heterocysts" (Figures 6 and 7) may form somewhere in the midst of the colony.

A cell destined to become a heterocyst enlarges its end walls, becomes rounded, and forms another wall internal to the existing cell wall.

*George F. Howe is Associate Professor of Biology at Westmont College, Santa Barbara, California 93103. He holds the Ph.D. degree from Ohio State University.

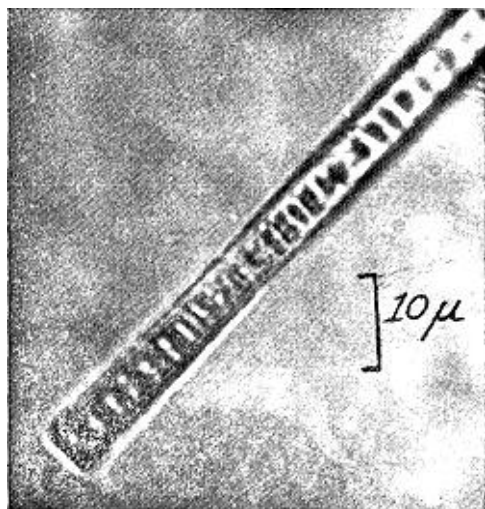


Figure 1. *Oscillatoria* sp. 1000X.

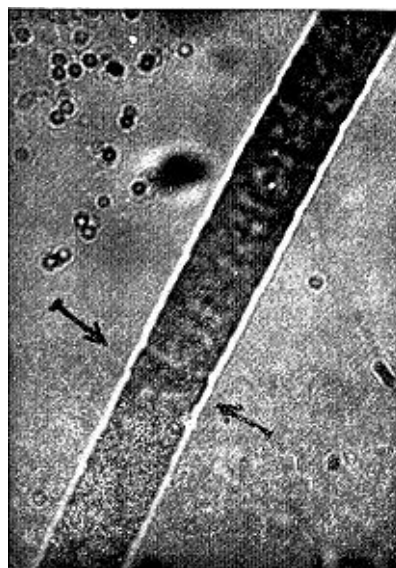


Figure 2. *Lyngbya* sp. 1000X. Typical "separation disks" are seen at arrows.



Figure 3. *Lyngbya* sp. 1000X. Biconcave "separation disks" at arrows indicate dead cells.

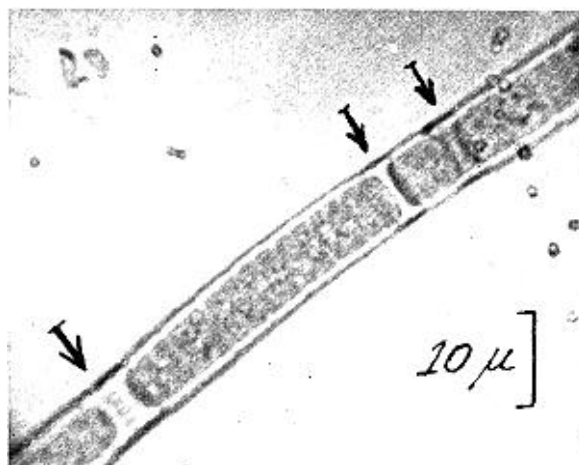


Figure 4. *Rivularia* sp. 1000X. Terminal heterocyst is visible. Arrow points to polar granule inside heterocyst.

Each end of the developing heterocyst appears to connect to its neighboring cell in a filament by a protoplasmic connection which apparently passes through an end pore. A thickening of the new cell wall around these two end pores creates a collar or nodule visible at either end of the heterocyst—the "polar granule" (Figures 4 and 5).

Heterocysts have been observed to germinate and form new thread-like colonies. In some species 80% germination has been noted and this fact suggests that the heterocyst serves in reproduction as a resting spore. Even in a structure so apparently simple and transparent there is structural detail and functional purpose that is in itself a testimony to the skill of the Creator.

Endospores

In certain blue-green algae the protoplasm of one cell divides many times within the old wall, giving rise to numerous small cells known as "endospores." The endospores secrete a thin wall around themselves when they are liberated from the old cell wall which ultimately dissolves. The two families that show such endospore formation have a complete absence of normal cell division and thus the endospore formation appears to be their sole reproductive mode.⁷

Nuclear Material and DNA

One of the most puzzling features of the blue-green algal cell is its nucleus which apparently has no membrane, no chromosomes, and no



Figure 5. *Rivularia* sp. 1000X. Two filaments of *Rivularia* are seen. Terminal heterocyst is visible on each filament. Cells farther back from the tip or heterocyst have a narrower width.

mitotic spindle. When viewed under a light microscope, the blue-green cells manifest a clear colorless central zone. This central region is known as the "nuclear material" because it gives a positive feulgen DNA stain.

The shape and structure of this nuclear region has been examined with the electron microscope. It is apparently an irregular network of channels and lobes which may extend some distance out into the cytoplasm. Many fine fibrils are noted in the nuclear region under the electron microscope. Such fine fibrils have been located in the same cellular zones that yield the feulgen DNA response. Thus the cytologic structure of a blue-green algal nucleus is somewhat like the nuclear region of a typical bacterial cell.

Blue-green Algal Origins

Paleontology

The most direct evidence bearing on the history of any group is its fossil record. Fossil remains of the blue-green algae indicate that very little change has occurred in these types since the time that the deepest fossil layers were deposited. "The fossil record contributes little to our understanding of evolutionary trends in the blue-green algae . . . Other fossil cyanophyte [blue-green algal] genera have been described, but in general the structure of fossil forms is

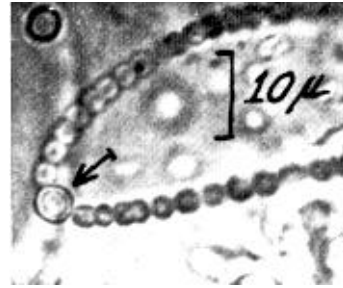


Figure 6. *Nostoc* sp. 1000X. Intercalary heterocyst is seen at the arrow.

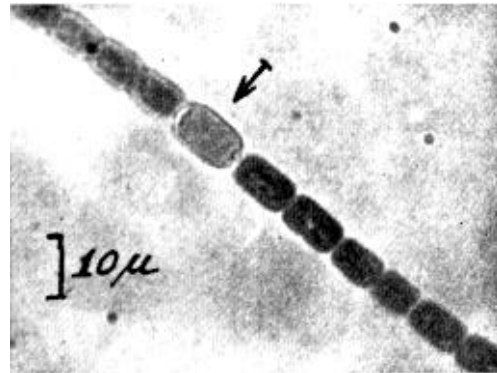


Figure 7. *Anabaena* sp. 1000X. Intercalary heterocyst is seen at the arrow.

similar to that of modern ones."⁸ This clear resemblance between fossil forms and living types is a strong argument favoring the persistence and fixity of distinct kinds. In four instances that follow, this fact will be demonstrated.

(a) *Gloeocapsamorpha* is a fossil that appears to have been a blue-green alga. It is quite similar in appearance to the *Gloeocapsa* types found on earth today. "*Gloeocapsamorpha* is found in Ordovician deposits, and as the name implies, bears considerable resemblance to the familiar *Gloeocapsa*."⁹

(b) *Girvanella*, a fossil of so-called Cambrian rocks, is quite like the modern blue-green alga *Symploca*. Speaking of *Girvanella*, Desikachary has said that it ". . . may be related, if not identical to the modern *Symploca*."¹⁰

(c) The blue-green *Maripolia* of British Columbia mid-Cambrian layers closely resembles *Schizothrix* types alive today.¹¹

(d) *Archaeothrix oscillatoriformis* of the famous Devonian Rhynie chert beds of Scotland is like the modern *Oscillatoria* (Figure 1) seen nowadays.¹²

Thus evidence for an evolutionary origin of blue-green algae or of any wholesale transformism within the groups of blue-green algae is completely lacking in the fossil series.

Analogy and Cytological Parallelisms

Some widely different animal forms such as butterflies, bats, birds, and fossil reptiles have wings. When an organ of common function (such as the wing) is seen in creatures of diverse anatomy, biologists call the resemblance an "analogy." Analogy demonstrates that similar patterns can be seen in creatures that are not closely related.

The fact of analogy is one of the strongest arguments against the general evolution theory because it is almost impossible to imagine that such organs as wings could arise in entirely different groups by natural selection. A baffling analogy is seen among the groups of blue-green algae.

Heterocysts and Parallelism

The various families of the blue-green algae that bear heterocysts are otherwise quite separate in any evolutionary sense (*Rivulariaceae*, *Nostocaceae*, and *Stigonemataceae*). Tilden¹³ has envisioned the families with heterocysts as "... apices of widely diverging lines of development." Yet all three families manifest heterocysts.

