

Creation Research Society Quarterly

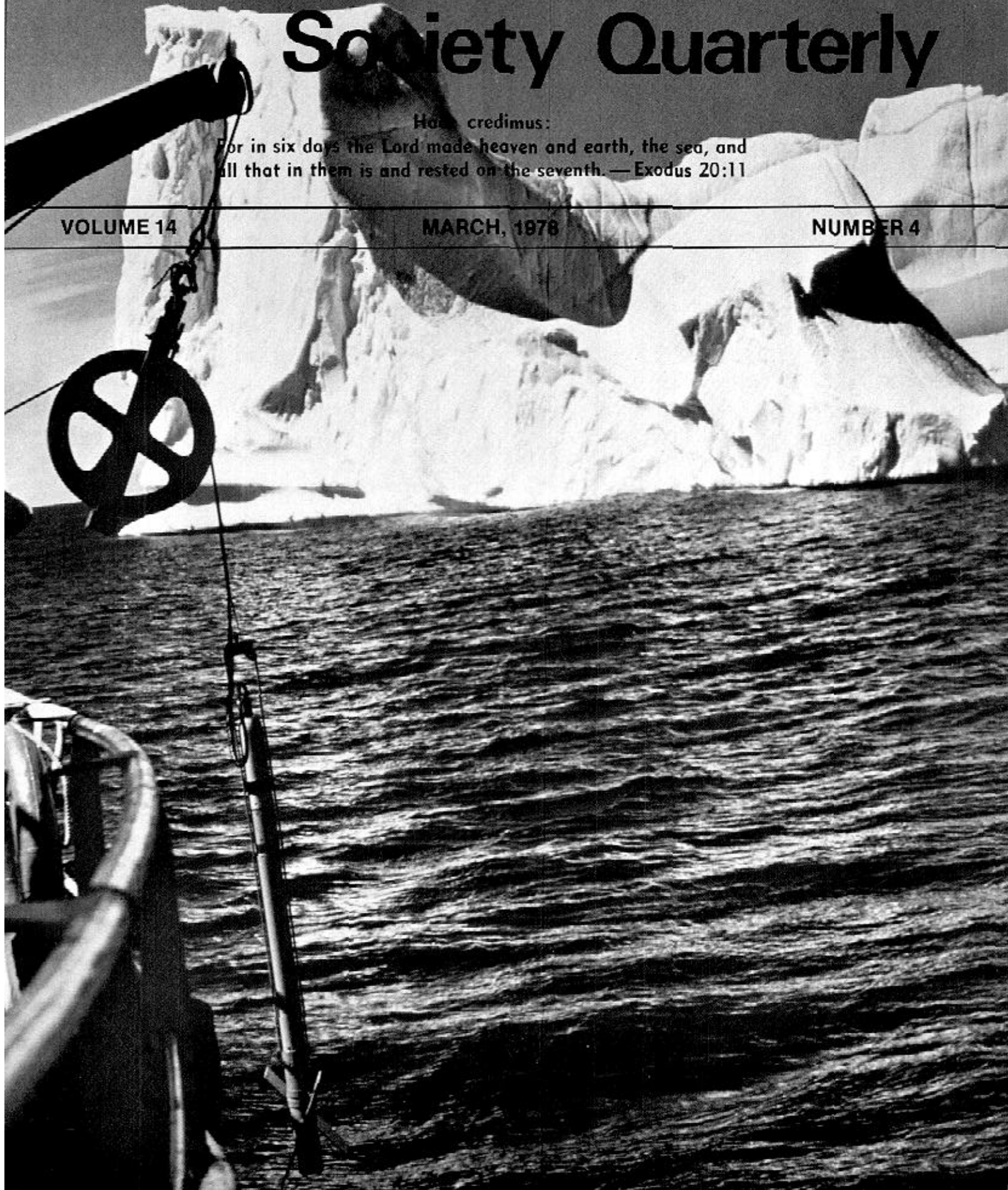
Hab. credimus:

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

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especially those concerned with drilling for oil or minerals.

Prof. Peter Benedict, of the Faculty of Engineering and Applied Science, Memorial University of Newfoundland, St. Johns, Newfoundland, Canada, supplied this picture. There is so much interest in protecting off-shore structures against icebergs that Prof. Benedict and others have formed a group, Ice Concepts Engineering, Ltd., P. O. Box 6082, St. Johns, Newfoundland, Canada, to provide consulting services about such protection.

COVER ILLUSTRATION

Elsewhere in this issue of the *Quarterly*, Dr. Clifford L. Burdick describes some evidence of glaciation in Wisconsin. It is quite likely, of course, that the glaciation did not last nearly as long as uniformitarian theory would have it.

Whatever be the truth about effect of ice on land, there is no doubt that ice at sea, i.e. icebergs, can be most destructive. For that reason there are patrols, and studies of ways to deal with the hazards of ice.

The picture on the cover shows an iceberg off the coast of Labrador, Canada. It was taken from the oceanographic ship C.S.S. Dawson, of the Bedford Institute of Oceanography, about July, 1972. This iceberg was estimated to weigh about 3,000,000 tons.

When thinking of the hazards of icebergs one commonly thinks of the Titanic. However, here the hazard is not so much to ships as to off-shore structures,

CHANGES IN THE LAWS ABOUT COPYRIGHT

Certain changes in the laws about copyright came into effect in the United States at the beginning of 1978. The effect of these changes on the operation of the *Quarterly* seems to be as follows.

The copyright of each issue of the *Quarterly* as a whole will continue to belong to the Creation Research Society, as it has in the past. The copyrights of individual items, however, will belong to the respective authors.

Thus, anyone wishing to reprint or reproduce an item from the *Quarterly* should get permission from the author. It is hoped, of course, that anyone planning such reprinting will also consult with the Editor.

ON CREATION WITH AN APPEARANCE OF AGE

FRANK L. MARSH*

Received 12 August 1977

Creationists have sometimes hesitated to maintain the doctrine of creation with apparent age, fearing that to do so might seem to be to hold that God has deceived men. But there is no deceit, since God has stated the truth plainly in revelation. Besides, it would be impossible for anything to have been created at all without features which could be taken as indications of age.

Recent discussions in the *Quarterly* about the doctrine of creation with apparent age¹ remind me of correspondence which I once had with Dobzhansky, consisting of an exchange of seven or eight letters each way. He wrote that he could not believe in a literal Genesis because to accept the Genesis account would be a blasphemous act. He noted that Genesis clearly stated that living things had originated by special creation, but he affirmed the natural evidence for organic evolution is so overwhelming all we can do is conclude that Genesis is a myth. He said his concept of God was that a Supreme Being would not originate living things by special creation in such a way as to witness so completely for organic evolution, and thereby deceive man. In his opinion it would be blasphemous to stand for special creation today.

Of course, one does well to believe that God is truthful. But I can not believe that there is anything untruthful, or deceitful, in God's act of creation a few thousand years ago.

From the reading of Genesis, obviously it was God's intent to enjoy close, face-to-face communion with Adam and Eve. See Gen. 3:8-22. This close association, with its accompanying explanation of natural things, was absolutely necessary for man's correct orientation in the natural world. Modern scientists have quite generally drifted so far from the original relationship as to spurn special revelation, and to declare the essential basic natural facts provided man in the Bible to be no more than myths. God provided the facts Adam needed for a correct understanding of nature, and Adam and following heads of households passed them on by memory from generation to generation for the first twenty-five hundred years, that is, until the facts about origins were revealed to Moses and put in writing by him in Genesis.² Most unfortunately the pride, and accumulating misinformation of man leads him to ignore the Bible, and concurrently to feel progressively more self-sufficient in all areas of knowledge.

Apparent Age in Adam's Time

I am of the opinion that it is very essential for natural scientists frequently to meditate on Adam's situation in that early and perfect world. He learned the story of origins from the Creator. To get at the facts let us assume that some time soon after Adam's creation on Day Six (Gen. 1:27 NASB), the Creator said to him, "Adam, look about you. There is not an object in this landscape that is more than three days (evenings and mornings; 24-hour periods) old." (As far into the week

as the morning of Day Three, no dry land was to be found. Gen. 1:9.)

Assume that Adam replied, "Lord you have given me this wonderful mind and these marvelous physical senses. Now suppose I study this matter open-mindedly and learn if your statement is correct."

Assume that Adam began his careful study of age by examining his own body. If he were to hypothesize that he had become mature (of marriageable age, Gen. 1:27) by normal (to us) growth processes, then he could reasonably conclude that he had lived at least twenty-five years. If his basic assumptions were correct, then by the agreement of proof from several ways of determining age, such as anatomical structure, physiological activity, and psychological maturity, he would "know" that he was more than three days old.

Assume that Adam continued his study and observed mature fruit trees (Gen. 1:12) which apparently were several years old. He observed great water animals (Gen. 1:21) possibly apparently sixty years old. He observed mountains (Gen. 7:19) and spreading plains with rivers (Gen. 2:10-14), erosion plains which some think require millions of years to form. If he had examined trees, I believe he would have found annual rings, and that if he had dated minerals radioactively it is possible that apparent ages of even millions of years would have been found.

After all this careful open-minded study of the Edenic world, Adam could have returned to the Creator and with great sincerity said, "Lord, I'm sorry to have to say this, but this landscape is much older than you think!"

If it had been available to him, it is very likely Adam could have had the confirmation of all our most sophisticated modern scientific apparatus in the matter of great age. Suppose this apparatus had been available to Adam, and that in making his report, he had invited the Creator to have a seat, and then had taken an hour and a half with tables, charts, and photographs, showing the agreement of inorganic radioactive time clocks, of fission-track data, of effects of solar wind in eroding moon craters, etc., etc., that our earth *had* to be at least four and one-half billion years old. Would the Creator have been impressed? Would all these data on age of the open-minded method have constituted *natural truth*?

Scriptural Evidence

Who would have been correct in such an imagined situation—the Creator, "nothing in the landscape over three days old," or Adam, after the results of open-minded study were all in? The Scriptures help us here:

Gen. 1:1: "In the beginning God created the heaven and the earth." Matt. 19:4-6 NASB: "... he who

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created them from (at, in) the beginning made them male and female" (the Creator speaking; see also Mark 10:6). Apparently our solar system and Adam and Eve were created in the same great event—the same six days, Creation Week. Ex. 20:11: "For in six days the Lord made heaven and earth, the sea, and all that in them is." Ps. 33:9: "For he spake and it was done; he commanded, and it stood fast."

Apparently before Creation Week no part of our solar system was in existence, and during the six days, at the spoken work of the Creator, all basic types (kinds) of plants and animals came into being. There was no evolution of living things through millions of years. Bible chronology (Bible history) shows us that Creation Week was nearer 6,000 than either 5,000 or 7,000 years ago. There was perhaps no written divine revelation, as such, for the first twenty-five hundred years of earth history, from Adam to Moses. God's revelations were relayed by memory from father to son. Then the Bible was written during the next sixteen hundred years from Moses to John the Revelator. (But see Reference 2.)

Why could Adam not believe what he thought he saw on the subject of age of the landscape? The answer stands clearly revealed in special revelation (the Bible). Our earth was created, along with the living forms with which it was furnished, with an *appearance of age*. Adam's open-minded method could bring the right answers for innumerable problems, *provided the phenomenon under study was not complicated by the factor of geological age*. The same situation holds for us today.

Effects of the Flood

There are a few basic questions which each modern scientist must face if he is concerned with age dating. We live on an earth which came into being in an *unnatural* way and which had an *appearance of age*. Then some sixteen centuries after Creation Week our earth's surface was destroyed by a terrific *unnatural* cataclysm which we call Noah's "Flood." In this cataclysm water, wind, earth movements, and volcanism were used in *unnatural* ways. The magnitude of the destructive nature of these forces upon the surface of our earth is indicated by the *centering* of many great earthquakes *below* a depth of 400 miles.³ The cataclysmic nature of Noah's "Flood" goes beyond the limits of our understanding and wildest imagination. The turbulent waters may have reached depths of as much as eleven miles (as in the valley of the Ganges?), but other forces disrupted the surface on down to a depth of over 400 miles.

On the Length of the Days of Creation Week

Creationists sometimes say that the days of Creation Week were days of twenty-four hours. In so saying they are, of course, right in what they mean; but the statement may not be very useful. In fact, it would be useful only were "hour" defined independently. If an hour is a

The Necessity of Revelation

How only can we know the natural truth about the age of our earth? Adam could learn that truth only by special revelation. Today our students of earth science are studying an earth which came into being *unnaturally* with an *appearance of age*. Some sixteen centuries after that creation the surface of this earth was utterly destroyed (more here and less over there) by the *unnatural* activities of Noah's "Flood." Today it is fair to ask, How is it possible now to determine *in natural ways* the age of a surface which was both created and destroyed in *unnatural ways*? I submit the thesis that until man accepts the necessity of special revelation regarding our natural world, he will never know the truth about the age of our earth or the origin of life upon it.

My sympathies go out to our young scientists in this skeptical day. I, as a Bible-believing creationist, associated for nine years in a total of four non-church-related universities, know from first-hand experience what these young students face. They wish not to be a laughing stock before their more mature scientific colleagues. But in the matter of age determination each Bible-believing scientist will have to choose between accepting the untruths which inevitably result from acceptance of the uniformitarian myth—and thereby enjoying the approval of his more mature skeptical colleagues, or taking the consequences of standing firmly for the truth of the simple declarations of Genesis.

How strongly the natural man wants to believe everything he thinks he sees! But regarding age, Adam could not do that, even in a perfect world, and still he was very happy! Our own love for truth should help us follow his example. For many years I have steered my bark away from areas of study where geological age is involved, and still find the world full of challenging problems awaiting open-minded study. A semblance of uniformity existed from Adam to Noah's "Flood," and again from Noah's "Flood" to our day. I am a fairly reasonable uniformitarian for those two periods. However, I depend entirely on divine revelation (1) with regard to the work of Creation Week, and (2) with regard to the destruction and relaying of our earth's surface in Noah's Flood.

References

- ¹Worrad, Lewis H., Jr., 1977. God does not deceive men. *Creation Research Society Quarterly* 13 (4):199-201.
- ²Or, it may be, as some have held, that Moses edited Genesis from written records which had come down from the patriarchs. See, e.g., Wiseman, P.J., 1946. New discoveries in Babylonia about Genesis. Marshall, Morgan, and Scott, London.
- ³Howell, B.F., 1959. Introduction to geophysics. McGraw-Hill Book Co., Inc., New York. Section on seismology.

twenty-fourth of a day, then any kind of day whatsoever is of necessity one of twenty-four hours.

Is a better statement about the days of Creation not provided by Genesis 1:5, which says, in the Hebrew, something like: "... and the evening and the morning were one day"? In other words, a day consists of a period of darkness and a period of light.

A DILUVIAN INTERPRETATION OF ANCIENT CYCLIC SEDIMENTATION

JOHN WOODMORAPPE*

Received 9 June 1977

"No more fascinating field for research and speculation exists within the entire domain of stratigraphy."