Such parallelism of a basic pattern in groups that are otherwise quite diverse is a roadblock to evolution theory. "Both the origin and the function of the heterocyst remain surrounded in mystery, although no algal structure has received more widespread or intensive study."¹⁴

However, as mentioned earlier, it seems quite clear that these heterocysts are resting spores designed to resist extremes of cold, drought, heat or other adverse environmental factors. Could it be that, here again, preoccupation with presumed evolutionary trends has blinded investigators to rather obvious examples of wonderfully designed structure?

Cytological Parallelisms between Red and Blue-green Algae

Certain members of the blue-green algae show definite connections between neighboring cells in a filament. This situation remarkably resembles the Floridean red algae in which "pit" connections of cytoplasm link all cells of the same strand together.¹⁵

Red algae and the blue-greens possess various prominent phycobilin pigments in common. The exact phycocyanin or phycoerythrin pigment molecules of the blue-green algae do not necessarily correspond to specific phycobilins of the red algae; nevertheless, such a general similarity of photosynthetic pigments is a noteworthy parallelism. On these cytologic bases, some workers suggest a close affinity (and presumed common ancestry) between the red and the blue-green algae.

Yet there are numerous reasons for recognizing that the red and the blue-green algae are probably not related. Blue-green algal cells have no organized nucleus, no organized chloroplasts, and only a relatively simple cell structure, which more closely resembles the bacteria than it does the red algae.

The red algal plants have nuclei, chloroplasts, and a more complex body organization. The two groups that are so different in many ways and yet so similar in other features point towards creative activity, not to an evolutionary ancestry.

Glycogen, Parallelism, and Phylogeny

Zea mays (common farm corn), mammals generally, and the blue-green algae all possess glycogen as a common storage product! When it is remembered that most other algae and most other flowering plants do not produce glycogen, such parallelism in widely different forms is hard to understand or even explain in terms of an evolutionary transformism.

Taxonomic Evidence and Blue-green Algal Ancestry

Green Algae

Even the non-biological reader will realize that it is helpful to classify similar plants together and to separate different plants into groups. This segregating and categorizing of living forms is known as "taxonomy". Taxonomists try to group on the basis of meaningful similarities and to separate because of key differences.

Certain plants are known as "green algae" and are put into a different category than the blue-green algae being studied. Green algae are really quite different from blue-green algae in that the greens possess an organized nucleus, an organized system of chloroplasts, and very frequently have motile gametes that function in sexual reproduction.

Despite all of these and other taxonomic differences between the two types of algae, certain blue-green algae bear a striking superficial resemblance in form to individual species or genera of green algae. Only three examples will be listed, but the interested reader will discover others in the reference given.

(a) *Elaktothrix* (a green alga by taxonomy) is amazingly similar to *Dactylococcopsis* of the blue-greens.¹⁶ Both forms have fusiform cells lying more or less parallel in a gelatinous matrix.

(b) Both *Dictyosphaerium* (a green alga) and *Gomphosphaeria* (a blue-green alga) have a stalked, branched, gelatinous mass of threads holding the various cells together.

(c) Normal vegetative cell division is strangely lacking in both the *Chlorococcales* order of the green algae and in certain families of the blue-green algal order *Chamaesiphonales*!

Bacteria

Although there is some similarity (analogy) between the blue-green algae on the one hand and the red or green algae on the other, it is usually proposed that the blue-greens are most closely allied to the bacteria. Thimann¹⁷ expressed the opinion that there is a close ancestral affinity between the bacterium *Rhodomicrobium vaniellii* and the blue-green algae. Thimann also stressed the similarity between the blue-greens and the bacteria in the matter of crosswall formation during cell division.¹⁸

It must be acknowledged that there are undoubtedly similar patterns of crosswall formation in both of these groups. Yet crosswall formation itself can be misleading taxonomically since some typically "plant" cells, such as the spore mother cells in flowers of certain flowering plants, have a cell wall formation by "cleavage furrow" that is strangely similar to the typical "animal" wall formation in division. Here is a case of parallelism between members of different biological kingdoms! Yet no one suggests that flowering plants and frogs are closely allied because they both can have cleavage furrows separating cells in cell division.

The bacteria and the blue-green algae both have "atypical" nuclei which generally lack a nuclear membrane and show no mitotic division figures. But here again nuclear parallelisms are no more of an absolute indication of ancestral affinity than are cell wall or chromosomal parallelisms.

Nuclear similarities between blue-green algae and bacteria are instructive but certainly do not indicate common ancestry. Concerning the supposed relationship between blue-greens and the bacteria, Kingsbury stated that the "... cells of blue-green algae have long been considered basically different from those of bacteria. Bacterial cells are, on the whole, much smaller."¹⁹

Evidence for the existence of a so-called bacterial "chromosome" is well-known. Both cytologic studies in the form of electron photomicrographs and genetic data indicate that in a process of sexual reproduction a "donor" bacterial cell injects chromosomal material (DNA) into a recipient bacterium. Enough genetic experimentation has been undertaken with the colon bacterium, *Escherichia coli*, to permit a provisional mapping of genes.

The blue-green algae have never been observed to reproduce sexually. Whether this indicates that they truly differ from bacteria in a complete absence of a sexual process or whether more studies will demonstrate sexuality is hard to predict. I am unaware of any extensive genetic studies on the blue-green algae.

As noted earlier, there is strong evidence for the presence of DNA in the central nuclear-region of each blue-green cell. This would suggest that future genetic analyses of blue-green algae will indicate the presence of genes and gene mutations. It can be concluded presently that in the possession of an "atypical" nucleus the blue-green algae indeed resemble the bacteria. In the absence of any observed or recorded sexual reproduction, the blue-greens differ markedly from the bacterial forms.

There are other salient objections to the suggestion that blue-green algae and bacteria might have evolved from a common ancestry. In his brilliant work, Pringsheim²⁰ has demonstrated the tenuous nature of such alleged relationships. Although Pringsheim did not completely agree with Dubos on the following statement, he quoted Dubos as having said,

One finds among bacteria organisms which show strong resemblances to certain of the blue-green algae, to the fungi, to the myxomycetes, or to the protozoa, and which can only be distinguished from these microorganisms by their much smaller size. . . . It appears more likely, however, that these microorganisms [the bacteria] constitute a heterogeneous group of unrelated forms.²¹

Dubos' statement would indicate that the bacteria are not only unrelated to the blue-green algae as a whole, but various kinds of bacteria may very well be unrelated to each other!

Endospores

Some workers have argued that the endospores of certain blue-green algae indicate a relationship to bacteria. However, "No Myxophyceae [blue-green alga] produces endospores comparable to those of Bacteria."²² The endospores of certain blue-green algae are formed in great numbers within one old cell wall, as seen earlier in this paper.

Likewise it was noted earlier that endospores in blue-green algae are generally formed only in groups that have no normal cell division mechanism. Bacterial endospore formation occurs in cells that can likewise carry on the normal division process. Thus the so-called "endospores" of the blue-greens cannot be equated with the endospores of bacteria.

Pigments

Concerning pigmentation, the blue-green algal chlorophyll-a is different than the bacteriochlorophyll of photosynthetic bacteria. This criterion is enough to suggest that they should be put into separate classes or even divisions (botanical counterparts of the zoological phyla) if the same reasoning used in delineating the green, red, and brown algal divisions be used here, Pringsheim

nicely summarized all of this information when he wrote, "The pigmentation does not afford any indication of relationship between bacteria and the Myxophyceae [blue-green algae]."²³

Biochemical Versatility

The various bacteria manifest an impressive array of physiological activities such as causing diseases, enhancing decomposition, and fermenting numerous organic compounds. Pringsheim says:

Nothing of the kind occurs in the Myxophyceae. In this respect the former [bacteria] approach more nearly to the Fungi, while Myxophyceae [blue-green algae] resemble the Algae, in correspondence with the possession of assimilatory pigments. Although some nitrogen fixating Myxophyceae exist, there is nothing like the "chemo-autotrophy" of bacteria.²⁴

Movement

Bacteria can swim (although some either "creep" or "glide") whereas the blue-green algae creep only. Bacteria often possess flagella, but none of the blue-green algae are known to have such whip-like organs of motion. Likewise, gliding or creeping is a hallmark of blue-greens: "No true bacterial organism (i.e., excluding colorless Myxophyceae and Myxobacteria) exhibits gliding movements."²⁵

Thus Pringsheim has suggested that those bacterial forms that creep are not typical bacteria. Despite a possible overlap of creeping forms in both groups, it is strikingly true that no blue-green algae have flagella while numerous typical bacteria do.

Pringsheim has written an extensive discussion on how each of the groups thought to be a "missing link" between the bacteria and the blue-green algae is not a link at all. Some of the groups are blue-greens, others are actually bacteria, and still others appear to be separate groups not related to either the blue-green algae or the bacteria.

These arguments against any close affinity between blue-greens and bacteria have been nicely summarized by a few succinct statements.

From the consideration of facts given in this review, it emerges that there is no affinity between the Bacteria and Myxophyceae. . . . There is therefore no indication that any member of the Bacteria has originated from the Myxophyceae.²⁶

Origins Summary

Some workers will always prefer to believe that the blue-green algae; the bacteria; the red, brown, and green algae; and all living things are somehow related to each other through branching of a theoretical ancestral tree, by some process of neo-Darwinian transformism.

On the basis of the scientific data available, however, it appears that life did not arise naturally from non-living matter; and, likewise, it appears that the various kinds of living organisms are not organically related to each other by any common evolutionary descent.

It is more in harmony with the scientific evidences to assume that life comes from life and that like begets like, as both Pasteur and Virchow have demonstrated. Although some minor variations (mutations, polyploidy, etc.) occur within the basic kinds, evidences in support of any comprehensive evolutionary "tree" are lacking.

It is suggested that more rapid progress will be made in discovering various unknown features of the many kinds of blue-green algae if each one is examined from the viewpoint of creative design. Thus, the heterocysts certainly need more detailed study as to precisely what environmental adversity they are designed to withstand. Likewise, investigation of the DNA structure of blue-green algae may very well lead to modifications in our ideas as to just how this complex mechanism functions both as regards regulation of heredity and development of the organism.

Evidence from many phases of biology (paleontology, cytology, taxonomy, and biochemistry) nicely supports the idea that many "kinds" of living organisms were originally designed and established by the Creator as outlined in Genesis chapters 1 and 2 of the Holy Bible. Such careful creation of distinct and virtually unchanging groups or "kinds" appears to apply not only to man, the larger animals, and the more complex plants, but also to the many discreet forms of microscopic life, such as the many separate types of blue-green algae and bacteria.

References

- ¹Smith, G. M. 1950. The fresh-water algae of the United States. Second Edition, McGraw-Hill Book Co., Inc., N. Y., p. 539.
- ²Desikachary, T. V. 1959. Cyanophyta, Indian Council of Agricultural Research, New Delhi. p. 3.
- ³Ris, H., and R. N. Singh. 1961. Electron microscope studies on blue-green algae. Jour. of Biophysic. and Biochem. Cytol. 9: 63-80.
- ⁴Desikachary, *Op. cit.*, p. 37.
- ⁵Smith, *Op. Cit.*, p. 549.
- ⁶Hill, J. B., L. O. Overholts, H. W. Popp, and A. R. Grove, Jr. 1960. Botany, a textbook for colleges. Third Edition. McGraw-Hill Book Co., Inc., N. Y., p. 35.
- ⁷Tilden, Josephine E. 1935. The algae and their life relations. The University of Minnesota Press, Minn., Minn., p. 62.
- ⁸Delevoryas, Theodore. 1962. Morphology and evolution of fossil plants. Holt, Rinehart, and Winston, N. Y. p. 12.
- ⁹Hill, *Op. Cit.*, p. 11.

(Continued on page 115)

A SUMMARY OF THE MONERA FALLACY

N. A. RUPKE*

During the second half of the previous century evolutionists tried to fill up the gap between matter and life by creating the group of the **Monera**. Defined as being extremely simple the **Monera** were assumed to support or even to prove spontaneous generation. Detailed descriptions of various **Monera** by foremost research workers overflowed the scientific literature.

However, little by little the **Monera** were discerned to be fallacious or false to the definition. In addition, prolonged research showed that even the most simple **Protista** are in fact inconceivably complex. Thus the gap between matter and life has widened and by that creationism proves to be justified on this issue.

Introduction

In the year 1756 Immanuel Kant published his *Allgemeine Naturgeschichte und Theorie des Himmels*. In it he expressed an evolutionary system of cosmogeny. This system was authorized when in the year 1796 Pierre-Simon, marquis de Laplace, defended it in his *Exposition du systeme du monde*.

Something like it occurred with regard to the hypothesis of organic evolution. It was advocated by Jean-Baptiste-Pierre-Antoine de Monet de Lamarck in his *Philosophie zoologique* (1809). Later on, this hypothesis was popularized by Charles Darwin in his *The Origin of species by means of natural selection or the preservation of favoured races in the struggle for life* (1859).

Among the consistent advocates of the idea of evolution, the need was felt of connecting the evolutionary system of cosmogeny and the hypothesis of organic evolution; i.e., of bridging the gap between the inanimate matter and the living units. So evolutionists undertook to prove the origin of life from lifeless matter (biogenesis, etc.) and to track some most simple form of life, still being as it were *in statu nascendi*.

However, shortly after the publication of Darwin's *The Origin of Species*, the French biochemist Louis Pasteur dealt a heavy blow to the high expectations of the evolutionary-minded naturalists. In the course of the years 1860-1866 a number of papers by Pasteur on fermentation and *abiogenesis* were presented to the *Academie des sciences*.

The main report was published in 1861 under the title: "Memoire sur les corpuscles organiques qui existent dans l'atmosphere. Examen de la doctrine des generations spontanees."¹ Till then it was believed that a microbe could originate from organic materials during fermentation, putrefaction etc.—a belief which implied *abiogenesis*. Pasteur proved by a variety of ingenious and cogent experiments that each microbe is

derived from a pre-existing microbe and that *abiogenesis* is a chimera.²

Evolutionists Support *Abiogenesis*

For all that, a number of ardent Darwinian naturalists did not lose courage in seeking after some most simple form of life, still being as it were *in statu nascendi*. Among them were "Darwin's bulldogs," viz., Thomas Henry Huxley and Ernest Haeckel. In order to establish *abiogenesis* these evolutionists made a mistake practically beyond compare.

In his *Generelle Morphologic der Organismen. Allgemeine Grundzuge der organischen Formen-Wissenschaft, mechanisch begrundet durch die von Charles Darwin reformirte Descendenz-Theorie* (1866), Haeckel created the group of the **Monera**. This name was conferred upon some most simple *Protista*, the sarcode or protoplasm of which was conceived to be entirely homogeneous and to lack a nucleus.

Particularly, Haeckel broached the **Monera** in order to bridge the gap between the inanimate matter and the living units.³ Shortly after in 1868, a monograph by Haeckel on the **Monera** was published, entitled: "Monographie der Moneren."⁴ In it Haeckel described in detail a number of **Monera**, among them the most simple *Moneron* which he had called before *Protamoeba primitiva*. Its minuscule body was said to be entirely homogeneous and to reproduce itself by process of fission (Figure 1).⁵

Also, in the year 1868, Huxley published a report, entitled: "On some Organisms living at Great Depths in the North Atlantic Ocean."⁶ In it he dealt with a number of samples of deep-sea mud dredged up from the Atlantic. The samples were preserved in alcohol—a circumstance, which later will appear essential. In the Atlantic mud, Huxley discerned some minuscule bodies, which he had called before "coccolithes" and of which he then had declared that they cannot be organic. He divided the *coccolithes* in "discolithes" and "cyatholithes."

In addition to the *coccolithes*, other bodies, known by the name of "coccospaeres," occurred. The minuscule bodies were imbedded between some granules in a gelatinous matter. Of this

*N. A. Rupke is completing undergraduate study with the European geologist Professor Ph. H. Kuenen in Groningen, Nederland. Mr. Rupke resides at Schipborgerweg 45, Zuidlaren, Nederland.

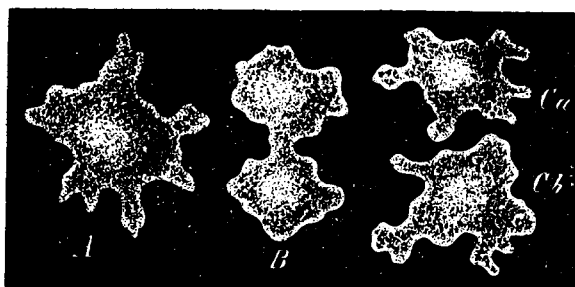


Figure 1. *Protamoeba primitiva* (Haeckel). This pretended *Moneron* turned out to be non-existent (From: Haeckel: *Natürliche Schöpfungsgeschichte*, First Edition, p. 144, Figure 1).

Huxley assumed that it represented a mass of protoplasm and he took this for a *Moneron*; by reason of its habitat he called the mass *Bathybius* (Figure 2). The *coccolithes* were supposed to be produced by the *Bathybius* "Urschleim." Huxley stated:

I conceive that the granule-heaps and the transparent gelatinous matter in which they are imbedded represent masses of protoplasm. Take away the cysts which characterise the *Radiolaria*, and a dead *Sphaerzoon* would very nearly resemble one of the masses of this deep-sea "Urschleim," which must, I think, be regarded as a new form of those simple animated beings which have recently been so well described by Haeckel in his "Monographie der Moneren." I proposed to confer upon this new "Moner" the generic name of *Bathybius*, and to call it after the eminent Professor of Zoology in the University of Jena, *B. Haeckelii*.