—J. M. Weller

"But God remembered Noah and all the beasts and all the cattle that were with him in the ark: and God caused a wind to pass over the

earth, and the water subsided. Also the fountains of the deep and the floodgates of the sky were closed, and the rain from the sky was restrained; and the water receded steadily from the earth, and at the end of the 150 days the water decreased."

—Genesis 8:1-3

The earth's water-laid rocks contain a repetitive type of stratigraphic layering known as cyclothems. Uniformitarian geologists have long debated the processes which formed them; but every theory proposed has failed to explain many basic properties.

In fact, uniformitarianism, which is not a scientific law or principle, has fostered an unnatural interpretation of cyclothem rocks. Numerous properties of cyclothems are explained far more fully and simply in terms of catastrophic sedimentation. These properties include their world-wide distribution and "age"-transcendence, the shallowness of the deposition, vertical gradation, and evidence in them of contemporaneous tectonism. A detailed account is presented of the genetic relation between cyclothem sedimentational and stratigraphic properties and the recessional phases of Noah's Flood.

Outline

- I. Introduction
- II. Uniformitarian Theories Proposed to explain the Causes of Cyclic Deposition
 - A. Differential Settling Theory⁹
 - B. Intermittent Subsidence Theory¹⁰
 - C. Differential Uplift Theory¹¹
 - D. Precipitation Control Theory¹²
 - E. Diastrophic Control Theory^{13,14}
 - F. Glacial Control Theory¹⁵
 - G. Plant Control Theory¹⁷
 - H. Compaction Control Theory¹⁸
- III. The Role of Uniformitarianism in Geological Interpretation of Sedimentary Rock Phenomena
 - A. The Antitheistic, AntiBiblical Nature of Uniformitarianism
 - B. Chronostratigraphic Facets and Cyclothems
 1. The Uniformitarian Geologic Column and Cyclothems
 2. Unconformities Versus Continuous Deposition
 3. Radiometric Dating and Cyclothems
- IV. Ramifications Of The Deluge In Cyclothem Formation
 - A. The Worldwide Occurrence and "Age"-Transcendence of Cyclothems
 - B. Paleohydrological Parameters and Cyclic Sedimentation
 1. Shallow, Intracratonic, Epicontinental Seas Versus Flooding of Continents
 2. Specific Evidences of Cataclysmic Sedimentation in Cyclothems
 3. A Critique and Re-Interpretation of Uniformitarian "Sedimentary Environment" Concepts as Applied to Cyclothems
- V. The Diluvian Tectonosedimentary Generation of Cyclothems
 - A. The Tectonic Component of Cyclothem Genesis
 - B. Specific Evidences of Cataclysmic Tectonism Contemporary With Cyclothem Formation
 - C. The Sedimentational Component of Cyclothem Genesis
 - D. The Relationship Between Individual Cyclothem Members and The Flood
 1. The Coals (Member 5)
 2. The Underclay (Member 4)
 3. The Limestones (Members 3, 7, 9)
 4. The Sandstones (Member 1)
 5. The Shales (Members 6, 8A-B, 10A)
- VI. Epilogue

I. Introduction

In beginning this article, may I make a suggestion, and then proceed to follow it myself? The suggestion is this: that in the future Flood geologists call themselves Diluvialists, not catastrophists, because of the fact that

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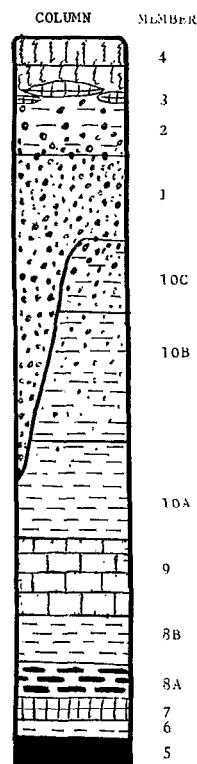


Figure 1. This shows an ideal Illinois cyclothem (See Reference 131.)

Note that at no locality are all 10 listed members present; the most commonly found cyclothem has 1 (and, or 2), 4, 5, 8, 9, and 10. Nearer to the source area (Pennsylvanian and Ohio) fewer limestones and greater thicknesses of coal prevail, with thicker, more massive clastic material. In Kansas (farthest from the source area) there are thinner coals, and only thin fine clastics and massive limestone beds.

The key to the letters and numbers is as follows: 4, underclay, nonbedded; root impressions, slickensides. 3, claystone, with or without limestone nodules and sheets. It grades into 2, siltstone or sandy shale. This grades into 1, sheet or channel sandstone, which is EITHER in sharp erosional contact with, OR grades into 10C, siltstone. This grades into 10B, sandy or silty shale. 10A, shale, gray, usually sandy in the upper parts, with ironstone nodules. 9, limestone, marine, fossiliferous or calcareous shale. 8B, gray shale. 8A, shale, black, fissile, with brackish or restricted marine fauna. 7, limestone, marine, fossiliferous, but rarely present. 6, shale, gray with plant fossils. 5, coal.

many orthodox uniformitarian geologists accept rapid sedimentation. Many others (Howorth, Velikovsky, etc.) accept catastrophes in the earth's past but do not accept the universality of the Deluge, or else do not accept the Divine Inspiration and complete factuality of the Biblical accounts, or else adulterate Scripture with claims of many other catastrophic occurrences—thus too often twisting Scripture to fit their presuppositions.

The term Diluvialist therefore refers to that scientist who accepts the historicity and factuality of the Biblical accounts of the Creation-Flood period (Genesis 1-10), without adding or subtracting any tenet which would constitute a twisting of the Inspired Word to fit any other world view or construction of claimed knowledge.

There exist among sedimentary rocks certain types which have very many types of rock, in thin layers, which lie one on top of another and repeat in a regular sequence. Much of the world's coal is found in such repeating layers. Each repetitive sequence (between coals and including one coal) is called a cyclothem. A diagram of an "ideal" or "complete" cyclothem found in Illinois is found in Figure 1. (The reader of this paper should continually refer to Figure 1 whenever the number or the lithological identity of a given member is described in this text.) The numbering and termination of the cyclothem differ, reflecting the disagreement among Pennsylvanian stratigraphers as to where one cyclothem "ends" and a superjacent one "begins." [Thus, some consider a new cyclothem to begin at the basal sandstone, member 1, while others consider a new cyclothem to begin with the coal (member 5)].

It must be hastily added that almost never in the earth does a "complete" cyclothem occur at any location as shown in Figure 1. A real field situation as exists might have this type of layering: members 1, 2, 4, 5, 10, 1, 2, 4, 5, 8, 10, 1, 2, 4, 8, 9, 10, 1, 2, 3, 4, 5, 6, 7, 8, 10, etc. The important fact to realize is that the relative order of the members always exists and that these members do repeat themselves consistently.

The cyclothem are asymmetrical, which means that the coal or shale (or any other member), may be vastly thicker or thinner than the corresponding member of the cyclothem above and below it. Furthermore, even within one cyclothem, the thickness or thinness of one member does not guarantee the thickness, thinness, or even presence of another member in that cyclothem at all. Six or more of the then members are usually found at any given locality and their relative order is always preserved. "The average thickness of a cyclothem is the central states is less than 50 feet¹. . ."

Although cyclothem and their valuable coal beds are found in many parts of the world, this paper will concentrate on the cyclothem found in Illinois as far as their morphology and specifics are concerned. "The Pennsylvanian sediments in the basin cover an area of approximately 55,000 square miles, chiefly in Illinois, Indiana, and Kentucky, with minor areas in Missouri and Iowa.

The maximum thickness of Pennsylvanian sediments, more than 2800 feet, occurs in the southern part of the basin in Kentucky. Shale is the predominant lithological unit of the sequence with subordinate amounts

of sandstone and much smaller amounts of limestone and coal. The presence of ordered lithological sequences or cycles is the most characteristic lithological feature of the Pennsylvanian sediments. More than 50 such sequences are recognized."²

Cyclothem are variable not only in terms of presence of members and thickness of members, but also in terms of lateral extent of each of the members. Some members can be traced for hundreds of miles while others wedge out (& thin out) in only a few miles or else grade into members elsewhere. "Many of the cyclothem are nearly as varied within a single county as within the entire state of Illinois.

For this reason, a detailed study of only a small area may leave the impression that the beds vary greatly, whereas a more general survey of almost the entire Eastern Interior Basin has revealed that the Pennsylvanian system throughout this region is remarkably uniform."³ Cyclothem, like humans, are paradoxically-so similar yet so different from each other.

The reason why the area of cyclic sedimentation has been chosen for this study is because "No more fascinating field for research and speculation exists within the entire domain of stratigraphy."⁴ This writer has engaged in both "research and speculation" in the field of cyclic sedimentation to try to understand how the Universal Deluge caused cyclic sedimentation.

The uniformitarians have proposed a good number of theories to explain how the cyclothem formed, but "None of these theories has gained much following."⁵ This is because "Recognition of the stratigraphic facts of cyclical repetition and distribution, and deduction of the causes responsible for them are unrelated, one to another. Evidence pertinent to the historical interpretation of cyclothem is incomplete, scattered, and not fully understood. Some of it has suggested different conclusions to different persons.

Also, several possible avenues of attack upon this problem have not been adequately explored. It is not surprising, therefore, that there is much disagreement regarding the basic cause or causes responsible for the development of cyclothem."⁶ The Diluvialist will add that one of the "Avenues of attack" that has not been explored is that of the Deluge.

The very fact that uniformitarianists are having difficulty coming up with a universally appealing theory to account for the formation of cyclothem is evidence that the case for alternative, non-uniformitarian theories is far from closed. Therefore, a Diluvialist is completely justified intellectually in proposing his own theory.

II. Uniformitarian Theories Proposed to Explain the Cyclic Deposition^{7,8}

Of the theories mentioned in the Outline, the first four, which are commonly admitted to encounter grave difficulties, will not be discussed here. The Diastrophic Control Theory contains some truth, and, when understood in the Flood setting, it is workable since logistic problems of timing are overcome. The Glacial Control Theory, since it works on a world-wide scale, deserves some thought; and the other two will be mentioned briefly.

F. GLACIAL CONTROL THEORY: This theory is speculative because of the near impossibility of demonstrating cause-effect in terms of claimed Paleozoic glaciations. A more serious objection has to do with the wedge shape of cyclothem; "Examination of sedimentary cycles at the margins of Carboniferous basins shows that they do not conform to the pattern that would be expected if the sea-level changes were eustatic. This is because eustatic rise in sea level must equally affect the margins and central part of the area of deposition. Deposits of this type are rare in the geologic column outside of the Quaternary . . . "They are unknown in the Carboniferous basins of deposition."²⁵ A modification of this theory postulates basinal subsidence, but this way of thinking only "patches up" the problem and makes the theory so non-falsifiable and plastic as to be completely untestable.

Since the Diluvialist contends that the uniformitarian geologic age system is devoid of reality, supposed glaciations "plugged into" those "times" are also rejected. Whitcomb and Morris in their classic Diluvialist work¹⁶ have written of suggested alternative explanations for claimed Paleozoic glaciation. It is significant that the Glacial Control Theory is the main theory among uniformitarians that attempts to come to grips with the worldwide occurrence of very similar cyclothem, because it elevates the riddle of cyclothem formation from local to worldwide proportions. It is up to the Diluvialist now to unify the worldwide aspects together with local morphology into a coherent Diluvian interpretation which is free from the limitations upon thinking created by the geologic dogma of uniformitarianism.

The two remaining minor theories are considered to carry very little weight. They are:

G. PLANT CONTROL THEORY¹⁷ This theory sees cyclothem being formed by differential blockage of zones of sediment accumulation by means of levees. Needless to say, this theory is incapable of explaining the persistent lateral extent of many cyclothem, and also much less the striking similarity of the cyclothem phenomena across the globe.

However, this theory has value in explaining certain local variations in sediment thickness in terms of Diluvian processes. As Floodwaters cyclically retreated and transgressed vast inland areas during the recessional stages of the Deluge, levees must have played a great role in determining over what regions sediment would be carried and stranded by waning fluvial-like water currents.

H. COMPACTION CONTROL THEORY¹⁸ This theory envisions the sedimentary basin being laden with sediments that can be compressed by vastly different degrees; this differential compaction accounting for sequences. For example, when sand is accumulated, the difficulty of compacting it would mean that it would fill up the basin faster than it would subside.

The basin being filled would lead to the area being constantly above water and consequently of peat accumulation. As peat accumulated it would be easily compressed, leading to the rate of subsidence exceeding the rate of accumulation. This would lead to new marine transgression drowning the swamp. The area

being again underwater would lead to a repeat of sand accumulation. This entire process would continually repeat, forming cyclothem.

This hypothesis meets its nemesis because materials could not be compacted sufficiently to allow for superjacent cyclothem to be added. As so many other uniformitarian theories, this one also fails to account for cyclothem in their totality as well as to account for worldwide distributions and large extent of cyclothem.

CONCLUSION. It bears repeating that "none of these individual theories has gained much following."⁵ It must be stressed once again that the Diluvialist, not restricted by uniformitarian philosophy, can unite the best elements of all these theories into a coherent view of cyclothem formation in terms of the Deluge. But before that venture is begun, an explanation of uniformitarianism and its control of geological theories, including theories of cyclothem origins, will be presented.

III. The Role of Uniformitarianism in Geological Interpretation of Sedimentary Rock Phenomena

PROPOSITION. The uniformitarian world view, which has dominated geologic thought since the 1830's, is not a scientific fact or deduction, nor a scientific law. It is based on the *a priori* decision to reject as invalid any Biblical, historical, or scientific evidence for any sedimentary process significantly different from those encountered today. The Diluvialist position, by admitting the possibility of catastrophes in the past, offers a fresh, new framework for earth history; and it leads to far more satisfactory explanations of sedimentary and stratigraphic phenomena that any theory which limits itself to consideration of present-day sedimentational phenomena.

A. THE ANTITHEISTIC, ANTIBIBLICAL NATURE OF UNIFORMITARIANISM. There is far more to geology in its implications than the study of our planet, "In its widest sense, geology covers the whole spectrum of human experience and understanding . . . few other disciplines have had and must have in the future a more profound influence on human thought."¹⁹ Thus, there is room for various interpretations of geological thought.

Uniformitarianism is not a scientific law that was deduced from the study of the earth; it was and is an *a priori* viewpoint, "Strict uniformitarianism may often be a guarantee against pseudoscientific fantasies and loose conjectures, but it makes one easily forget that uniformity is *not a law, nor a rule established after the comparison of facts*, but a methodological principle *preceding the observation of facts*. (Italics added)."²⁰ The uniformitarian must therefore not claim that the study of rocks has disproved the Deluge and established that present-day sedimentary processes have produced the earth's sedimentary rocks precisely because it is his *a priori* presupposition that rejects that historicity of the Universal Deluge and assigns present-day sedimentation to be the guide of the study of the formation of sedimentary rocks.