From the manner in which the youngest *Discolithi* and *Cyatholithi* are found imbedded among the granules; from the resemblance of the youngest forms of the *Discolithi* and the smallest "corpuscles" of *Cyatholithus* to the granules; and from the absence of any evident means of maintaining an independent existence in either, I am led to believe that they are not independent organisms, but that they stand in the same relation to the protoplasm of *Bathybius* as the spicula of Sponges or the *Radiolaria* do to the soft part of those animals.⁷

At that time there was a controversy in regard to the nature of supposed organic structures, discovered in the serpentine limestones of the Laurentian series in Canada. The Canadian geologist John William Dawson described these structures as those of a gigantic *Foraminifer*; on it he conferred the name *Eozoon Canadense*. Dawson's view was shared by the English naturalist William Benjamin Carpenter. Instantly, the newly discovered *Moneron B. Haeckelii* was invoked

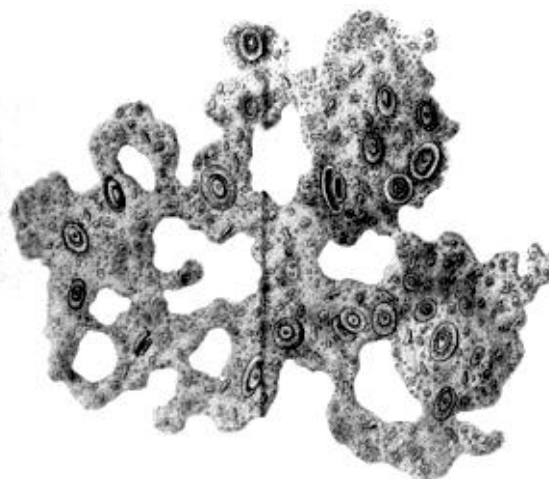


Figure 2. *Bathybius Haeckelii* (Huxley). This pretended *Moneron* appeared to be a mineral precipitate. The coccolithes, presumed to be produced by the glairy mass, turned out to be settled fragments of the *Coccolithophoridae*. (From: *Jenaische Zeitschrift*, 5. Band, Taf. XVII, Figure 1).

to warrant the gigantic size of *Eozoon Canadense*, Carpenter stated:

the discovery of this indefinite plasmodium covering a wide area of the existing seabottom should afford a remarkable confirmation, to such (at least) as still think confirmation necessary, of the doctrine of the organic origin of the serpentine limestone of the Laurentian formation. For if *Bathybius*, like the testaceous Rhizopods, could form for itself a shelly envelope, that envelope would closely resemble *Eozoon*. Further, as Prof. Huxley has proved the existence of *Bathybius* through a great range, not merely of depth but of temperature, I cannot but think it probable that it has existed continuously in the deep seas of all geological epochs.⁸

Later on, however, it has been recognized that the supposed organic structures are of mineral origin.

The existence of *B. Haeckelii* was affirmed by the English naturalist Sir Charles Wyville Thomson, who, later on, conducted the civilian staff of the expedition with H. M. S. "Challenger." In an 1869 article, "on the Depths of the Sea,"⁹ Wyville Thomson contended in regard to a sample of mud from the Atlantic:

This mud was actually alive; it stuck together in lumps, as if there were white of egg mixed with it; and the glairy mass proved, under the microscope, to be a living sarcod. Prof. Huxley regards this as a distinct creature, and calls it "*Bathybius*."¹⁰

Wyville Thomson dealt with *B. Haeckelii* more

in detail in his renowned book entitled: *The Depths of the Sea, Etc.* (1873).¹¹

The report on the occurrence of free albumen masses in the deep-sea was suited remarkably well to the philosophy of a universal transformism and to the implicit idea of *abiogenesis*. The report was enthusiastically received by the supporters of this philosophy; at last, nascent life was detected!

Haeckel et al. Support Huxley's Work

Above all others Haeckel contributed to the newly discovered *Moneron*, the species of which was dedicated to him. In his "Beitrage zur Plastidentheorie,"¹² he confirmed in 1870 Huxley's assertions in this matter and enlarged his report in some ways ("Im Wesentlichen kann ich alle Angaben von Huxley bestätigen, doch auch nach einigen Richtungen hin dieselben vervollständigen und erweitern.")¹³

Haeckel analyzed a glass of deep-sea mud—placed in alcohol as well. The granules, imbedded in the gelatinous matrix, he conceived to be real protoplasm; for the granules coloured when treated with a carmine or a iodine solution. As to the *coccolithes*, Haeckel took it for likely, though not yet altogether proved, that they were produced by *B. Haeckelii*.

In a speech in 1870 entitled, "Das Leben in den grossten Meerestiefen,"¹⁴ Haeckel assured that it was almost incontestable that *B. Haeckelii* did originate by *abiogenesis* ("... dass die freien Urschleim-Körper des Bathybius sich an Ort und Stelle unter dem Einflusse der eigenthümlichen hier waltenden Existenz-Bedingungen aus anorganischer Substanz bilden").¹⁵ In general, he argued—evidently versus Pasteur—that the question of *abiogenesis* could not be answered by experiment, but solely by philosophy.

Well then, Haeckel's evolutionary philosophy, implying a process of *abiogenesis*, turned out to be true! The discovery of the *Monera* like *Pro-tamoeba primitiva* and *B. Haeckelii* put the matter beyond doubt. Finally, the chasm between matter and life was filled up! In his widely read *Natürliche Schöpfungsgeschichte. Etc.* (Second Edition, 1870) Haeckel wordily expressed:

Sobald man früherhin die Vorstellung der Urzeugung zu fassen suchte, scheiterte man sofort an der organischen Zusammensetzung auch der einfachsten Organismen, welche man damals kannte. Erst seitdem wir mit den höchst wichtigen Moneren bekannt geworden sind, erst seitdem wir in ihnen Organismen kennen gelernt haben, welche gar nicht aus Organen zusammengesetzt sind, welche bloss aus einer einzigen chemischen Verbindung bestehen, und dennoch wachsen, sich ernähren und fortpflanzten, ist jene Hauptschwierigkeit gelöst, und die Hypothese

der Urzeugung hat dadurch denjenigen Grad von Wahrscheinlichkeit gewonnen, welcher sie berechtigt, die Lucke zwischen Kant's Kosmogonie und Lamarck's Descendenztheorie auszufüllen. Es giebt sogar schon unter den bis jetzt bekannten Moneren eine Art, die vielleicht noch heutzutage beständig durch Urzeugung entsteht, Das ist der wunderbare, von Huxley entdeckte und beschriebene *Bathybius Haeckelii*.¹⁶ (English translation in note)

By more or less tacit consent it had been accepted that *B. Haeckelii* covered a vast part of the sea-bottom. In a speech in 1870 before the Royal Geographical Society Huxley,¹⁷ returning to the subject, emphatically signaled the general occurrence of his reputed discovery. In respect of *B. Haeckelii* he said:

Evidence of its existence had been found throughout the whole North and South Atlantic, and wherever the Indian Ocean had been surveyed, so that it probably forms one continuous scum of living matter girding the whole surface of the earth. This opinion had been confirmed in all its essential details by Prof. Haeckel, who had published an admirable account of specimens obtained by him.¹⁸

The discovery of the peculiar *Moneron B. Haeckelii* met with general favor. It was reported in 1871 in the *Archives des Sciences physiques et naturelles*¹⁹ and in no time it became a public property. Several foremost scientists set themselves to a detailed study of this conclusive *Moneron*.

In an 1870 article entitled "Vorläufige Mittheilungen über Tiefseeschlamm,"²⁰ the German geologist Carl Wilhelm von Gumbel made a communication relating to deep-sea mud—preserved by him in alcohol also. Gumbel stated that he had come to the conclusion, just like Huxley and Haeckel, that the *coccolithes* and *B. Haeckelii* were a living mass ("... dass auch mir kein Zweifel an der organischen Natur der Coccolithen und des Bathybius übrig blieb.")²¹

Besides, he maintained that *B. Haeckelii* was not confined to a bathyal environment; he had observed it in a paralic environment as well and so he was led to conclude that *B. Haeckelii* had a universal distribution ("... dass Coccolithen (*Bathybius*) in allen Meeren und in allen Meerestiefen vorkommen").²² Because of the occurrence of *coccolithes* in numerous limestones Gumbel stressed the lithogenetic importance of *B. Haeckelii*.

Gumbel's compatriot Oscar Schmidt made known in an 1870 article, "Über Coccolithen und Rhabdolithen,"²³ that, during an expedition in the Adriatic, he had met with *B. Haeckelii*.

Schmidt stated that in a fresh sample, *B. Haeckelii* behaved in like manner as when placed in alcohol ("Der frisch aus dem Meere gehobene *Bathybius* zeigt . . . genau jene Erscheinungen, welche die in Weingeist conservirten Proben wahrnehmen lassen").²⁴ In addition to the *coccolithes* Schmidt observed some bodies of hitherto undescribed characteristics, naming it "*rhabdolithes*." He, indeed, gave it as his view that the bodies were independent from *B. Haeckelii*.

A Still Lower *Moneron* Reported

At that time the existence of a still lower *Moneron* than *B. Haeckelii* was reported! It was discovered along the coast of Grinnell Land by the German naturalist Emile Bessels, both surgeon and naturalist to the U.S. Arctic expedition with the ship "*Polaris*." Bessels called it: *Protobathybius Robesonii*. Its existence was announced in 1874 in *Nature*²⁵ and a description of it by the discoverer was published in A. S. Packard's *Life histories of animals, including man or outlines of comparative embryology* (1876). The description by Bessels of *Protob. Robesonii* is as follows:

It is mainly distinguished from *Bathybius* by the absence of both the *Discolithes* and *Cyatholithes*. For this reason I take it to be an older form than *Bathybius*, whence the name given to it. It consists of nearly pure protoplasm, tinged most intensly by a solution of carmine in ammonia. It contains fine gray granules of considerable refracting power, and besides the latter a great number of oleaginous drops, soluble in ether. It manifests very marked amoeboid motions and takes up particles of carmine or other foreign substances suspended in the water in which it is kept. It hardly contained any foreign matter, except a fine sediment of limestone constituting the bottom of the sea.²⁶

It is beyond the scope of this summary to bring under close scrutiny all the numerous publications and references relating to the *Monera* and particularly to *B. Haeckelii*. I will only mention that the German geologist Karl Alfred von Zittel in his *Handbuch der Paleontologie* (First part, 1876) described the *Monera*, at the head of which class he placed *B. Haeckelii*.²⁷

About this time, however, the days of *B. Haeckelii* and its predecessor *Protob. Robesonii* came to an end—much though these *Monera* were a *conditio sine qua non* to any consistent hypothesis of evolution.

Criticisms Finally Published

Already the English naturalist G. C. Wallich, in an 1869 paper, "On the Vital Functions of the Deep-sea Protozoa,"²⁸ had objected to Huxley's discovery of *B. Haeckelii*. Wallich showed that

there is no connection between it and the *coccolithes* and that these peculiar bodies, whether *discolithes* or *cyatholithes*, are nothing more than the *disjecta membra* of the *coccosphaeres*, inhabiting the surface-waters of the ocean. Wallich summarized his objections in this matter in an 1875 paper, "On the true Nature of the so-called '*Bathybius*,' and its alleged Function in the Nutrition of the Protozoa."²⁹ He stated:

It has been shown that, whereas Prof. Huxley, in his original report, declared that the coccoliths "*cannot be organic*," I proved them to be organic; whereas he doubted their being the *disjecta membra* of the *coccosphaeres*, I proved them to be so; and whereas he alleged that they normally, as "*coccoliths*," "*discoliths*," or "*cyatholiths*," constitute part and parcel of the living thing to which he gave the name of *Bathybius*, I distinctly proved that the "*coccoliths*" have no physiological connexion with the viscid matter in which they are imbedded at the bottom of the sea, but are detached and normal appendages of *coccosphaeres* which have lived in the superficial waters of the ocean, and subsided to the bottom only after death.³⁰

Yet it was not until the twentieth century that the true nature of the *coccolithes* and the *rhabdolithes* was discerned. In the year 1902 the German biologist H. Lohmann made public an article on "*Die Coccolithophoridae, eine Monographie der Coccolithen bildenden Flagellaten, etc.*"³¹ In it he put the matter beyond doubt that the *coccolithes* and the *rhabdolithes* are nothing more than settled fragments, which at one time formed part of the calcareous envelope of floating *Coccolithophoridae*, by which name he signified a class of flagellates (Figure 3).

At the end of the year 1872 an expedition was sent out with H. M. S. "*Challenger*" in order to make a series of soundings and dredgings in the three great ocean basins. In the early part of the cruise, attempts were made again and again to obtain *B. Haeckelii*; however, with no definite result. J. Murray, naturalist to the expedition, observed that a sample of deep-sea mud, when placed in alcohol, assumed the aspect of *B. Haeckelii*!!

Murray observed this phenomenon in such quantity that, if it was really of the supposed organic nature, the presence of organic matter should be easy to detect. However, J. Y. Buchanan, chemist to the expedition did not find satisfactory evidence of it. What had happened to the reputed *B. Haeckelii*? Buchanan concluded:

There remained, then, but one conclusion, namely, that the body which Mr. Murray

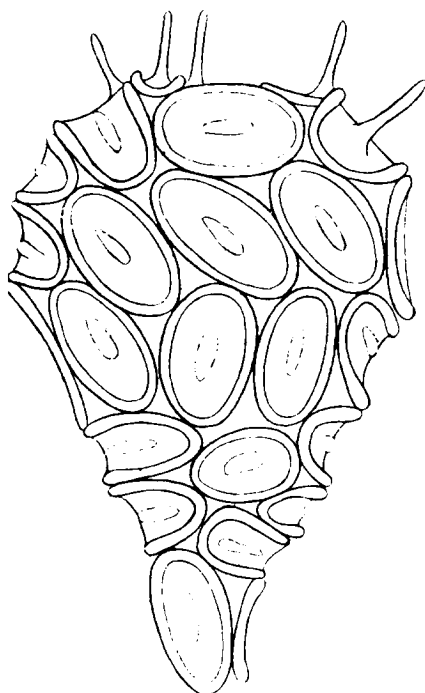


Figure 3. *Syracosphaera pulchra* (Lohmann). A representative of the *Coccolithophoridae*, a class of flagellates; the settled fragments of its calcareous envelope were claimed to be produced by the fictitious *B. Haeckelii*. (From: *Archiv der Protistenkunde*, I, Taf. IV, Figure 33).

had observed was not an organic body at all; and on examining it and its mode of preparation I determined it to be sulphate of lime, which had been eliminated from the sea-water, always present in the mud, as an amorphous precipitate on the addition of spirit of wine. The substance when analyzed consisted of sulphuric acid and lime; and when dissolved in water and the solution allowed to evaporate, it crystallized in the well-known form of gypsum, the crystals being all alike, and there being no amorphous matter amongst them.³²

In a letter³³ to Huxley by Wyville Thomson, dated June, 1875, the tragic end of *B. Haeckelii* was made known. It was suspected that the thing which Huxley had named was nothing more than a sulphate of lime, precipitated in a flocculent state by the *strong alcohol* in which the samples had been placed. Having read this letter, Huxley was highly inclined to drop *B. Haeckelii* as reposing on a delusion.

Case for *Abiogenesis* Destroyed

By this time, however, the fate of *B. Haeckelii* was not yet considered to be absolutely decided. This did not happen until the "Preliminary Reports to Professor Wyville Thomson, F. R. S.,

Director of the Civilian Scientific Staff, on Work done on board of the Challenger" of 1876 by Murray and that by Buchanan has been made public. In his reports Murray gave *B. Haeckelii* the "knock-out blow" where he informed:

In the early part of the cruise many attempts were made by all of the naturalists to detect the presence of free protoplasm in or on the bottoms from our soundings and dredgings, but with no definite result. It was undoubted, however, that some specimens of the sea-bottom preserved in spirit assumed a very mobile or jelly-like aspect, and also that flocculent matter was often present.

Mr. Buchanan determined that the flocculent matter was simply the amorphous sulphate of lime precipitated by spirit from the sea-water. Subsequently a number of experiments were made out upon the behaviour of this amorphous precipitate when precipitated with different quantities of spirit and when treated with colouring-solutions. The precipitate was also examined alone and mixed up with some of the ooze. The ooze was examined at the same time, and in the same manner, but without having been treated with spirit. The results were shortly these:-

When sea-water is treated with twice its volume of spirit or less, nearly the whole of the amorphous precipitate assumes the crystalline form in a short time.

When treated with a great excess of spirit the precipitate remains amorphous, and assumes a gelatinous aspect.

This gelatinous-like sulphate of lime colours with the carmine and iodine solutions, and when mixed with the ooze has, under the microscope, the appearances so minutely described by Haeckel.

The ooze washed with distilled water, or taken just as it comes up, and treated in the same manner with colouring-solutions, does not show these appearances. The jelly-like aspect and the matter coloured with carmine can always be removed from the spirit-preserved specimens of the ooze by treating with distilled water.

In all cases the jelly-like or mobile aspect of the ooze is found to be due to the presence of the flocculent precipitate from the sea-water associated with the ooze.

No free aluminous matter could be detected.