Uniformitarian geologists may come to wear blinders which hide everything other than what is going on today in sedimentary environments, "Advocates of methodological uniformitarianism seem to view the classic formulation of the uniformity principle as a

tautology: our reconstructions of the past are bound to be determined by whatever we discover to be going on at present."²¹ It is therefore obvious that even consideration of the Deluge will not get the slightest chance in uniformitarian geology because there are no worldwide floods going on at present. (And God promised Noah that there would never be another worldwide flood. (Genesis 8:21)) It is an exercise of highest futility to hope for geologists as a whole to ever consider the factuality of the Universal Deluge. "... our interpretations of prior events must necessarily consist of inferences based upon present observations,"²² insist the uniformitarian geologists.

The religion of atheistic humanism dominates geology. Not only is no process not represented in kind today permitted, but God and His Word are specifically banned from geologic thought today, "What are our assumptions in such a procedure (Uniformitarianism)? Fundamentally, there are two: (1) We assume that natural laws are invariant with time. (2) We exclude hypotheses of the violation of natural laws by Divine Providence, or other forms of supernaturalism."²² "Indeed, if I am correct, the residual issue between uniformitarianism and catastrophism comes down to the issue between *naturalism and supernaturalism* or at least between *naturalism and anti-naturalism*."²³

That is where it is! Not a conflict between science (supposedly uniformitarianism) and religion (supposedly only Diluvianism) but a battle between one religion (atheistic, naturalistic, humanism) and another (Biblical Revelation); at one level. At the scientific level, it is a battle between interpreting non-observational, non-experimental, non-repeatable data in terms of the consequences of naturalistic, atheistic humanism vs. interpreting them in terms of the consequences of Divine action in human history and geologic history as revealed and recorded in Scripture. Both positions fit facts to theories. With Diluvialism, it is obvious; with uniformitarianism, it is also true: "We do not merely find facts and make theories; we fit facts to theories as well as theories to facts."²⁴

B. CHRONOSTRATIGRAPHIC FACETS AND CYCLOTHEMS

1. The Uniformitarian Geologic Column and Cyclothems

It is well known that the earth's sedimentary strata is pieced together into a vast system of supposed ages of the earth's past; the fossiliferous rock being alleged to go back 600 million years. Yet the basis for this age-column is evolution. Certain fossil forms are supposed to spell a long sequence of evolutionary events. Various forms of these index fossils are found in fossiliferous rocks and a chronology of rock layers is built upon this and similar fossil-recording-evolution progressions.

Thus, if some fossil form evolves from form A to D, then any rock containing A will be older than B which in turn will be older than C, etc. Yet a rock C lying on top of A will be assumed to either have had B on top of A before C was deposited (B being "eroded away" before C's deposition) or else not have been an area of sedimentation during the time B supposedly evolved.

That is how a geologic column some 130 miles net sedimentary thickness spanning some 600 million years

is constructed by the evolutionists-uniformitarians in spite of the fact that at no location on earth is the complete sequence found and nowhere on earth does the sedimentary rock cover exceed some 7 miles.

The uniformitarian geologic column is the exact antithesis of the Diluvialist position, which sees practically all of the fossiliferous sedimentary rock laid down during Noah's Flood or shortly afterward. Diluvialists have long noted how artificial and specious this column is. They have exposed the underlying foundation of evolution, and have particularly stressed the innumerable gaps and distinct, abrupt appearances of complex fossils without evidence of any evolution from "lower" forms. This column, a biologic onion-skin theory as stated by the noted late Diluvialist, George McCreedy Price, ignores, for the most part, other data. Thus, there is no difference between a Cambrian shale or a Cretaceous shale except the claimed age difference. Only fossils and supposed evolutionary stages delineate the rocks and their ages.²⁶ There are specific examples of fossils of different "ages" mixed together. One example is the finding of Devonian fossils in Pleistocene sediment.²⁷ Another is the finding of plant spores in coal (or in rock) outside their "ranges" with the result of there being "no consistent pattern" in these assemblages.²⁸ In both these cases, the protective concept invoked is that of "reworking" whereby an old sedimentary rock is eroded and its fossils included in much younger rock.

However, the *prima facie* (raw, face value, pre-interpreted) evidence of mixed fossils indicates one fatal flaw in uniformitarian thought. Another example found is that of Eocene and Pennsylvanian fossils coexisting in a rock in Alaska.²⁹ The rock was labelled Eocene and the other fossil dismissed as a "striking homeomorph (look alike)" of *Annularia*, a Pennsylvanian fossil. The claim of earlier misidentification may have to be granted, but in any case the weak basis for uniformitarian "age" designations is fairly evident.

Divisions of geologic periods, predictably, are quite weak: "I have already indicated something of the difficulty in fixing both upper and lower boundaries of the Upper Carboniferous rocks... The division between Namurian (lower Pennsylvanian) and Westphalian (middle Pennsylvanian) is quite arbitrary... The boundary between Stephanian (upper Pennsylvanian) and Westphalian is even less objective."³⁰

Even whole geologic periods in places are invented to keep fostering the illusion of long ages and evolution: "Definition of the boundary between rocks classed as Pennsylvanian and Permian in the Kansas region has led to much debate and disagreement... (It was)... proposed to avoid the difficulty by not recognizing the Permian at all... This procedure might be defended on the basis of the stratigraphic succession in the midcontinent area, but it is evidently unsuited to world-wide application."³¹

In other words, the rock evidence (stratigraphy, gradational nature of rocks) is deliberately forced to conform to evolutionary-uniformitarian thought. The Diluvialist rejects outright these artificial, unnatural divisions of these Flood-deposited rocks, because, "Judgement has been generally expressed that any

adopted boundary is measurably arbitrary.”³² The Diluvialist can grasp the idea of continuous, nearly contemporaneous deposition of these cyclothem rocks by the Universal Deluge.

Unnatural age divisions of Flood-laden rock inevitably lead to flagrant contradictions between the forced rock delineation and its stratigraphic properties which must be resolved by illogically segmenting continuous rock bed masses. Into this situation cyclothem enter: “Paleontological and physical evidence seem to conflict, the paleontological evidence favoring Weller’s correlation and the physical evidence favoring that of the writer.”³³ Also, “. . . laterally continuous lithologic units may be of different ages in different positions in the basin. Matching of the depositional cycles may demonstrate the lateral facies equivalence despite the chronological difference.”³⁴

In the final analysis, the entire uniformitarian geologic column is admitted to be arbitrarily divide rocks: “. . . the stratigraphic column does not naturally divide itself into sharply defined systems of world-wide extent.”³⁵ “A . . . source of confusion and controversy lies in preconceived notions on stratigraphic classification handed down from the early stages of the development of stratigraphy . . . As an example is the tendency to believe that the classic time-stratigraphic divisions (systems, series, stages) established largely in Europe during the last century constitute “natural divisions” of the earth’s stratigraphic column which can be recognized as such around the world . . . Although few would now openly subscribe to this extreme segmentation of the stratigraphic record, nevertheless many almost unconsciously endow the boundaries of these original time-stratigraphic units with a world-wide significance far beyond their real nature of quite *arbitrary* . . . divisions of . . . the earth’s sedimentary strata.”³⁶ (italics added).

2. Unconformities Versus Continuous Deposition.

A most important ramification of the Diluvian notion of continuous deposition is the gradational nature of sedimentary rock beds. Scientific Diluviology scrutinizes superposed rock beds of widely different “ages” and notes the gradational nature between them with no evidence of any buried erosional surface and consequent hiatus of deposition. Erosional surfaces, or unconformities, definitely exist but are not as widespread as the uniformitarians would have them be.

As a result, uniformitarianism collapses in its claim of that 130-odd mile thick, 600 million year geologic rock-time continuum. On the other hand, the absence of worldwide erosional surfaces, the gradation of every formation somewhere into another, etc., all strongly argue for the Noachian Deluge.

There are various unconformities related to cyclothem. One is the unconformity (buried erosional surface supposed to indicate a considerable span of time) between cyclothem “stacks” and the underlying, non-cyclothem “older” rock. The other is the unconformity which is supposed to divide one cyclothem from the next one above; considerable time is variously ascribed between individual cyclothem.

The Silurian-Devonian in Kansas underlying the cyclothem is “. . . poorly distinguished³⁷. . .”

The unconfirmity between the cyclothem Pennsylvanian and noncyclothem lower Paleozoic material is considered to be “. . . one of the most important unconformities in the Paleozoic of the east-central U.S.³⁸. . .” Yet there are very many locations where there is no compelling evidence for any stoppage of deposition, and erosion, between Pennsylvanian and pre-Pennsylvanian rocks.

For example. Lower Carboniferous rocks,” . . . overlap the Devonian formations, but no noticeable discordance has been observed between the two formation.³⁹” Eocene cyclothem rest on top of Cretaceous: “. . . these were previously thought to be of Cretaceous age. These beds rest with no marked discordance on the Cretaceous⁴⁰. . .”

The Mississippian-Pennsylvanian unconformity in the U.S. is very interesting. In attempting to distinguish Mississippian and Pennsylvanian rocks, Siever⁴¹ notes that: “The chief difficulty is that many Chester (Mississippian) beds resemble Pennsylvanian beds in lithological character, texture, and mineralogy.”⁴¹ “Even with this detailed lithological study there will be many drill holes in which it is impossible to ascertain the exact depth of the contact. Under such conditions, and where the stratigraphy is doubtful, the best method is to make an intelligent *guess* substantiated by any information available.”⁴² (italics added)

The Mississippian-Pennsylvanian in Virginia is now seen as “partly contemporaneous.”⁴³ In Oklahoma: “. . . the unconformity separating Mississippian and Pennsylvanian strata disappears into the basin. No evidence of truncation or missing stratigraphic intervals either above or below the unconformity can be demonstrated . . . At other places local unconformities may be identified at the base of a particular sandstone unit, but no regional erosional surface can be recognized.”⁴⁴

Quite recently the uniformitarians have come around to recognizing gradation and intertonguing of different “aged” rocks: “. . . the unconformity concept is largely subjective and is based to some degree upon preconceptions concerning modes of origin.”⁴⁵ “Finally, it is evident that the regional systemic unconformity between “Pennsylvanian” and “Mississippian” strata . . . (is) no longer valid.”⁴⁶ However, the uniformitarians have come up with a new way of explaining away the gradation-intertonguing of different “aged” rocks. They call it a “time-transgressive relation” where some sedimentary basin is filled in a time spanning geologic periods or from sedimentation of continuous sedimentary environments.

However, no amount of assigning new names can cover up the fact that these ages never existed, and that corroboration of the fact of the Flood is offered by gradational-intertonguing relations in massive sedimentary rock beds. Also noteworthy is the fact that Upper Mississippian cyclothem grade directly unto the Pennsylvanian ones.⁴⁷

Much the same non-division noted in the Mississippian-Pennsylvanian also exists in rocks unnaturally divided into the Pennsylvanian and Permian “periods.” In the U.S.S.R., for example,” Problems remain with the Devonian-Carboniferous and Carbon-

iferous-Permian boundaries.⁴⁸” Also, “The Carboniferous-Permian boundary has long been a puzzle in the Upper Paleozoic in Japan and in the extensive area covering Korea, Manchuria, and North and South China.⁴⁹” In the U.S., “Cyclo-phase deposition crosses the systemic boundary of the Pennsylvanian-Permian.⁵⁰”

Not only do the sedimentary rocks reveal their *prima facie* nature of being continuously Flood-deposited, but rocks layered in “reverse age” sequences create additional embarrassment for the uniformitarian position: “Another problem, more difficult to explain, is that in some localities carbonates and red and green shales with “Mississippian” faunas overlie “Pennsylvanian” orthoquartzites . . . In such cases, the “Pennsylvanian” orthoquartzites are assigned to the “Mississippian” . . . Thus, however awkward, the tabular-erosional explanation has been consistently applied in absence of any viable alternative explanation.⁵¹” Diluvialists have continually exposed the fantastic explanations offered by uniformitarians to escape the fact of glaring contradictions to their geologic time scale.

In summary, the *de facto* gradation, in some (most) locations of Silurian into Devonian, Devonian into Mississippian, in turn into Pennsylvanian, in turn into Permian, all suggests that this span represents a continuously-deposited sequence of rock. The artificial geologic age designations collapse in futility, some 190 million years of nonexistent time evaporates, and the rocks give powerful testimony to the fact of the Noachian Deluge as causing their origin. It will now be shown that the cyclothem layers within them also were continuously deposited and also show no compelling reason to believe that there was any significant time span between their formation.

The two places where cyclothem are divided are the sandstone and underlying siltstone (members 1 and 10C, Fig. 1) and the coal and overlying member (member 5 and whatever is superjacent).

“The prominence of the basal sandstone unit and its channel aspect in the typically limited outcrop areas of the Eastern Interior have led workers to stress the importance of this unconformity. However, unconformities appear to be present in less than 20% of the area of any cyclothem in Illinois, and for some cyclothem no unconformities are known.⁵² . . .” Hence, in the majority of cases, there is a gradation⁵³ between the basal sandstone and the underlying siltstone. Furthermore, the unconformity vanishes almost completely basinward in the Kansas region.⁵⁴ Even where an erosional surface below the sandstone does exist, “No evidence of weathering was observed beneath the contact.⁵⁵”

The artificiality of this sandstone-siltstone transition being used as a depositional-stop is admitted: “The importance of the discordant surfaces present beneath some sandstone bodies . . . has been exaggerated . . . In such a classification system, the products of a single pulse of clastic deposition are unnaturally split between two adjacent units.⁵⁶”

The other position in the cyclothem where a cyclothem is thought to “end” and the superjacent one “begin” is the coal bed. However, this practice of dividing is subjective like the sandstone-siltstone contact: “Nor does it matter whether the cyclothem are

separated at the base of the sandstone . . . or at the top of the coal, as is preferred by some others, including most European stratigraphers. The selection of this boundary is a matter of *opinion*⁵⁷ . . .” (italics added). It must be realized that the coal grades into whatever is above it.

Specifically, the coal grades into or intertongues with limestone⁵⁸ and also often grades into the black shale, even to the point of making it “. . . difficult to remove it from the coal during mining operations.⁵⁹” It could similarly be shown that every cyclothem member grades into superjacent and subjacent members at least somewhere. It can therefore be concluded that there is no substantial time gap between cyclothem formation, that uniformitarian notions which claim time intervals between cyclothem can be justifiably rejected, and that cyclothem can be understood in terms of uninterrupted Flood action.

The calling attention to the gradational nature of the rock beds is not meant at all to imply that there are no buried erosional surfaces, on the contrary, there are vast areas possessing unmistakable erosional surfaces. The point was that there is no universal unconformity that points to any significant stoppages of deposition.

The localized nature of the unconformities can be viewed as regions which were covered with Flood water, exposed, then re-inundated. This is eminently reasonable when one considers how shallow several hundred feet of Floodwater are in relation to tectonic changes in topography and their effects. Some erosional surfaces may result simply from very rapid lithification of Flood-laden rock.

“Certain colloids tend to aggregate very quickly; even in minutes . . . For example, polymerization of silica occurs most rapidly and produces an extremely powerful, irreversible cohesion. Such effects are very important in sediments, particularly the clays⁶⁰ . . .” Hence some non-gradations, predictably local as is actually the case, can be accounted for by this rapid lithification and later erosion during the overall continuous deposition of the Flood.

An interesting situation exists between some areas of Mississippian rock and overlying Pennsylvanian. The localized erosional surface that has been chosen as the boundary possesses buried valleys whose walls have collapsed (slumped)⁶¹. In some places this slumping is so profound that it “. . . amounts to virtual collapse of the valley wall.⁶²”

How an ordinary river could produce such slumped valley walls is a puzzle to the uniformitarian: “Presumably stream action erodes and destroys most bank materials subsequent to their failure. The fact that structures produced by stream bank failure are preserved is, thus, seemingly an enigma.⁶³” The Diluvian position can amply explain this situation as being caused by poorly consolidated sediment laid down earlier in the Flood being eroded into during the recessional stages of the Flood, with consequent slumping of weakly consolidated sides of gorges.

Thus localized erosional surfaces, when properly understood, do not justify the uniformitarians’ extrapolation of them into regions of gradation. Flood ac-

tion operates as local erosion superposed over continuous deposition.

3. Radiometric Dating and Cyclothems

The familiar use of radioactive decay parent-daughter element ratios has been taken by many to have proved the uniformitarian contentions of extremely long geologic ages.

Diluvialists, on the other hand, have stated repeatedly that the geologic column and its inherent long-age claims were decided long before even the discovery of radioactivity. Diluvialists also noted the independence of the previously-discussed paleontological dating from radiometric dating, and uniformitarians also concur: "The development of an absolute time scale has been of immense importance to geology but it is not accurate and complete enough to replace the standard methods of classical stratigraphy. The geologist who works within a certain system still relies entirely on relative dating. Indeed, many practising stratigraphers regard absolute time as not very essential and absolute ages are mentioned with great care, if not suspicion.⁶⁴"

Diluvialists often cite examples of how uniformitarians accept only those dates which agree with their preconceived notions. A recent example of this is where "The $^{87}\text{Sr}/\text{Sr}^{86}$ and $^{87}\text{Rb}/\text{Sr}^{86}$ ratios are positively correlated, but this relationship is the result of mixing and does not reflect the age of the provenance nor the time of deposition of the sediment.⁶⁵" If "mixing" indeed accounts for consistent ratios, then the Flood can account for much mixing.

The scrutiny of radiometric dating methods has uncovered the degree of subjective bending of data: "There is no really valid way of determining what the initial amounts of Sr^{87} in rocks were. There is much juggling of numbers and equations to get results in agreement with the U-Th—Pb "clocks." In all these radioactive clocks, all methods are made to give values that fit the evolutionist's belief as to the age of the earth and the ages of the various geological events.

The reason that the various dating methods give similar ages after "analysis" is that they are made to do so. In the case of the initial $\text{Sr}^{87}/\text{Sr}^{86}$ ratios, these values can be adjusted so that any age desired is obtainable.⁶⁶" A vivid portrayal of this action is offered by recent radiometric dating of inclusions in cyclothem sandstones: "An initial $\text{Sr}(87/86)$ ratio of 0.706 has been CHOSEN for the Rb-Sr calculations. A higher value would make the Rb-Sr age for M1117a lower than the K-Ar age, a phenomenon very unusual in nature and certainly NOT TO BE EXPECTED from a simple detrital muscovite. If muscovites have been weakly metamorphosed, then the K-Ar age may be lower than the Rb-Sr age because of the greater loss of radiogenic Ar^{40} relative to radiogenic Sr^{87} . If an initial ratio of 0.703 (low for a granite; but hypothetically possible) is CHOSEN ages of 378 and 411 Million years (for M1117a and M1125, respectively) result. This brings the K-Ar and Rb-Sr dates for M1117a to within 1 million years for M1125; hence our *preference*. is for the 0.706 value. The K-Ar ages are the mean of duplicate analysis, whereas the Rb-Sr ages are single determinations only⁶⁷. . ." (emphasis added)

Not only do uniformitarians take great liberties in

bending data to suit their presuppositions, but also there is a growing body of radiometric evidence for the extreme youthfulness of the earth. Recent findings of radiohalos in Triassic and Jurassic coals, presumed to be 140 to 230 million years old, are an exciting example: "If remobilization is not the explanation, then these ratios raise some crucial questions about the validity of present concepts regarding the antiquity of these geological formations and about the time required for coalification.⁶⁸" Furthermore, "Such extraordinary values admit the possibility that both the initial infiltration and coalification could possibly have occurred within the past several thousand years.⁶⁹" The notion of coalification only "several thousand" years ago is in complete agreement with Scriptural dating of the Universal Deluge.

CONCLUSION: The uniformitarian position, which is intrinsically anti-Biblical and rejects the Deluge, falters gravely in its major tenets of long-ages, extensive stoppages of deposition, various artificial and arbitrary subdivisions of Flood-laden strata, etc. Figuratively speaking, the rocks testify to the reality of the Flood and cry out vociferously against uniformitarian attempts to avoid it.

IV. Ramifications of the Deluge in Cyclothem Formation

PROPOSITION: A variety of factors which are properties of cyclothems are neglected in uniformitarian circles, but these are extremely pertinent as ramifications of The Universal Deluge. Other sedimentological factors are implied to support ideas of present-day type sedimentation, but these can be understood as types of localized Flood action instead.

A. THE WORLDWIDE OCCURRENCE AND "AGE"-TRANSCENDENCE OF CYCLOTHEMS

Many types of cyclothems exist. Among these are carbonate-evaporite cyclothems⁷⁰ which may be ascribed to early Flood action. However, this paper concentrates on coal-bearing cyclothems which are ascribed to the recessional stages of the Deluge.

Some coal-bearing cyclothems have been traced along outcrops for 400 miles or more.⁷¹ Cyclothem members have been claimed to have been correlated between basins (which could imply a cyclothem continuity of nearly 1000 miles) but these correlations aren't observable in continuity and therefore cannot be proven. Nevertheless, cyclothems in North America and Europe, from "... Texas to the Donetz (Russia) coal basin⁷². . ." are extremely similar. This is understandable in terms of the worldwide Flood producing similar worldwide results.

Although the Pennsylvanian-Permian cyclothems are the most widespread, there are cyclothems of "ages" between Devonian and Miocene, or even more recent. Because Diluvialists are completely free from the uniformitarian Geologic-Column age designations, all coal-bearing cyclothems of the world can be viewed as having formed virtually contemporaneously as the Flood-waters receded everywhere on earth. Thus, the Pennsylvanian-Permian cyclothems of the East and Midwest could be contemporary with the Tertiary cyclothems of the Phillipines and with the short Mesozoic cyclothems of the Rocky Mountain states.

The differences that do exist between "younger" and "older" cyclothems of different regions can be accounted for by differences resulting from "... greater slope of the depositional surface."⁷³ "The situation of Jurassic cyclothems overlying Upper Paleozoic cyclothems in the U.S.S.R.⁷⁴ can also be viewed as being continuous recessional Flood deposition.

Cyclothems exist in every niche of earth's surface. Cyclothems are found in North America, Europe, Africa⁷⁵ and Madagascar,⁷⁶ South America,⁷⁷ Australia,⁷⁸ western Asia including China,⁷⁹ India;⁴⁰ New Zealand,⁸⁰ Japan,⁸¹ Antarctica.⁸⁴

The uniformitarians sense the unity and universality of cyclothems, but cannot grasp their testimony to the universality of the Flood and its recessional sedimentary-tectonic operation (because of their belief in geologic ages): "... it is held that comparison of the different types of cyclothems developed in rocks of many different ages strongly suggests a common cause."⁸² "The occurrence of some coal-bearing sediments in all Systems from the Devonian to the Late Tertiary might be held to suggest that the pulsations causing the cyclic deposition were continuous or nearly so (and not in themselves periodic) giving rise to rhythmic deposits wherever other conditions were favourable. But the time-distribution of important carbonaceous deposits appears to be too irregular to support this suggestion."⁸³

Thus, if geologic ages are accepted, cyclothems appear in the geologic column too irregularly for any regular cause to be discerned: Diluvialists, obviously rejecting all geologic ages, can therefore consider all "age" cyclothems all over the world being formed contemporaneously by the Universal Deluge with its universal, and similar, effects everywhere on earth.

B. PALEOHYDROLOGICAL PARAMETERS AND CYCLIC SEDIMENTATION

1. Shallow, Intracratonic, Eipcontinental Seas Versus Flooding of Continents.

One of the first things which a textbook on historical geology mentions is the claim that most of Paleozoic sedimentation occurred in "shallow, intracratonic, eipcontinental seas." Cyclothems are likewise believed to have been deposited in very shallow seas: "it is generally agreed ... that the seas in which thin fossiliferous black shales and limestones formed were very shallow and resulted from short-lived inundations of large areas."⁸⁵

However, uniformitarianism breaks down in its attempts to find *bona fide* examples of such shallow seas today. Although Hudson's Bay has been proposed, the fact remains the familiar statement, "The present is the key to the past," may be a misleading one when considering epeiric sedimentation. There simply is no existing models of epeiric sedimentation to guide our investigations, and although it is true that many similarities do pertain between the past and the present, it is equally true that many differences exist as well.⁸⁶

This fact can be used to raise questions as to whether the "epeiric seas" were seas at all. In other words, instead of the present time being considered unusual because of its virtual absence of extensive shallow seas, the past sedimentation can be considered the unusual situation consisting of extensive Flooding of all the con-

tinents. Hence, when properly understood, the Paleozoic and some Mesozoic "shallow marine" sedimentary blankets covering major portions of all the continents can be seen as the direct result of the Universal Deluge. The absence of such sedimentation today reflects the fact that Noah's flood is ended and no longer will oceanic waters transgress over continents.

The exact depth at which the epeiric waters covered the continents is a matter of controversy in uniformitarian circles. There is some evidence of extremely shallow water. This is "... evidence of local dessiccation, brecciation, and inclusion of clastic grains in the very widespread Ames limestone that indicates shallow water or local emergence. The only conclusions possible at present are that these marine members did represent maximum submergence but that this submergence may be as little as 5 feet or as much as 180 feet."⁸⁷ The blanketing of continents with variably deep, but extremely shallow, water is precisely in accord with the Flood.

2. Specific Evidences of Cataclysmic Sedimentation in Cyclothems.

The time ascribed to cyclothem formation by uniformitarians varies from 20,000 to 350,000 years.⁸⁸ However, even uniformitarians now acknowledge that "... average rates of sedimentation are meaningless⁸⁹..."

One of the family of *prima facie* evidences for rapid burial is the nearly universal presence of clastic inclusions and plant/tree/coal debris in the cyclothem sandstones: "Log casts, carbonized plant debris, and shale fragments are locally abundant in the sandstone⁹⁰..." Diluvialists have noted countless evidences of cataclysmic burial in rocks and that only such burial can preserve fossils; and uniformitarians are beginning to agree: "... it is generally accepted that rapid burial in a protective medium is necessary for fossil formation ... anastrophic events may be considerably more important in the formation of fossil assemblages than currently is recognized."⁹¹

Many sandstones contain the same type of debris in widely separated geographical areas, such as Illinois,⁹² Virginia-West Virginia,⁹³ Tennessee-where the sandstone debris is stated to have been "transported into the area by currents⁹⁴...", and Pennsylvania-where coal inclusions "... occur(s) as angular, elongate fragments up to several inches long and as discontinuous seams up to half a foot thick and 8-10 feet long."⁹⁵

The evidence points to rapid deposition of the shale and sandstone members⁹⁶ "... "Many sandstones must have accumulated with considerable rapidity."⁹⁷ The poorly-lithified nature of many cyclothem sandstones in another evidence supportive of rapid sedimentation because poorly consolidated sediments are indicative of having been rapidly accumulated.⁹⁷ One sandstone breccia "represents a catastrophic sedimentary event, such as a flood."⁹⁸ The sandstone-shale transition also shows evidence of rapid sedimentation; "... the change from dark shale to sandstone occupies no more than a few inches of strata."⁹⁹

The presence of polystrate fossils is a classic example of rapid sedimentation.¹⁰⁰ "Tree casts are not rare in coal-bearing rocks."¹⁰¹

Another example of a polystrate fossil is an upright tree trunk in the cyclothem Francis Creek Shale in Illinois.¹⁰²

Another family of evidences for rapid burial involves transported rocks interbedded with sediments. rocks have been found all over the world (in coal) including the U.S.S.R.¹⁰³ Equally important is the finding of Pre-Cambrian rock pebbles in limestone in Illinois,¹⁰⁴ some 250 miles from their source. Copious limestone fragments also reflect the Flood's violent episodes: "... it is unusual for pebbles or angular fragments of limestones to be transported by streams without being pounded to a powder by abrasion in transport, or dissolved.

Nevertheless, there are instances where this has actually happened, and there has been an accumulation of limestone pebbles and boulders of considerable thickness but of local areal distribution¹⁰⁵..." Rapid flood erosion-deposition could generate so many such fragments that the waters would not be able to abrade-dissolve them all.

The non-sandstone and non-shale members also show evidence of rapid burial: "Pyrite concretions are often preserved in coal, under clay, or grey shale over coals... Pyrite concretions form as a result of a high concentration of reduced organic matter. This may occur as a result of rapid burial¹⁰⁶..." The presence of bivalve-escape tunnels in shale (member 8B) is further evidence of the rapid deposition of the shale.¹⁰⁷

The universal presence of evidences of cataclysmic burial at all cyclothem levels coupled with the aforementioned *de facto* gradation of all cyclothem members along with cyclothem-cyclothem gradation and cyclothem rock-noncyclothem rock gradation provides the total picture of Flood action.

3. A Critique and Re-interpretation of Uniformitarian "Sedimentary Environment" Concepts as Applied to Cyclothem.

Not only do uniformitarians segment the Flood-laden strata into a system of vast ages, but also inherent in their thought¹⁰⁸ is the concept of "sedimentary environment." In this scheme, modern-type environments (as rivers, deltas, lakes, seas) are supposed to have produced all of the earth's sedimentary rocks. Cyclothem are ascribed to ancient deltas.⁵² Deltas have different laterally-contiguous zones of deposition called facies. As the delta progrades seaward, the facies migrate seawards also, causing a net seaward overlap of facies. The end result is that the lateral facies are preserved as vertical rock units; or so it is claimed by uniformitarians. This is Walther's Law, but "it does not state the the vertical sequence always reproduces the horizontal sequence, but that "... only those facies ... can be superimposed ... which can now be seen developing side by side.¹⁰⁹

"Yet "The interpretation of stratigraphic sections is an intricate mixture of *speculation* and observation... The model constructor *assumes* some situation in the past and tries to develop the sequences of processes which lead to the rocks which are found in the present.¹¹⁰" (emphasis added.)