When it is remembered that the original describers worked with spirit-preserved specimens of the bottom, the inference seems fair that *Bathybius* and the amorphous sulphate of lime are identical, and

that in placing it amongst living things, the describers have committed an error.³⁵

Thus *B. Haeckelii*, the "Urschleim" from the sea-bottom, which was embraced by nearly all evolutionists of that day as bridging the gap between matter and life, turned out to be a pure mineral precipitate! In that way this most simple form of life, conceived to originate by *abiogenesis*, was wiped out of existence; and together with it the related form *Protob. Robesonii* made its exit.

Haeckel Refused to Concede

Yet Haeckel, in an 1877 paper on "Bathybius und die Moneren",³⁶ insisted that *B. Haeckelii* actually did exist. He only admitted that its geographical distribution was more confined than previously supposed, so that owing to this the H. M. S. "Challenger" expedition had not met with it. However, in spite of his insistence of the actual existence of *B. Haeckelii*, Haeckel suppressed it from the publications by him ever since that time. This proves Haeckel was less than forthright in advocating the case of evolution in this matter.

By tacit agreement the "Urschleim"-fallacy, obviously discrediting the hypothesis of evolution according to which the "Urschleim" had been postulated, was generally ignored. Of that time I have read but one paper in which the "Urschleim"-fallacy was really critically discussed. The paper was written by A. de Lapparent who made it public in 1878 under the title: "Le Bathybius. Historie d'un protoplasme."³⁷ Having told the story, de Lapparent drew the moral with these words:

Devant un tel resultat, n'est-il pas permis de sourire et ne serait-on pas excusable d'évoquer ici le souvenir de cet astrologue de la legende, qui decouvrait des animaux dans la lune parcequ'une souris s'était introduite dans son telescope? Voila pourtant les surprises que la science incredule nous reserve, toutes les fois que l'esprit de parti preside a ses investigations! Si encore de telles mesaventures la rendaient plus prudente; mais il suffit de lire les derniers ecrits de MM. Huxley et Haeckel pour voir avec quel dedain, avec quelle hauteur les adversaires du transformisme sont traites par eux.³⁸ (English translation in note)

Notwithstanding the wholesale "fade-out" of *B. Haeckelii* and *Protob. Robesonii* the group of the *Monera* as such were sustained. Representatives of the group, like *Prota. primitiva*, were put upon the stage again and again till well into the twentieth century. Such a form, which had been defined as being entirely homogenous and lacking a nucleus, was still considered to narrow the gap between matter and life.

The Ultimate Result

However, *Prota. primitiva*, so minutely described by Haeckel in 1868, was gradually recognized to be non-existent, Thus *Prota. primitiva*, at first conceived to be the most simple *Moneron*, turned out to be a mere hoax! The other *Monera* were gradually recognized to be non-existent as well, or, possibly, false to the definition. H. F. Copeland stated in a 1938 article on "The kingdoms of organisms"³⁹:

In his *Generelle Morphologie*, Haeckel postulated the existence of a group of organisms without nuclei; he named the group Monera (originally Moneres, but the neuter form used in later works is preferable) and included it in Protista. He is said to have postulated, rather than to have recognized or assembled, such a group, because most of the organisms which he assigned to it, *Protamoeba*, *Protomonas*, and *Vampurella*, are either non-existent or false to the definition. Among Haeckel's original examples of Monera, *Vibrio* is the only one representing organisms which actually exist and are interpretable as lacking nuclei.⁴⁰

At present, however, we know for fact, thanks mainly to relatively recent cytological, genetic and biochemical research, that the *Bacteria*, like *Vibrio*, have a DNA containing nucleus—though not surrounded by a membrane—which stores genetic information. Consequently, *Vibrio* cannot be classed properly in *Monera*, as formerly conceived by Haeckel. Presently, the group, on which that name has been conferred, must be looked upon as entirely imaginary.

Summary and Conclusions

The foregoing may be summarized as follows:

(a) In order to establish *abiogenesis*— implicit to any consistent hypothesis of transformism—the most renowned biologists of that time, viz., Huxley, Haeckel et al., postulated the fictitious *Monera* and "discovered," "observed" and "analyzed" the most simple "representative" *B. Haeckelii*.

(b) Moreover, the "find" of a still lower form, namely *Protob. Robesonii*, was reported.

(c) In regard to an already "discovered" form, viz., *Prota. primitiva*, Haeckel "observed" the reproduction by process of fission—though the relevant "organism" did not exist.

(d) And some naturalists "observed" *B. Haeckelii* in a fresh sample of mud—though it was a mere sulphate of lime, which only formed when placed in alcohol.

(e) Also, Gumbel, Zittel et al., foremost geologists of that time, introduced the *Monera* into geological literature.

(f) Finally, to all this the majority of the contemporary biologists and geologists readily assented. As a consequence of the impact of the

philosophy of evolution, these men did not observe **fact**, but a **fictitious system**. In that way the philosophy of evolution has exerted a harmful effect on the study of nature and on the progress of science.⁴¹

The *Monera* were “observed with the standard microscope. In the course of the last decades, the more powerful phase and electron microscope plus such techniques as microdissection have revealed an astounding complexity in protoplasm and the cell. Thus modern techniques have widened the gap between matter and life. (Figure 4)

Now then, an hypothesis is said to be acceptable in proportion to its degree of heuristic value, i.e., in proportion as it stimulates the discovery of still unknown fact. As shown, the hypothesis of evolution did not lead to *fact* but to mere *fiction*.

On the other hand, the doctrine of creation—to which doctrine a wide gap between matter and life is implicit—proved to be in conformity with fact. In consequence, the doctrine of creation has to be accepted—at least, as a working hypothesis.

Notwithstanding all that, this is not done by W. Seifriz in his book on *Protoplasm* (1936). Having wrongly ascribed the “discovery” of *B. Haeckelii* to Haeckel, Seifriz stated: “Though his find was not what he thought it to be, yet Haeckel’s philosophical idea is nevertheless sound, for we cannot escape the conviction that life began in a relatively undifferentiated mass of protoplasm.”⁴²

This statement of **belief** is endorsed by the majority of present-day evolutionists. Consequently, these evolutionists love **system** better than **truth**; and their aversion against the doctrine of creation cannot be a matter of science, but, on the contrary, it only can be the result of an *a priori* philosophy.

Notes and References

¹*Annales des sciences naturelles* (partie zoologique), 4^e serie, XVI, 1861, pp. 5-98, pl. I.

²Pasteur’s papers on *abiogenesis* are collected in: *Oeuvres de Pasteur*, II, pp. 185-358; Paris, 1922.

³*Generelle Morphologie der Organismen*, I, p. 135; Berlin, 1866.

⁴*Jenaische Zeitschrift für Medizin und Naturwissenschaft*, 4. Band, pp. 64-137, Taf. II, III; Leipzig, 1868.

⁵*Ibid.*, pp. 104-107, Taf. III, Figures 25-30.

⁶*Quarterly Journal of Microscopical Science*, new series, VIII, 1868, pp. 203-212, pl. IV.

⁷*Ibid.*, p. 210, Pl. IV, Figure 1.

⁸*Proceedings of the Royal Society of London*, 1868, p. 191; quoted by G. C. Wallich: “On the true Nature of the so-called ‘Bathybius,’ and its alleged Function in the Nutrition of the Protozoa” in *The Annals and Magazine of Natural History*, 4th series, XVI, 1875, p. 323.

⁹*The Annals and Magazine of Natural History*, 4th series, IV, 1869, pp. 112-124.

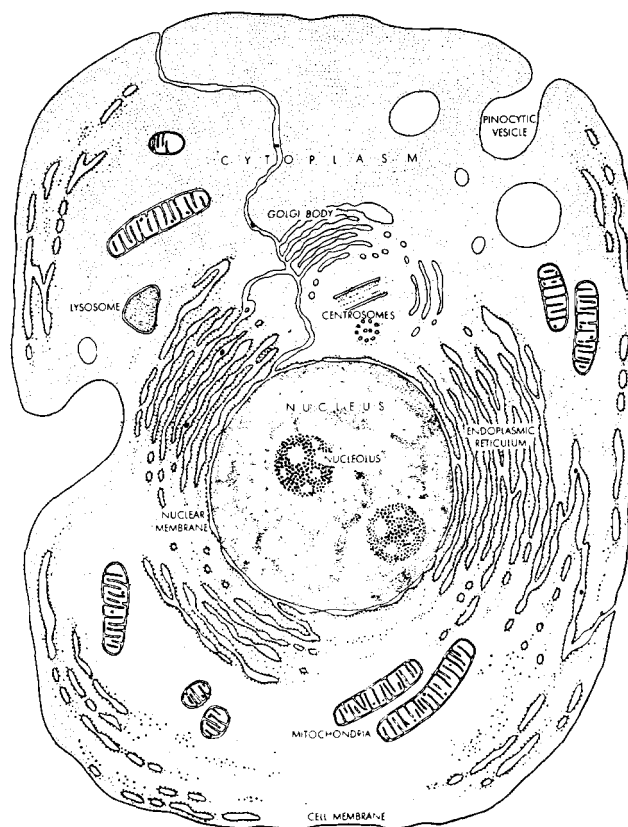


Figure 4. Diagram of a typical cell. The diagram, based on electron micrograph, gives an idea of the astounding complexity in protoplasm and the cell. (From: *The Living Cell*, Readings from *Scientific American*, Sept. 1961, p. 9).