This situation provides the setting for the first of several uniformitarian circular arguments employed when deducing "sedimentary environments." Here the

use of present-day facies relationships is justified in its use on ancient strata because the ancient rocks were formed in present-type environments: and the claim of them forming in present-type environments is justified on the basis of their facies relationships. (Figure 2A) The Diluvialist sees various conditions of Floodwater action producing different suites of sedimentary rocks.

The Diluvialist School of Geologic Thought should be aware of the subjectivity of uniformitarian thought as pertaining to "sedimentary environments." "The human element is an undeniable, highly subjective component of earth science...¹¹¹," but it plays a large role in claim "sedimentary environment" identifications. "It is a common failing with geologists that at the conclusion of an endeavor based on data assiduously gathered and assessed, they permit themselves to indulge in ill-founded prognostications, half-true generalizations and even virtual fantasy...¹¹²" Yet "Recognition of ancient environments is not a mathematical problem; it also involves much *hypothetical* thinking."¹¹³ (emphasis added).

In claiming that ancient sediments were formed by present-type sedimentation, the uniformitarians see only what they want to see in the rock and ignore contrary evidence: "Even though rocks in Tennessee and in other adjacent areas of the Appalachian coal field have been mapped and studied in considerable detail, they have not been adequately examined for fossils. This is probably largely due to the *unwarranted assumption* that most of these beds are non-marine, hence barren of fossils."¹¹⁴ (emphasis added) Hence uniformitarians failed to see the fossils that they didn't want to see.

Controversial factors exist in studying strata: "... realization of the awesome complexities involved, the number and variety of variables which may be invoked to explain, for example, so simple an observation as that of a bed of sandstone... The more experienced the stratigrapher becomes, the greater the wealth of observation at his command, the more rapid is the pace at which unifying principles and generalizations appear to recede from his grasp."¹¹⁵ The uniformitarians confidently assert that they can identify sedimentary environments in rock, yet they fail to be able to distinguish between widely different alleged environments: "The state of our knowledge of ancient sedimentation is indicated by the Pennsylvanian sands of the Mid-Continent about which much has been written but on the deposition of which little is known.

The same Pennsylvanian shoestring is interpreted by different writers as an offshore bar or a channel, an ancient river, or a marine feature.¹¹⁶" The Diluvialists can appreciate the situation of trying to classify a Flood deposit according to present-day sedimentation. The large, widespread cyclothem (alloyclic) are considered to be deposited by processes explained by theories explained earlier. The short, choppy cyclothem (autocyclic) are thought to be caused by delta-lobe switching. However, the best (by far) studied delta-the Mississippi, fails to provide evidence of cyclothem generation by lobe subsidence: "... the stratigraphic evidence requires rapid subsidence between cyclothem... It is difficult to understand the stratigraphy in terms of steady, slow subsidence. The

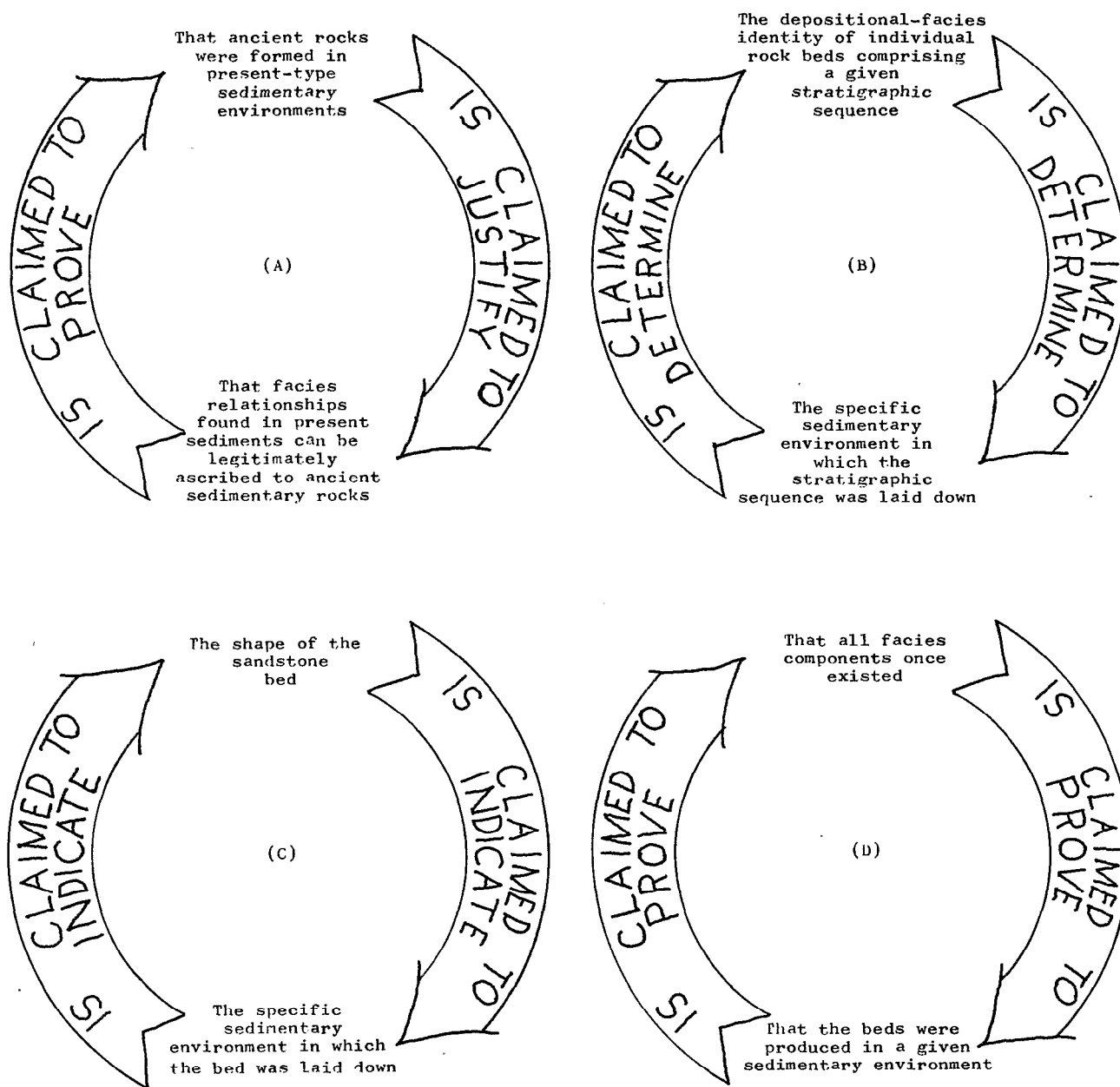


Figure 2. This shows schematically four of the types of circular argument employed by uniformitarians in putting forward their claims to have detected analogies of modern sedimentary environments in the earth's sedimentary rocks.

authors do not consider that there is an analogy to be made with the Mississippi delta.

It is significant that the seven known courses formed during the last 5000 years are all at the surface at the present day and these changes have not caused extensive cycles of sedimentation to be laid down.¹¹⁷ The cycles that do exist were glacial-eustatic, and—as previously mentioned—glacial-eustasy can't account for Pennsylvanian cyclothems.

Although the present is supposed to be the key to the past, "... the better known recent sediments may have no equivalents in the geologic record..."¹¹⁶ There would be differences between Flood deposits and contemporary sedimentation.

The uniformitarians use circular reasoning in establishing the identity of "sedimentary environments." For example, it is observed that only under "unusual circumstances"¹¹⁸, are entire deltaic sequences preserved. Yet "any stratigraphic correlation based upon the lateral relationship between the various deltaic facies must assume that all facies were originally present and will be preserved, unless removed by erosion."¹¹⁹ Circular reasoning (D, Figure 2) results.

Sandstone thicknesses judged to be capable of delineating components are admitted to be arbitrary.¹²⁰ and "A misconception of the geometry of the rock unit leads to a misconception or misinterpretation of the environmental conditions of deposition."¹²¹ Circular

reasoning is used (C, Figure 2) when the original shape is unknown¹²¹ due to erosion or poor outcrop-drill hole information. In "sedimentary environment reconstruction," "Individual facies, however, cannot be interpreted by themselves: it is too difficult to draw a unique interpretation from the petrological character of any single facies...¹⁰⁹" and only can the "deltaic environment" be "reconstructed" by use of "... knowledge of facies relationships drawn from the study of modern environments...¹⁰⁹" Circular reasoning (B, Figure 2) results.

"Although the term 'delta' is not difficult to define in modern sediments, ancient ones are not readily so identified...¹²²" and the famous model for an ancient delta, the Catskill Delta,¹²³ is now questioned as to whether it was a delta at all. That the contention of fossil assemblages proving ancient environments is unprovable is admitted,¹²⁴ as is the fact that fossil assemblages are a "... matter of interpretation...¹²⁵" as to what environments they purportedly indicate. A great deal of bioturbation (as traced fossils: "worm burrows, raindrop prints, worm trails,") can be explained as bubble imprints.¹²⁶

That short cyclothems were generated by delta-lobe switching-subsidence can be questioned for various reasons, including the wide area of even short cyclothems.¹²⁷ "The wide lateral uniformity of some cyclothem members (particularly the coals) is hardly consonant with the switching of several discreet delta complexes. The existence of all-alluvial cycles also seems difficult to explain by delta switching, as does the sequence of different limestone and shale types in the marine phase.

The development of cyclothems across facies boundaries—e.g., alluvial, deltaic, and lacustrine—appears incompatible with this theory, since the cyclic fluctuations should create the facies, not be imposed upon them.¹²⁸ "Taken individually few of the cyclothem members can be definitely associated with a single environment of deposition: present evidence indicates that each represents some one of a series of environments that produce similar lithologic, structural, and fossil characteristics.¹²⁹" To claim that cyclothems are formed by deltas is therefore to resort to circular reasoning (B, Fig. 2)

The uniformitarians greatly contradict themselves in their claims of sedimentary environment identifications: "Some students have attributed a marine origin to most of the sandstone, underclay, and unfossiliferous shales, but others have considered them to be fluvial, deltaic, or eolian.¹³⁰" Also: "When Pennsylvanian sandstones are critically examined... their non-marine character is fairly evident... some European stratigraphers continue to regard similar strata as marine.¹³¹" In fact, "Very few Pennsylvanian strata possess perfectly diagnostic characteristics which are not duplicated at other horizons.¹³²" Since few outcrops usually exist in plains regions, drill holes and mechanical log correlations are employed; yet these data are known to contradict other observable data.¹³³

The Diluvialist can reject these uniformitarian "sedimentary environment" designations because of illogical reasoning behind them (circular reasoning, also

known as *petitio principii*, or begging the question, is one of the classic logical fallacies). The fact that the Diluvialist is free from the assumption that present-type processes are the sole (or even most important) guide to interpreting sedimentary rocks enables him to see the aforementioned circular reasoning, doubtful (if not invalid) extrapolations, contradictory identifications, etc., as clear indicators of the fallacy of the uniformitarian claims of being able to identify modern-type environments (present-day sedimentary processes) in ancient rock.

No erroneous opinion, however, is successful without some major half-truth behind it. The half-truth is the unquestionable similarity that does in fact exist between ancient and modern sediments. However, this similarity does not mean that modern-type sedimentary processes have produced the ancient rock, but rather that the physics of water flow/deposition is the same today as it was during the Flood. The fact that many sedimentary features are present in all modern environments, and that features associated with a given environment may be absent¹³⁴ is further indication of the similarity of hydrologic behavior under different conditions.

Two Diluvian conceptual terms are now coined: Floodwater Mass Movement (FMM), and Floodwater Depositional Milieu (FDM). For illustrative purposes, it may be stated that a long, thin, narrow sandstone (which uniformitarians claim was laid down by an ancient river; hence—by definition—is a fluvial sedimentary environment) was actually laid down by a swift, longitudinal FMM; the sandstone therein deposited in a torrential FDM. The fact that an "ancient river" is described as being "... broad, shallow, and highly sinuous...¹³⁵" accords well with the idea of it not being a "river" at all, but rather a torrential FMM. Also, since it is claimed that "Ancient alluvial plains" may have "... wide lateral extent,¹³⁶" it can mean that, in reality, it was a wide, swiftly moving FMM which laid down that sedimentary rock.

The previously-discussed "shallow Paleozoic seas" were actually extremely-widespread but stagnant FMM's. Cyclothems were formed in zones of transitional FDM's (that is, the front of torrential FMM's colliding with stagnant FMM's.) The aforementioned absence of some "deltaic facies" reflects the difference between true deltas (operating only before and after the Flood) and transitional FDM's. The fact that cyclothem sandstones possess certain "marine" and certain "fluvio-deltaic" properties in reality reflects certain "riverlike" and "shallow-sea type" properties coexisting in the FMM. That "... statistical textural studies of ancient sediments have largely proven an unsatisfactory method of environmental diagnosis.¹³⁷" is understandable in terms of variously acting FMM's.

The uniformitarians admit that "It should be apparent... that sedimentary environment analysis is at best an imprecise art rather than a deterministic scientific discipline.¹³⁸" Diluvialists must remember that uniformitarian "... sedimentary models remain ill-defined and subjective... Some kind of conceptual model is essential for any IMAGINATIVE kind of interpretation...¹³⁹" (emphasis added). Since "sedimentary environments" in ancient rock are "Imaginative," the

Diluvialist can justifiably reject the entire uniformitarian concept of "Sedimentary Environment," and view ancient rock as being Flood-laden under varying conditions. An example of this, using the two coined Diluvialist concepts, was applied to the cyclothem Francis Creek Shale/Purinton Shale/Oak Grove Limestone¹⁴⁰ facies of North Central Illinois (See Table 1.)

CONCLUSION. The fact of the amazing, world-wide occurrence of cyclothem, together with their transcendence of the specious uniformitarian geologic column, is significant attestation to the universality (in both area and effect) of the Deluge. At the other extreme—the very local-level-uniformitarian ascription of cyclothem to present-type sedimentary environments is based on: gaeet personal subjectivity, demonstrably illogical reasoning, fantastic extrapolations, and contradictory identifications. The Diluvialist rejects these fallacies and views of rocks as being directly formed by the Deluge.

V. The Diluvian Tectono-Sedimentary Generation of Cyclothem

PROPOSITION. Cyclothem were generated by irregular tectonic activity superposed upon steadily retreating Flood waters.