¹⁰*Ibid.*, p. 121.

¹¹*The Depths of the Sea*, pp. 410-415, Figure 63; London, 1873.

¹²*Jenaische Zeitschrift für Medizin und Naturwissenschaft*, 5. Band, pp. 492-550, Taf. XVII; Leipzig, 1870.

¹³*Ibid.*, p. 504.

¹⁴*Sammlung gemeinverstaendlicher wissenschaftlicher Vortraege*, 5. Serie, Heft 110, pp. 1-43, 1 Titelbild; Berlin, 1870.

¹⁵*Ibid.*, p. 38.

¹⁶*Naturliche Schopfungsgeschichte. Etc.*, Second Edition, p. 306; Berlin, 1870. English translation:

As soon as one formerly tried to visualize *abiogenesis*, one directly broke down on the organic make-up of even the most simple organisms which were known at that time. This main difficulty has not been solved until we have been acquainted with the highly important *Monera* which are not at all made up of organs, which are only composed of one single chemical compound, and still grow, feed and reproduce, and by that the hypothesis of *abiogenesis* has gained that degree of probability as to entitle it to fill up the gap between Kant’s cosmogeny and Lamarck’s descent theory. There is already even among the till now known *Monera* one species which probably still today

continually originates by *abogenesis*. It is the miraculous *Bathybius Haeckelii*, discovered and described by Huxley.

¹⁷*Proceedings of the Royal Geographical Society*, XV, 1871, pp. 37-39.

¹⁸*Ibid.*, p. 38.

¹⁹*Archives des Sciences physiques et naturelles*, nouvelle periode, XLI, 1871, pp. 76-78.

²⁰*Neues Jahrbuch für Mineralogie, Geologie und Palaeontologie*, 1870, pp. 753-767.

²¹*Ibid.*, p. 757.

²²*Ibid.*, p. 763.

²³*Sitzungsberichte der kaiserlichen Akademie der Wissenschaften* (mathematisch-naturwissenschaftliche Classe), 62, Band, 1. Abteilung, 1870, pp. 669-682, Taf. I.

²⁴*Ibid.*, p. 673.

²⁵*Nature*, IX, 1874, p. 405.

²⁶Packard, A. C., *Life Histories of Animals*, pp. 3-4; New York, 1876.

²⁷von Zittel, Karl A., *Handbuch der Palaeontologie* (First Part), pp. 58-60; München und Leipzig, 1876-1880.

²⁸*The Monthly Microscopical Journal*, 1, 1869, pp. 32-41.

²⁹*The Annals and Magazine of Natural History*, 4th series, XVI, 1875, pp. 322-339.

³⁰*Ibid.*, p. 330.

³¹*Archiv für Protistenkunde*, 1. Band, 1902, pp. 89-165, Taf. IV-VI.

³²Buchanan, J. Y., "Preliminary Report to Professor Wyville Thomson, F. R. S., Director of the Civilian Scientific Staff, on Work (Chemical and Geological) done on board H. M. S. "Challenger" " in *Proceedings of the Royal Society of London*, XXIV, 1876, p. 605.

³³*Quarterly Journal of Microscopical Science*, new series, XV, 1875, pp. 390-392.

³⁴*Proceedings of the Royal Society of London*, XXIV, 1876, pp. 471-544.

³⁵*Ibid.*, pp. 530-531.

³⁶*Kosmos. Zeitschrift für einheitliche Weltanschauung auf Grund der Entwicklungslehre*, 1. Band, 1877, pp. 293-305.

³⁷*Revue des Questions Scientifiques*, III, 1878, 1, pp. 67-74.

³⁸*Ibid.*, p. 73. English translation:

Before such a result, is it not allowed to smile, and would one not be excused for recalling to mind, that astrologer of the myth who discovered animals in the moon because a bat had entered into his telescope? These, however, are the surprises which incredulous science gives us always when bias presides at its investigations! If only such misfortunes would make incredulous scientists more cautious, but it suffices for one to read the latest writings by Huxley and Haeckel to note with what contempt, with what haughtiness the adversaries of transformism are treated by them.

³⁹*The Quarterly Review of Biology*, XIII, 1938, pp. 383-420.

⁴⁰*Ibid.*, p. 385.

⁴¹Already the harmful effect of the hypothesis of evolution on research has been stressed by W. E. Lammerts in a paper on "Mutations and Evolution," *The Challenge of Creation*, pp. 8-9; Caldwell, Idaho, 1965.

⁴²Seifriz, W., *Protoplasm*, p. 11; New York and London, 1936.

(Continued from page 87)

Science Curriculum Studies textbook, *Biological Science, An Inquiry into Life*, (Yellow Version) Harcourt, Brace, & World Inc., 1963.

George Howe's careful review of the blue-green algae is a fitting companion paper to Rupke's in that the complexity of even these relatively simple forms of plant life is clearly shown. It is becoming more and more evident that there really are no "simple" forms of plant life, as was imagined by earlier generations of evolutionists such as Haeckel. Unicellular and filamentous organisms are complex *internally*

instead of externally. Even the blue-green algae present problems as regards any postulated origin from a common ancestral form.

A plea is made herewith for library, field, and laboratory research articles. If each one of our active scientist members would review just one article in his or her favorite science journal per year, sending it either to the editor or one of the associate editors, we would soon have a splendid backlog of material for our quarterlies and the annual.

Walter E. Lammerts
Editor

COMMENTS ON SCIENTIFIC NEWS AND VIEWS

HAROLD ARMSTRONG*

An article by H. B. Fell in *Nature*, Vol. 214, pages 1192 *et seq.*, 17 June 1967, gives some information which might have a bearing on Flood geology (although, of course, it is not given from that viewpoint). It appears that there are places at which the number of species of sea stars and other echinoderms is greatest, and the number of species decreases more or less exponentially with distance east.

This kind of distribution was first noticed in the Southern Ocean. Similar distributions of molluscs, fish, and penguins have been found.

One of the interesting points found is that sometimes the decrease continues on the other side of a continent just as if the continent were not there. Further investigation showed that the decrease is westward between latitudes about forty degrees north and south, but eastward for higher latitudes.

There are, of course, currents in the ocean, from east to west near the equator, west to east in the higher latitudes. It is suggested that ancestors of the different species have been distributed by ocean currents, and, maybe, "crossed continents during periods of marine transgressions".

Some studies of the distribution of fossils of extinct creatures, such as ammonites, show similar behaviour, but the decrease is not along the east and west direction so much as along directions inclined to the parallels of latitude. This is taken as evidence of different locations of the poles in former times. It is claimed, incidentally, that these distributions of fossils do not support the notion that the continents have drifted.

Two Difficulties Noted

There seem to be two difficulties. In the first place, nothing is said as to how the ancestors of the various species became segregated before they set out on their journeys. In the second place, if they crossed continents as if they were not there, the inference is that the continents were not there most of the time, not just at rare intervals. But such a proposition does not seem to be held seriously.

The following outline of an explanation, based on Flood geology, might be proposed.

Before the Flood, there was much less water on the Earth's surface than now, the seas being both smaller and shallower. In fact, instead of an ocean with continents here and there, there was land with small seas, maybe about the size of the Mediterranean, and only narrow connec-

tions between them. There might naturally be different kinds of creatures in the various seas.

When the Flood came, and the whole Earth was covered with water, there were naturally currents such as we know now, and the creatures were distributed. Creationists do not deny that they may have diversified to a certain extent. Thus arose the present distribution of varied species.

Fossils, which are distributed "obliquely," are another problem. The article takes their distribution as evidence that the poles have changed their location. Again, Flood geology may provide another explanation.

When it is said that the fountains of the great deep were broken up, it is usually supposed that this means that water, which had been held underground, burst free. This water was likely hot and charged with minerals. Thus it likely killed many creatures, and swept their remains great distances.

Of course currents also would have been a cause in distributing them, but the effect of the original outburst made the distribution oblique. Because most of the creatures caught in these outbursts were killed, it is fossils, not living creatures, which are distributed in this way.

The notions used here about what happened at the time of the Flood are not new; the idea of the canopy which fell, adding to the water on the Earth's surface, is found in *The Genesis Flood* and other books.