A. THE TECTONIC OF CYCLOTHEM GENESIS. "The earth strives for gravitational equilibrium, or in other words for a minimum of free potential energy of the rotating globe . . .¹⁴¹" Disturbance of this equilibrium causes spontaneous compensation manifested by crustal tectonics. The Flood would, unquestionably, cause massive disequilibrium. This disequilibrium would be compensated for by mountain building as well as basin formation by downwarp. Only a basin can collect and preserve sediments,¹⁴² protecting them from erosion. The cyclothem-filled Illinois basin subsided irregularly¹⁴³ while "pulsatory nature¹⁴⁴" of mountain building are jointly held responsible for cyclothem formation according to some previously-discussed diastrophic theories. It is obvious that only a minor elevational change will " . . . inundate vast areas and shift the shoreline by perhaps hundreds of miles.¹⁴⁵"

A major causal factor is sought for the pulsatory diastrophic events. As mentioned, the chief problem of the diastrophic explanations of cyclothem origin is the incredible nature of "tectonic hiccups; which would have to repeat regularly, at long intervals of time, and be nearly identical to each other. Continental Drift/Plate tectonics (or Mobilism) has been called upon as an explanation for diastrophic pulses¹⁴⁶ causing cyclothem, but both uniformitarians and Diluvialists are divided on this question, and " . . . it is too early to choose a single favored theory of global tectonics.¹⁴⁷"

In any case (whether Mobilism or Fixism), geophysical studies have shown¹⁴⁸ that basinal subsidence can be caused by mantle material flowing into the adjacent newly-uplifting mountains. Pertaining to cyclothem formation, "Recent studies on the strength of the crust suggest that subsidence to form basins commonly takes place in sudden steps along fault lines. Repeated movement along fault lines bordering a basin

or shelf region is the primary cause of intermittent subsidence and the formation of sedimentary cycles.¹⁴⁹" To this may be added that " . . . the stratigraphic evidence requires rapid subsidence between cyclothem . . .¹¹⁷" and that the Bible (Psalm 29:6) mentions mountains "skipping like calves" during the Flood. See also Psalm 104:6-8.

For every basin-wide cyclothem, there are found many local, short cyclothem or cyclothem parts which wedge into it and/or grade into it. (Fig. 3; Profile, basin-wide coals A, B, C, D, with local cyclothem coals splintering downward). "Their presence complicates the problem of cyclothem classification, for what appears to be a typical cyclothem in one area may easily be subdivided into two, three, or four in other areas . . . They are more common in basins nearer highlands with tectonic activity.¹⁵⁰"

Cyclothem were most probably formed during the recessional phase of the Flood. Mountains were uplifted while water was receding (Psalm 104:6-9) and their pulsative increase (Psalm 29:6) generated the few basin-wide cyclothem (Fig. 3; Profile, A, B, C, D). The resultant basinal downwarp occurred assymmetrically and suddenly, with only local areas subsiding at a time, forming "basinettes" (Fig. 3) which, when filled, became local cyclothem branching out from the basinwide ones. Tectonic megawaves helped cause selective downwarping. Several dozen diastrophic pulses in the last few months of the Flood is reasonable (because both orogenic pulses and selective basinal downwarp operate on threshold values of activation), whereas the notion of a diastrophic pulse every 400,000 years going on for 35 million years is clearly fantastic. If Illinois is taken as the "average" basin tendency with its 50 cyclothem, about 5 of which are extremely widespread; one diastrophic pulse every three weeks would generate the widespread, basinwide cyclothem; with the 9 short ones in between caused by local "Basinette" subsidence. In mountain regions, where there is more tectonism and subsidence, there are 250 cyclothem (in Virginia) but they are short (the same 5 basinwide cyclothem with 30 very short ones in between every basinwide one.)

In sum, diastrophic control of cyclothem as caused by the Deluge in both Scriptural and reasonable (because of time-element, threshold values, etc.) whereas the uniformitarian version stands untenable due to its time encasing. Every cyclothem represents a movement of Floodwater. The short cyclothem form when most basinal areas are not sufficiently downwarped: " . . . most sediment in transit would by pass the area continuing on until a region of active downwarping is reached . . .¹⁵¹"

B. SPECIFIC EVIDENCES OF CATACLYSMIC TECTONISM CONTEMPORARY WITH CYCLOTHEM FORMATION

The fact of crustal paroxysms associated with the Flood's formation of cyclothem is attested to by the wealth of evidence found amidst cyclothem rock; much of it clearly occurring contemporaneous with cyclothem deposition. "Deformed rocks interpreted as the result of penecontemporaneous slump and mud flow are common in rocks of Pennsylvanian age in the Appalachian Plateau . . . Mud flows include strata

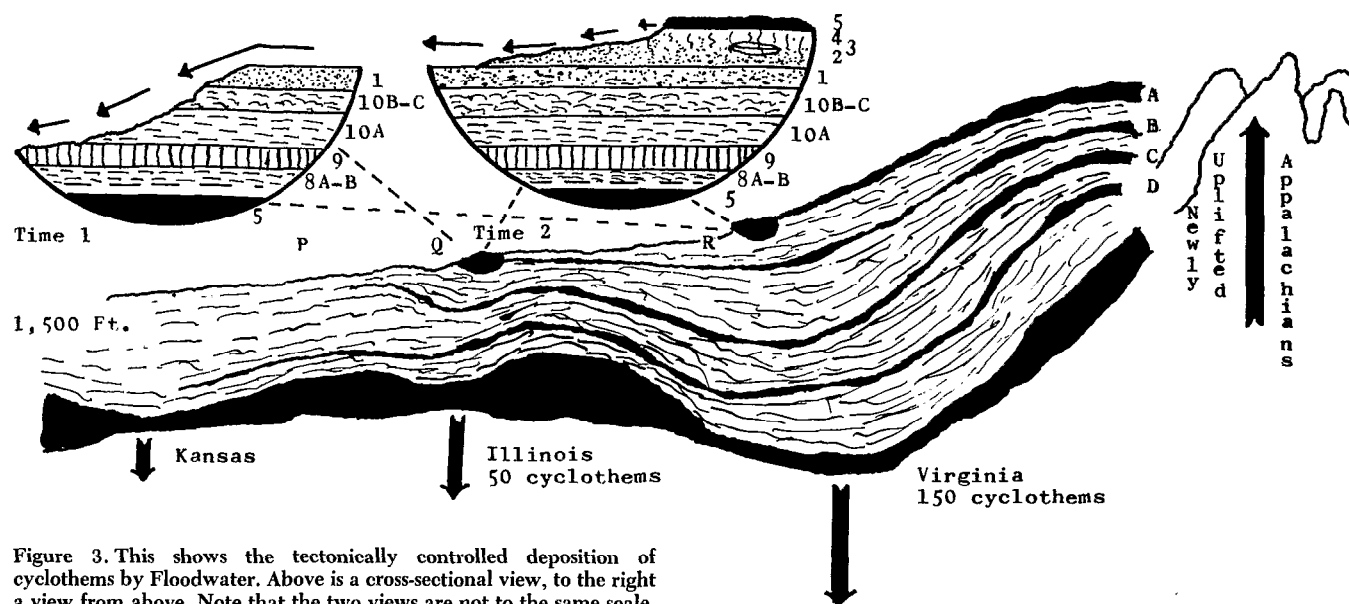


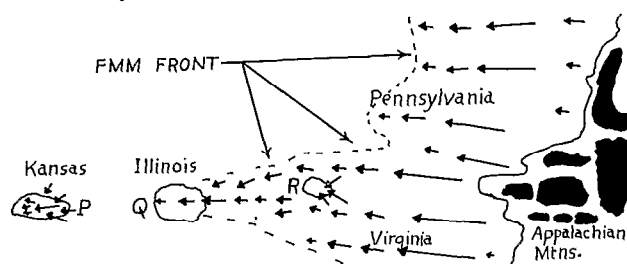
Figure 3. This shows the tectonically controlled deposition of cyclothems by Floodwater. Above is a cross-sectional view, to the right a view from above. Note that the two views are not to the same scale.

The sequence is as follows: 1: The clastic source-area mountains were uplifted during the recession of the Flood (Psalm 104:6-9, and Genesis 8:3-5) hastening the flowoff of the Floodwater.

2: Irregular uplifting of the Appalachians, due to thresholds of activation, caused FMM's to blanket the basin, forming basinwide cyclothems A, B, C, and D.

3: Irregular subsidence, in different locations at different times, formed "basinettes" (the Figure shows P, Q, and R) in which the numerous short-range cyclothems formed between A, B, C, and D.

4: Both basinwide and short-range cyclothems formed as follows: the FMM gradually increased in competence, laying down fining-downward member 10A-10B-10C-1 transition. (Tim 1; vectors show water speed.) After the momentum was spent (Time 2) the fining-upward member 2-3-4 transition was deposited. Then followed tangled masses of vegetation (Member 5), and the flow-off broth (incorporated in member 8A).



which deformed mainly as fluids and partly as plastics.¹⁵² "Decollement within Pennsylvanian rocks occurred when the rocks were hydroplastic."¹⁵³

Some volcanic rocks associated with mountain cyclothems were formed with "large amounts of water."¹⁵⁴ Some widespread, thin clay layers amidst coal may be of volcanic origin.¹⁵⁵ "Coalification patterns . . . reflect (1) Depth of burial . . . and (2) regional thermal disturbances . . ."¹⁵⁶ German cyclothems reveal " . . . an extensive magmatic upwelling . . ."¹⁵⁷ as revealed by coal grade. Most volcanic activity, however, had passed by the time the Floodwaters receded (Genesis 8:2); the sedimentation of cyclothem rocks occurring during Flood recession supported by the general distribution of volcanic inclusions: " . . . with the exception of the Eocene of the Pacific Northwest, pre-Cretaceous graded sequences tend to have greater volumes of volcanic rocks associated with (and volcanic detritus in) the sandstone and conglomerate . . ."¹⁵⁸

Even in relatively undeformed basinal cyclothem strata, there is considerable evidence of tectonism, as growth faults, for example: "growth faults . . . result from tension, caused partly by subsidence of the basin floor, and partly by the rapid compression of the recently deposited sediments."¹⁵⁹ Such growth faults, which by definition—form contemporaneously with sedimentation, are found in southern Illinois cyclothems.¹⁶⁰ In

Missouri, " . . . many structures that exist as folds in younger Paleozoic rocks project downward into faults or fault zones in subsurface rocks."¹⁶¹ A tectonic graben exists in Illinois.¹⁶² Other clear fault zones occur in Pennsylvania,¹⁶³ southern Illinois,¹⁶⁴ Kansas,¹⁶⁵ to name a few locations. Great fissures in cyclothem rocks occur in Ireland¹⁶⁶; these are clastic dykes. Such fissures occur also in the Appalachian Plateau,¹⁶⁷ and in Illinois, where a description of these joints states that: " . . . the strata were pulled apart laterally in almost every direction . . . the clay veins exhibit no signs of having been formed at different periods."¹⁶⁸

The entire earth bears the scars of God's judgement during the Flood, and violent tectonism during cyclothem sedimentation is attested to by these contemporaneous-with-sedimentation occurrences.

C. THE SEDIMENTATIONAL COMPONENT OF CYCLOTHEM GENESIS. Some Diluvialists have proposed that cyclothems were formed by tidal incursions upon the continents during the beginning stages of the Flood. This paper, on the other hand, proposes a recessional-Flood cyclothem formation and a tectonic mechanism. While the matter is still open, there seems to be no evidence of substantial tidal movement associated with cyclothems,¹⁶⁹ and furthermore, it seems unlikely that tides could form in such shallow water.¹⁶⁹

The cyclothems reveal the following sedimentational trends as they are traced further from the source areas: Strata thinning of cyclothems,¹⁷⁰ thinning of coals,¹⁷⁰ decrease in grain size of clastics,¹⁷⁰ increase in limestone

thickness, repeated presence, etc. The decrease in clastic grain size reflects the net decrease in availability of suspended sediment as Floodwaters flow ever further from the newly-uplifted mountain source areas. Likewise, the progressively basinward thinning and frequency of absence of coals (Fig. 3, Profile A, B, C, D, coal, basinward (Kansas ward) trends reflects the decrease in available (still not stranded) floating plant-tree masses. The limestone increase towards the basin is explicable in terms of the decline of clastics allowing greater freedom of chemical reactions between colliding FMM's possessing different ions in solution.

The *modus operandi* of Diluvian cyclothem sedimentation is as follows: Receding Floodwaters flow into the regional downwarp of "basinette," (Fig. 3) or else inundate the entire plains area (in the case of the few basinwise cyclothems). The resulting surge of Floodwater passes given geographical points with ever increasing velocity. At first there is no clastic deposition; only the widespread "marine limestone" (Member 9) is formed as the advancing FMM's ions react with those of the stagnant FMM being displaced. When the stagnant FMM is steadily being displaced and the FMM gains progressively greater momentum, this Fore FMM (Table 1) deposits progressively coarser clastics (Member 10A-11B-10C-1 sequence).

Eventually, the deposition exceeds grade, and erosion begins, forming (in many areas) the characteristic channels (gulleys) Members 10C-1). From then on, the FMM having spent its flow momentum and clastics, the flow becomes progressively weaker and the progressively finer clastics (Members 2, 4) are deposited. The stagnant water grows shallow enough for limestone to precipitate (Mem. e) and for the floating plant-tree debris to settle out and blanket the terrain. The percolating waters emanating from the rotting debris create reducing conditions for the initial shale deposition of the subsequent FMM, and the (Member 8A-8B transition forms.

Varying local conditions cause some missing members of every cyclothem: lack of chemical conditions cause missing limestones (especially members 3 and 7); differential availability of clastics causes varying types of fining-upward, fining-downward clastics to be deposited (with varying shape, thicknesses, and channel erosion from differing grade), and varying amounts of coal (presence, purity, and thickness) are caused by varying amount and presence of floating tree masses. The previously-discussed tectonic mechanism generates varying types of cyclothem: regional tectonic factors being responsible for "extra" members (as coals and limestones (as the uncommon member 7) as well as occasional abrupt thickenings, thinnings, and fade-out of members. Thus is explained the differences superposed upon the profound similarity of all cyclothems.

Every cyclothem is thus the product of increasing FMM velocity competence (Members 9 through 10C) followed by decreasing competence (Members 1 through 4) and ending up with stagnant FDM (Members 6 through 8B). The stratigraphic properties of cyclothem members is explicable in terms of Flood sedimentation. That limestones are "... geographically extensive..."¹⁷¹ is caused by their independence of

clastic supply and reliance upon the chemistry of mixing FMM's.

The fining-upward Member 1-2 transition¹⁷² has probably been overrated at the expense of the much-sharper fining-downward Member 1-10A transition, but now fining-downward sequences are no longer considered uncommon.¹⁷³ The author of this article studied 15 drill-hole core logs of Illinois cyclothems and counted 29 (21 sharp and 8 weak) fining-downward sequences and 26 (13 sharp and 13 weak) fining-downward sequences.¹⁷⁴ The change of FMM speed during sedimentation is confirmed by petrology (detrital interstitial material.)¹⁷⁵

Clearly, then, the prominent fining-downward trends show "... depositional conditions ranging from low velocity suspension at the base to high velocity traction sedimentation in the upper sandstones."¹⁷⁶ The fining-upward sequence, which extends to the underclay,¹⁷⁷ on the other hand, "... can be produced ... by deposition in the last phases of a heavy flood ..."¹⁷⁸ The "... extensive mixing of detritus ..."¹⁷⁹ in sandstone reflects certain mixing properties of the FMM, whereas the "... similar sorting ..."¹⁷⁹ of widely-separated sandstone regions attests to the widespread overall similarity of Flood action. "In general lithological respect, the sandstones are homogeneous over several now separated basins from Missouri to Pennsylvania. Thus we have a picture of current activity whose intensity varied greatly in time and space within certain average limits. But the limits and degree of variability were remarkably uniform over much of the North."¹⁸⁰; (emphasis added). That sandstones have various shapes and "... thicken ... basinward ..."¹⁸¹ reflects their upmost sensitivity to FMM velocities.

At the other extreme (showing the least dependence upon FMM velocities), "The most persistent elements are the coal beds and overlying black shales."¹⁸² Their widespreadness results from their having been formed from floating tree-plant masses and hence being quite independent of Floodwater velocity. The underclays are somewhat widespread because of the fineness of the particles and their near-universal presence in even the slowest FMM.

Since water flows only downhill, the source areas for the clastics in cyclothems must have been the newly-uplifted mountains: "... the tectonic borderlands of the northern Appalachian mountains ..."¹⁸³ Diluvialists must view "source area" claims skeptically, because under "extremely different conditions ..."¹⁸⁴ (from today, as the Flood was) mature and supermature sands can form in one cycle, and because there is some "... intense chemical weathering ..."¹⁸⁵ observed in fact. The Flood must have brought down material from "... a series of point sources, rather than from one uniform source."¹⁸⁶ Hydrogeochemically, the flood contained silica waters which percolated through Illinois sandstones,¹⁸⁷ cementing them, and caused contemporaneous-with-plant-matter silicification of Antarctic coals.¹⁸⁸

D. THE RELATIONSHIP BETWEEN INDIVIDUAL CYCLOTHEM MEMBERS AND THE FLOOD.

Every cyclothem member reflects some FDM.

1. The Coals (Member 5)

Member	Outstanding Sedimentary Structure	Hydrologic Characteristic Indicated	Uniformitarian Interpretation (Deltaic facies)	Diluvian Interpretation (FMM facies)
1	Oscillation ripples Current ripples Ripple drift Cross-laminae Scour and fill Small-scale folding Convolute laminations	Orbital wave motion Moving current Continuous traction deposition Turbulent variable current Turbid flow of sediment Fast flow, flood	Delta front sub-aqueous levee Point bars	P R O G R A D I N G M i d l e F M M at its fastest. Violent, torrential flow capable of carrying sand grains. Localized erosion of gullies, making channel sandstone bodies. Possible wind-generated waves. (Genesis 8:1)
10C	Regular layers Oscillation ripples Small-scale folding Convolute laminations Compactional deformation	Fluctuating velocity Orbital wave motion Turbid flow of sediment Fast flow and/or flood Deposition on irregularities	f o r c e s t a n d D E L T A D E P O S I T I O N S	Subdued velocity of FMM capable of carrying only silt and finer. Possible wind-generated waves. (Genesis 8:1)
10B	Regular layers Irregular layers Mottles	Fluctuations of water velocity Small-scale slump, bioturbation Mostly slumping inclusions	S h a l l o w w a t e r s s u r r o u n d i n g d e l t a s	F l o o d i n g S l u m p i n g c a u s e d b y e a r l y t e c t o n i c a c t i v i t y . S l o w b u t v a r i a b l e F M M v e l o c i t y
10A	Mottles Homogeneties Concretions (Siderite)	As above. Also clastic inclusions No textural variations of sediment Iron-rich water from coal	T i d a l c h a n n e l s	S l o w e s t M o s t f r o n t a l c o m p o n e n t o f F M M . S o s l o w t h e f i n e s t c l a s t i c s a r e l e f t ; a n d t h e y c a n s e t t l e o u t.
9	Irregular layers Mottles Homogeneties Concretions (Siderite)	Slumping (tectonic?) bioturbation Mostly slumping clastic inclusions No textural variation of sediment Iron-rich water from coal		F u r t h e r e v i d e n c e o f e a r l y t e c t o n i c a c t i v i t y a t t h e s t a r t o f s e d i m e n t a t i o n . M o s t f r o n t a l n o n -c l a s t i c c o m p o n e n t o f F M M . C h e m i c a l r e a c t i o n s o f c o l l i d i n g m a t e r i a l s.

Table 1. Here are proposed the Diluvian interpretations of the cyclothem facies.

Although it is well known that coalification occurs rapidly,¹⁸⁹ the majority of uniformitarians hold on to the autochthonic (in-situ deltaic peat-forming swamp) position of coal formation as opposed to the allochthonic (transported) position. "Some of the arguments for this autochthonous development are: (1) the great lateral extent of many seams; (2) the purity . . . of many seams; (3) the presence of upright tree stumps in coal measure strata; and (4) the presence of underclay (or "seat earths") beneath many seams. The last two arguments are no longer especially strong ones. Tree stumps are only occasionally found actually penetrating or within a coal seam, but are usually above the seam or in sandstones of shales associated with the seams.

In addition, there is a growing body of evidence . . . to suggest that "seat earths" are not soils, but are themselves allochthonously derived.¹⁹⁰ The underclays will be discussed separately; the last two arguments are admittedly weak, but the first two in actuality reflect the narrowness of the uniformitarian position. Certainly in any local flood or sedimentary process ". . . there would be no available source for the vegetation whose detritus was to cover such vast areas.¹⁹¹" The global Flood easily denuded the entire

earth and blanketed significant portions of continents with layers of floating (on recessional FMM's) vegetation. The purity of coals is not difficult to understand in terms of early-Flood rains washing the floating vegetable detritus free of any (soil) material which would not float.

Furthermore, the coals do show trends of thickness reflecting the thickness of members beneath,¹⁹² suggesting minor FMM's currents nudging floating detritus away from slightly higher areas. More importantly, "The coals thin and become impure over anticlines with maximum structural relief . . . This phenomena is also observed in other Allegheny cycles.¹⁹³" The Floodrain-cleaned floating vegetal detritus became contaminated in shallower waters over anticlines owing to the greater likelihood of mixing of muddy, underclay-depositing waters with the detritus.

One of the vast lines of evidence for the allochthonic formation of coal is the presence of "... water-worn . . .¹⁹⁴" fusain (plant matter) fragments, as is the vast extent of clay layers in coal: "A principal problem to explain in any case is how the forest vegetation of a swamp could be so completely bevelled as to permit accumulation of a continuous layer of clay . . .¹⁹⁵" Some coals are magnitudes thicker than any imagined peat

swamp condition could accumulate: "Ekibastuz. The thickness of coal seams in this field is unique in the USSR. There is a coal seam which, including thin intercalations of shale is 150M. (487.5 ft.), and must have been produced as the result of the accumulation of 450-600m (1462.5-1950 ft.) of peat.

Present-day peats, however, are on average 6-8m (19.5-26 ft.) thick, reaching 20-24m (65-78 ft.) in isolated instances.¹⁹⁶ Coals follow patterns of sedimentational filling (thickening) in some channel sandstones¹⁹⁷ and possess everywhere stratigraphic properties consistent with local variations of vegetal-floating conditions: "... coals thicken and thin, change in character, and not uncommonly pinch out entirely ...¹⁹⁸" That coals not only have minerological trends similar to underlying underclay¹⁹⁹ but also (in areas without underclay) "... grade down into laminated shales, siltstones, and sandstones.²⁰⁰" further confirms their *prima facie* nature of being part of continuous, rapid FMM sedimentation.

2. The Underclays (Member 4)

These were long considered to be fossil soils of deltaic swamps, but recent studies reveal that the most powerful inherent evidence for this position, root impressions, is invalid: "For the last 150 years, *Stigmara*, the rootlike base of Paleozoic lycopods has been interpreted as occurrence in situ ...²⁰¹" "The preferred orientation of specimens of *Stigmara* ... can only be explained by transportation ... Appendices attached to *Stigmara* are sometimes found to be cracked, broken, or twisted in a way difficult to explain from a functional point of view ... the rapid accumulation of the stigmaraian beds in a short time interval, as indicated by the well-preserved upright trunks, rules out the possibility of forest growth in situ.²⁰²"

The fact of root orientation in current direction observed in superjacent beds²⁰³ reinforces claims to their allochthony. It is most important to note that underclays "lack ... a soil profile similar to modern soil ...²⁰⁴" that "... coals and underclays are not genetically related ...²⁰⁵, that the undisputably-allochthonic "... clay partings ... possess most of the characters of underclay ...²⁰⁶, and that underclays contain detritus preservable only by rapid sedimentation: "... well-preserved leaf impressions and tiny coal veinlets are common.²⁰⁴"

The homogeneity and absence of bedding in underclays is explicable in terms of homogeneity of the finest sediment remaining at the end of the cyclothem-generating FMM flow as an alternative to the root-turbation explanation, and "... the best explanation of slickensides in underclays is the hypothesis of compaction of a sediment deposited in a loose, hydrous condition.²⁰⁷" The underclays can therefore be considered to be the finest of the (rapidly-deposited by (waning) FMM) clastics: "It seems reasonable that the gradation of shale or sandstone upward into an underclay may simply represent conditions of transitional sedimentation from coarse to fine particle sizes. It appears that this evidence may be used to explain the detrital origin of underclay.²⁰⁸"

3. The Limestones (Members 3, 7, 9)

The cyclothem limestone formed during clastic-poor FDM periods of stagnation prior to underclay-coal deposition (Mem. 3) and, more prominently, as a result of chemical reactions between colliding FMM's (Mem. 9, 7): "If carbonate ions are continuously added to a solution containing several metallic ions, the pH of the solution will rise and the metallic ions will precipitate in the order in which the solubility products of their carbonates are exceeded.²⁰⁹" The uniformitarian position, in contrast, claims limestone formation by lime-secreting organisms inhabiting the bottoms of shallow seas, but there is admission of the chemical aspects of limestone formation being given "... little or no attention.²¹⁰"

Certain widespread, abrupt, clastic-mixed limestone bed thickenings admittedly mitigate the necessity of alleged marine incursions.²¹¹ "The Pennsylvanian limestones vary greatly in character. Some of them are earthy, shaley, or impure, but others are quite pure and dense.²¹²" also is observed the "... massive, blocky nature of some beds and thin, wavy bedding of other limestones.²¹³" The Flood-blind uniformitarian position is perplexed by the variations: "The significance of some types of deposits is not understood. For example, the cause of variation in types of limestone ... is largely unknown.²¹³" The observed limestone variations are much better explained in terms of locally-variable chemically-reacting FMM's rather than monotonous, tranquil shallow seas of old. The gradation of limestones into clastics²¹² and "... common ... intraformational conglomerates ... and ... sandstone lenses ...²¹⁴" within them further confirm their FMM origin (because of definitely transported clastic lenses in them).

4. The Sandstones (Member 1)

Of the water-sorted clastics, these are the thickest in grain size. Geometrically, the sandstones have several basic shapes; namely, the sheets (relatively wide areal extent but less than 20 feet thick) and elongates (much thicker 20-105 ft.) but narrower (25 ft. to 2-3 miles), filling channels (or gullies)²¹⁵ "Virtually all Pennsylvanian sandstones contain both sheet and elongate sand bodies.⁹²" The elongates fill channels (gulleys) which "... range from small cut-and-fill structures within the formational boundaries to large channels that were eroded into the underlying formations.²¹⁶" Thus, while Fig. 1 portrays the channel terminating in Member 10A, the channels frequently cut into 2 or more subjacent cyclothems.

As previously discussed, the uniformitarians stumble in attempting to understand the sandstones in terms of presently-operating sedimentary environments: "Opinions have varied as to whether the infilling of the channel was alluvial, part alluvial and part marine, or exclusively marine.²¹⁷" The fact that "... the sandstones have a dendritic pattern, thicken in the direction of the dip ...²¹⁸" is claimed to indicate fluvial sedimentation whereas "... equidimensional quartz grains ...²¹⁹" orientation trends contraindicatively reveal a would-be upstreamward water flow. The channels have been also ascribed to deltaic distributary systems "... but their abrupt entrenchment and the absence of any indication of natural levees suggest that they do not mark

distributaries of aggrading streams in a deltaic area.²²⁰

Just as an individual believing only in apples and cherries would have difficulty telling which of the two a strawberry, is, so analogously the Flood-rejecting, present-process believing uniformitarian has difficulty assigning these Flood deposits to presently-operating sedimentational processes.

FMM dynamics easily explain the different sedimentary/stratigraphic properties of sandstone. For example, the waxing-in-competence cyclothem-generating FMM lays down the fining-downward sequence and then, at maximum competency (contemporaneous with or immediately following sandstone deposition), the FMM torrents sometimes erode gulleys into the just-deposited sandstone (and below), forming the channel sandstones. The observed coexistence of tributary and distributary filled-channel patterns²²¹ and other above-mentioned phenomena are caused by local-slope variations giving rise to differential direction FMM bifurcation or coalescing.

That erosion of the gulleys was admittedly "... rapid ...²²²" and that neither local increase in slope²²³ nor emergent conditions²²⁴ were necessary for FMM gully erosion further clarified the nature of the FDM at that part of the FMM flow. Of utmost importance, however, is the fact that local floods readily erode gulleys in (especially unconsolidated) sediment.²²⁵ The sandstone sheets grade into elongates,²²⁶ reflecting the continuous tempo of FMM erosion-deposition, whereas the usual fining-upward trends in filled channels reflect the initiation²²⁷ of the waning phase of the cyclothem-generating FMM flow.

5. The Shales (Members 6, 8A-B, 10A)

"... the shales comprise by far the larger part of the sedimentary lithological column ...²²⁸" and also of cyclothem, portraying the awesome magnitude of chemical weathering of the anteDiluvian supracratonic material. That "... shales differ from clays ... only in being bedded or laminated.²²⁹ attests to the fact of rapid-flowing fore-FMM properties in contrast to the stagnancy and particle-sameness of underclay deposition. The shales have a layer which is black and fissile (member 8A), reflecting reducing conditions, but also these "Black shales probably are more a function of rapid deposition than of restricted chemical circulation.²³⁰" (emphasis added).

Pertaining to these very-persistent black shales, there are "... several lines of evidence pointing to a widespread mat of vegetation covering the surface of the water.²³¹" and "... these beds extend without appreciable change far to the west and far beyond the coal beds of their cyclothem²³²" These properties suggest that FMM's washed reducing vegetal "broth" (and plants) from the previous FMM-deposited pre-coalified vegetal surficial layer, incorporating it in the shale above the coal and downcurrent into Kansas (forming the black shale stratigraphic equivalents of coal there). The observed grading-upward of black shale into the main gray shale²³³ (members 8B, 10A) marks the point where reducing conditions caused by the subjacent vegetal mass ceased having their chemical effect, whereas the "... fairly well preserved impressions of land plants and somewhat MACERATED land plant re-

mains.²³⁴" found in black shales further corroborates their rapid deposition and origin from precoalified-material flowoff. (Emphasis added.)