Bacteria and Learning

Readers Digest, (Canadian Edition), for April, 1967, has a report on page 147 (apparently quoted from *Time*) to the effect that certain bacteria, including *Shigella*, *Salmonella*, and *Escherichia coli*, can "learn" to resist antibiotics, apparently just by contact with other bacteria which are already resistant.

How this is done seems to be not clear. Do they really "teach one another? Do they transfer something from one to the other? If so, does that happen always when they meet, or only when it is to their advantage?

Almost any answer that can be given to these questions will seem fantastic. Certainly this shows once again what creationists have always maintained, that living creatures are complex, far more complex than would have been imagined in (for instance) Darwin's time.

Population Data Considered

Pamphlet No. 150 of the Evolution Protest Movement, issued in June 1967, is of interest to creationists, as are all the publications of the Movement. This one discusses, among other

*Harold Armstrong is a faculty member of the Queens College, Kingston, Ontario, Canada, and holds a Masters of Science degree from Queens University.

things, evidence from archaeology that the present order of the world began about three thousand years B.C.

There are also two pieces of evidence from population study. The world population of Jews, about 18 millions in say 1930, would be reached from the time of Jacob's marriage, about 1900 B.C., by doubling about every 160 years. Likewise the present population of the world, about 3,500 millions, would be reached from eight people after the Flood, say about 2500 B.C., by doubling at the same rate, about once every 160 years.

There is another piece of evidence, not mentioned in the Pamphlet, which might interest those who live in the Western Hemisphere. It is estimated that the population of the hemisphere in say 1600 was about 15 or 16 millions, about the same as the Jewish population in 1930.

So we might expect the population of the New World to have begun, in some sense, about 300 years before Jacob's marriage, viz., about 2200 B.C. (These dates are not Ussher's, but we do not need the dates for the argument, only the intervals.)

Now 300 years before Jacob's marriage would take us back to Peleg's life, and in his time the Earth was divided. If this division separated off the New World, and a very few people with it, the subsequent growth of the population is what would be expected.

Incidentally, any creationists who does not yet know of the publications of the Evolution Protest Movement would find it worth while to find out what the Movement has done. The Secretary of the Movement is: A. G. Tilney, Santhia, Stoke, Hayling Island, Hants., England.

(Continued from page 99)

tree was preserved as a cast, and the evidence available suggested that the cast was at least 38 feet in height. The original tree must have been surrounded and buried by sediment which was compacted before the bulk of the tree decomposed, so that the cavity vacated by the trunk could be occupied by new sediment which formed the cast. This implies a rapid rate of sedimentation around the original tree It is clear that trees in position of growth are far from being rare in Lancashire (Teichmüller, 1956, reaches the same conclusion for similar trees in the Rhein-Westfalen Coal Measures), and presumably in all cases there must have been a rapid rate of sedimentation.

²¹Rupke, *Op cit*, pp. 21-25.

²²*Ibid*, pp. 25-29.

²³A. Seilacher, "Paleontological Studies on Turbidite Sedimentation and Erosion," *Journal of Geology*, Vol. 70, March 1962, p. 227.

²⁴See *The Genesis Flood*, by John C. Whitcomb, Jr. and Henry M. Morris. Nutley, N. J., Presbyterian and Reformed Publ. Co., 1961, pp. 159, 160 for a discussion of various examples of this phenomenon.

²⁵Alan V. Jopling, "Some Principles and Techniques Used in Reconstructing the Hydraulic Parameters of a Paleo-Flow Regime," *Journal of Sedimentary Petrology*, Vol. 36, March 1960, p. 34.

²⁶G. H. Dury, "Results of Seismic Explorations of Meandering Valleys," *American Journal of Science*, Vol. 260, November 1962, p. 691.

²⁷See *The Genesis Flood*, pp. 405-421.

²⁸Alan V. Jopling, "Laboratory Study of Sorting Processes Related to Flow Separation," *Journal of Geophysical Research*, Vol. 69, August 15, 1964, p. 3413.

²⁹Lucien B. Platt, "Fluid Pressure in Thrust Faulting, A Corollary," *American Journal of Science*, Vol. 260, February 1962, p. 107.

(Continued from page 105)

¹⁰Desikachary, *Op. cit.*, p. 58.

¹¹Darrah, W. C. 1960. Principles of Paleobotany. Second Edition. The Ronald Press Co., N. Y. p. 33.

¹²Delevoryas, *Op. cit.*, p. 12.

¹³Tilden, *Op. cit.*, p. 50.

¹⁴Tilden, *Ibid.*, p. 50.

¹⁵Desikachary, *Op. cit.*, p. 15.

¹⁶Smith, *Op. cit.*, compare plates on pp. 134 and 560.

¹⁷Thimann, K. V. 1963. The life of bacteria. The Macmillan Co., N. Y. p. 737.

¹⁸*Ibid.*, p. 142.

¹⁹Kingsbury, J. M. 1964. Mimeographed notes from an algology class, Cornell University, Ithaca, N. Y. p. 3-2.

²⁰Pringsheim, E. G. 1949. The relationship between bacteria and Myxophyceae. Bacteriological Reviews 13: 48-90.

²¹*Ibid.*, p. 48, quoted Dubos, R. J. 1945. The bacterial cell. Harvard University Press, Cambridge, Mass.

²²*Ibid.*, p. 54.

²³*Ibid.*, p. 54-55.

²⁴*Ibid.*, p. 57.

²⁵*Ibid.*, p. 59.

²⁶*Ibid.*, pp. 87 and 90.

Our Society of research scientists representing various fields of successful scientific accomplishment is committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution), both of the universe and the earth with its complexity of living forms.

We propose to re-evaluate science from this viewpoint. Beginning in 1964, we are publishing an annual yearbook of articles by various members of the Society and thereafter a quarterly review of scientific literature. Our eventual goal is the realignment of science based on theistic creation concepts and the publication of textbooks for high school and college use.

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.
2. All basic types of living things, including man, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.
3. The great Flood described in Genesis, commonly referred to as the Noachian Flood, was an historic 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.

Dues are \$5.00 (Foreign, \$6.00 U.S.) per year and may be sent to Wilbert H. Rusch, Sr., Treasurer, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. Voting membership is limited to scientists having at least a Masters degree in a natural science. Sustaining non-voting membership is open to those who subscribe to the above statement of belief at \$5.00 (Foreign, \$6.00 U.S.) per year and includes subscription to Annual 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: \$8.00 (Foreign, \$9.00 U.S.).

The Board of Directors includes the following:

Thomas G. Barnes, D.Sc.; Physicist, Professor of Physics, Texas Western College and Consultant to Globe Explanation Company, 2115 N. Kansas Street, El Paso, Texas

Clifford L. Burdick, M.S.; Geologist (consultant), 206 North Jacobus Avenue, Tucson, Arizona

Bolton Davidheiser, Ph.D.; Geneticist, Biola College, La Mirada, California

Douglas Dean, Ph.D.; Biologist, Pepperdine College, 8035 South Vermont Avenue, Los Angeles 44, California

Duane T. Gish, Ph.D.; Biochemist, Upjohn Company, Kalamazoo, Michigan

John J. Grebe, D.Sc.; Nuclear Physicist, 1505 West Andrews Drive, Midland, Michigan

George Howe, Ph.D.; Botanist, Westmont College, Santa Barbara, California

John W. Klotz, Ph.D.; Geneticist, Concordia Senior College, Fort Wayne, Indiana

Richard G. Korthals, M.S.; Physics, Astronautics, Concordia Junior College, Ann Arbor, Michigan

W. E. Lammerts, Ph.D.; Geneticist, Germain Seed Company, Livermore, California — Editor

Karl W. Linsenmann, M.D.; 312 East Main Street, Midland, Michigan

Frank L. Marsh, Ph.D.; Biologist, Andrews University, Berrien Springs, Michigan

John N. Moore, Ed.D.; Science Education, 136 Brody Hall, Michigan State University, East Lansing, Michigan

Henry M. Morris, Ph.D.; Hydraulics and Hydrology, Virginia Polytechnic Institute, Blacksburg, Virginia — Chairman

Wilbert H. Rusch, Sr., M.S.; Biology, Geology, Concordia Junior College, Ann Arbor, Michigan

Harold Slusher, M.S.; Geophysicist, Asst. Professor of Geophysics and Director, Kidd Memorial Seismological Observatory, Texas Western College, El Paso, Texas

William J. Tinkle, Ph.D.; Geneticist, Anderson College, 112 South St., Eaton, Indiana (retired) — Secretary

Paul A. Zimmerman, Ph.D.; Chemist, President, Concordia Junior College, Ann Arbor, Michigan

Membership price \$5.00 (Foreign, \$6.00 U.S.)

Subscription price \$8.00 (Foreign, \$9.00 U.S.)