CONCLUSION: The basic sedimentary, stratigraphic, and tectonic properties observed in cyclothem rock provide a picture of the recessional aspects of the Flood.

VI. Epilogue

Diluvialists must always remember that uniformitarianism is not a scientific fact, but an *a priori* atheistic worldview controlling disciplines studying origins. This viewpoint must be balanced by Diluvialists who work from the polar-opposite pro-God worldview. The rise of uniformitarianism (and consequent denial of the Creation and the Flood) is a striking fulfillment of Biblical prophecy (2 Peter 3:3-9). The Diluvian position is just as scientific (if not far more so, because it explains data more fully and simply) as any uniformitarian application. It is hoped that this work will greatly enrich the Diluvian position.

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- AJS—American Journal of Science
- CONG—18th International Geological Congress (Great Britain) Report, part 4
- DIS—Developments in Sedimentology
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- FGM—Fieldiana, Geological Memoir: Natural History Museum, Chicago
- GM—Geological Magazine
- GSAB—Geological Society of America Bulletin
- GSAP—Geological Society of American Abstracts and Programs (Annual Meetings)
- GSASP—Geological Society of America Special Paper
- GSL—Quarterly Journal of the Geological Society of London
- IGS—Illinois State Geological Survey Circular
- IGSRI—Illinois State Geological Survey Report of Investigations
- JG—Journal of Geology
- JSP—Journal of Sedimentary Petrology
- JWS—John Wiley and Sons, New York
- KCS—Kansas State Geological Survey Bulletin
- MM—MacMillan and Co., London
- OB—Oliver and Boyd, Edinburgh, London
- PGS—Pennsylvania State Geological Survey Bulletin, 4th Series
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A Remarkable Bit of Foresight

"If you drop any science out of the circle of knowledge, you cannot keep its place vacant for it; that science is forgotten; the other sciences close up, or, in other words, they exceed their proper bounds, and intrude where they have no right. For instance, I suppose, if ethics were sent into banishment, its territory would soon disappear, under a treaty of partition, as it may be called, between law, political economy, and physiology; what, again, would become of the province of experimental science, if made over to the Antiquarian Society; or of history, if surrendered out and out to Metaphysicians? The case is the same with the subject-matter of Theology; it would be the prey of a dozen various sciences if Theology were put out of possession; and not only so, but those sciences would be plainly exceeding their rights and their capacities in seizing upon it. They would be sure to teach wrongly, where they had no mission to teach at all . . . The human mind cannot keep from speculating and systematizing; and if Theology is not allowed to occupy its own territory, adjacent sciences, nay, sciences which are quite foreign to Theology, will take possession of it. And this occupation is proved to be a usurpation by this circumstance, that these foreign sciences will assume certain principles as true, and act upon them, which they neither have

authority to lay down themselves, nor appeal to any other higher science to lay down for them."

J. H. Newman, in Discourse IV of his discourses later collected in his *The Idea of a University*, about 1852-1855. This is given in the selections *The Uses of Knowledge*, edited by Leo L. Ward, published by Appleton-Century-Crofts, New York, 1948.

Good and Very Good

" . . . in the Book of Genesis it is said: 'God saw all the things that He had made, and they were very good', each one of them having been previously said to be good. For each thing in its nature is good, but all things together are very good, by reason of the order of the universe, which is the ultimate and noblest perfection in things."

St. Thomas Aquinas, *Summa Contra Gentiles*, Book II, Chapter 45.

USING THE SECOND LAW MORE EFFECTIVELY

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Creationists could make more effective use of the second law of thermodynamics by pointing out three facts: (a) The second law applies as rigorously to open systems as it does to closed ones. (b) Solar energy increases entropy on the earth, which is not what evolutionists want. (c) There are no known exceptions to the law, not even in living systems.

In debates with creationists, evolutionists often claim that:

1. The second law of thermodynamics does not apply to open systems.
2. Energy from the sun produces evolution on the earth.
3. Some systems, particularly living organisms, violate the second law.

Although creationists have made many good points in refuting such claims, it seems to me that they could be more positive in doing so. Let us examine each claim in order.

1. Open Systems

Although textbooks often state the second law in terms of a closed system, it is possible to formulate the law in terms of an open system. One can start with a closed-system formulation of the law and derive, with mathematical rigor, an open-system formulation such as the following:

$$dS = dS_{ext} + dS_{int} \quad (1)$$

$$dS_{int} \geq 0 \quad (2)$$

In this formulation, given by evolutionist physicists,¹ dS is the change of entropy in an open system during a time interval dt , dS_{ext} is the amount of entropy flowing into (or out of) the system from the external surroundings, and dS_{int} is "the [internal] entropy production due to irreversible processes inside the system such as diffusion, chemical reactions, heat conduction, and so on."¹ What these equations say is that even in an open system, there is an internally-produced part of the change in entropy which is never negative.

In other words, the only way to decrease entropy in any system is to have a flow of entropy out of the system which is greater than the sum of the entropy flowing into it and the internally-produced entropy. Such an entropy outflow is equivalent to putting information and order into the system from outside it. But as long as entropy inflows and outflows are accounted for, the second law holds.

So the second law *does* apply to open systems. A simple affirmation of this fact, along with an appropriate reference, could settle much of the dust raised by the "open systems" claim.

2. Energy from the Sun

By definition, the change in entropy of a system at temperature T degrees Kelvin when the system receives a small quantity of heat dQ is:^{2,3}

$$dS = \frac{dQ}{T} \quad (3)$$

In this definition of entropy, a positive value for dQ means that the system is receiving energy.³ Since the absolute temperature T is always positive, a positive value for dQ results in a positive value for dS . In other words, a net *inflow* of energy into a system will *increase* its entropy. A simple example is a pot of water on a stove. An inflow of heat into the water increases the disorder among the water molecules and so increases the entropy of the water.

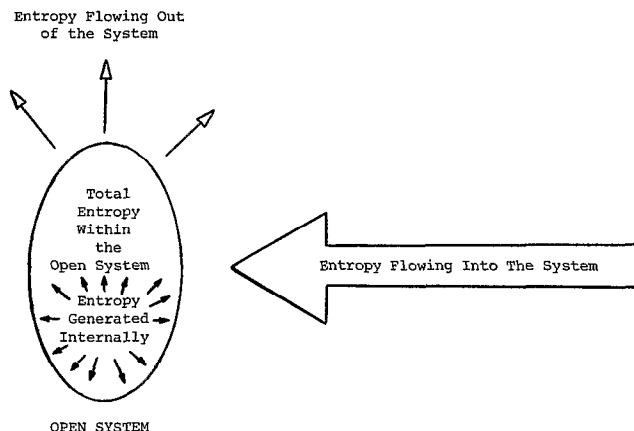


Figure 1. Entropies to be accounted for in an open system.

Now let us consider the earth and its atmosphere as an open system which is receiving energy from the sun. Since energy is flowing *into* the system, equation (3) says there is a positive entropy flow also going into the system. If we use the known energy flux from the sun, we can estimate the rate of entropy increase on the earth due to incoming solar energy alone. The result turns out to be about 140 trillion calories per degree Kelvin per second.⁴ This is a large flow of entropy—but it is in the wrong direction to produce evolution. Evolutionists want the sun's energy to produce greater and greater order upon the earth; this requires that entropy be decreasing in our open system. But solar energy does just the opposite; it *increases* the earth's entropy!

Of course, the earth reflects or re-radiates much (but not all) of the incoming solar energy back into space, so the net increase of entropy may not be as great as mentioned above. But the main point is that the incoming solar energy produces an effect opposite to the one desired by evolutionists. In all the debates and articles, I have never seen any creationist point out this simple fact in response to the "energy from the sun" claim. Yet it seems to me to be a very effective point to make.

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3. Systems Violating the Second Law

Occasionally creationists make statements which allow room for exceptions to the second law, such as: "Now, if one examines closely all such systems to see what it is that enables them to supersede the Second Law locally and temporarily..."⁵ But there is no evidence that even temporary or local violations of the law exist. A well-known physicist wrote, concerning exceptions to the second law: "In fact, no violation can be brought about in this case, nor with any of the ingenious and often subtle engines which have been devised with the object of circumventing the law. Moreover, the consequences of the law are so unfailingly verified by experiment that it has come to be regarded as among the most firmly established of all the laws of nature."⁶

In view of the strength of this statement (and many others like it), it would seem that the burden of proof for exceptions to the second law should lie heavily upon the evolutionist. In an excellent article,⁷ Dr. Emmett L. Williams showed that though biological systems are so complex that they have not yet been rigorously analyzed, there is much evidence that the second law does apply to living organisms, and no evidence that it does not. "There is simply not enough scientific information available to substantiate the claim that living systems violate the second law of thermodynamics."⁸

Therefore, since there is such strong experimental evidence that the second law applies to all systems, open or closed, living or non-living, creationists do not need to grant to evolutionists the ground of possible exceptions to the second law of thermodynamics.

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A NEW THEORY OF THE ELECTRON

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In this article work begun in a previous one, Reference 20, is continued. Two matters especially are considered. One is the increase of mass of charged elementary particles moving at high speeds. Special relativity includes this increase, but offers no physical explanation; it is hard to see how arguments about observers can explain what happens when no observers are present. Here the increase of inertia is seen to be due to the magnetic field generated by the motion. The other matter is the stability of elementary particles such as electrons. These particles are basic to electrodynamics; but electrodynamics predicts that the particles would explode, unless there be additional forces to bind them together. Here such a binding force is investigated; and an incidental outcome of the investigation is the removal of a discrepant factor, such as $\frac{1}{3}$, which has long plagued theories of the electron.

Outline

- I. Introduction
- II. The Special Theory of Relativity
 - A. An Evaluation of the Experimental Evidence
 - B. Logical Fallacies in the Present Approach
- III. A Classical Foundation for Electrodynamics
 - A. The Michelson-Morley Experiment
 - B. The Electromagnetic Field Transformation Equations
 - C. A Resolution of the Force-Meter Paradox
 - D. The Preferred Frame of Reference

- IV. A New Model of the Electron
 - A. The Static Electron
 - B. The Dynamic Electron at Low Velocities
 - C. The Equivalence of Energy and Mass
 - D. The Dynamic Electron at High Velocities
 - E. In Retrospect
- V. Conclusion
- VI. Acknowledgements

I. Introduction

Since its beginning with Galileo toward the end of the sixteenth century, classical physics has enjoyed many great accomplishments. In 1630, Johannes Kepler provided a foundation for astrophysics when he was able to formulate his three laws of planetary motion

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utilizing the empirical data of Tycho Brahe. Fifty-seven years later, Isaac Newton published *Mathematical Principles of Natural Philosophy* in which he presented his Universal Law of Gravitation and Three Laws of Motion.

Two centuries later, using Michael Faraday's new field concepts, James Clerk Maxwell devised his *electromagnetic theory of light* in which three previously separated areas of physics were unified. On the basis of Maxwell's four field equations, physicists have been able to explain almost the entire scope of electricity and magnetism. With this brief history it is understandable why the situation appeared favorable for physics toward the end of the nineteenth century.

As time progressed, however, problems arose. Newton's laws of motion were known to be invariant between frames of reference moving with respect to one another with constant velocity (i.e. inertial frames of reference). This was not surprising; since Newton's laws have to do with acceleration. With Maxwell's equations, which involve velocities, however, mathematical invariance was not found to hold under the classical Galilean transformations.

The reason for this, it was generally believed, was that electromagnetic radiation moved with respect to the "luminiferous ether,"¹ an assumed substance filling space which served as the medium for the propagation of light and other electromagnetic effects.² The frame of reference with respect to which this substance was at rest was considered to be the absolute frame of reference.

Various experiments were performed, however, which cast considerable doubt upon the concept of a universal ether. The most notable of these was that performed by Michelson and Morley in 1887. As a result, physicists were faced with three possible alternatives: 1) Maxwell's equations were wrong (as Ritz believed), 2) the Galilean transformations were incorrect, or 3) a preferred frame of reference could still somehow be identified.

Albert Einstein, in 1905, proposed, in his *special relativity*, that the Lorentz transformations, (used earlier by Lorentz, and still earlier, for another purpose, by Voigt), which leave Maxwell's equations invariant, as desired, should replace the intuitive Galilean transformations also in mechanics, and generally. From this arose the variations of length and time with motion, and also the (now) well known relations:

$$E = mc^2 \quad (1)$$

the equivalence of mass and energy*, and

$$m = \gamma m_0 \quad (2)$$

*The connection between energy and mass can also be derived from the pressure of radiation, roughly as follows. If a jet of fluid, of density ρ , travelling at a speed v , strikes a surface and is absorbed, it is easy to see that the pressure exerted on the surface by the jet is of magnitude ρv^2 . Likewise light, falling on a surface, exerts a pressure equal in magnitude to the density u of energy in the light. Since the speed is c , it must be that $\rho c^2 = u$. But u is the energy per unit volume, and ρ the mass; hence energy = mass times c^2 . See O'Rahilly, A., 1965. *Electromagnetic theory*. Dover (reprinted from 1938) pp. 304-323.

the increase of mass m with velocity where m_0 is the mass at rest and $\gamma = [1 - (v/c)^2]^{-1/2}$

The special theory of relativity has been considered to be one of the greatest achievements in science because of these results, especially (1).

While special relativity has indeed suggested many things in physics, if taken seriously it would greatly change one's conception of the real world. In a history text entitled *Civilization Past and Present* the authors acknowledge:

"While Newton's mechanics still continue to be of satisfactory use in everyday science and engineering, Einstein's more advanced concepts have completely reoriented men's attitudes toward the structure and mechanics of the universe."³

The main reason for this altering of classical ideas would be Einstein's second postulate of the constancy of the speed of light as seen by all inertial frames of reference. This postulate leads to the notions of "length contraction" and "time dilation". These are negligible in normal activity, becoming significant only at speeds approaching that of light. According to this theory a rod four meters long, for example, will contract to a length of just two meters if traveling at 87% of the velocity of light. Length is not considered to be absolute, but diminishes with velocity. Time is also believed to be relative, i.e., physical processes slow down with motion.

Einstein suggested that these changes are real and gave an illustration which is known as the *twin paradox*. To illustrate that paradox consider twin brothers twenty years of age. Pretend that one of them enters a hypothetical rocket ship that will travel with 99% of the velocity of light. This twin leaves the earth with this very high speed and does not return until his stay-at-home brother is ninety years old. According to Einstein's equations the twin in the rocket is only thirty years old when he returns to earth. Such seeming fantasies are physical realities according to the special theory of relativity.

Before Einstein the universe as a whole was considered to possess three absolute entities: energy, space, and time. Even now energy is thought to be absolute in the sense that the total quantity is always conserved. Energy of course has various forms such as heat, light, and mass; but the total quantity is a constant. If the energy of a given particle increases with velocity it is only because the energy increase was supplied by the force accelerating it to that particular velocity, the total energy of the combined system remaining constant.

In special theory, as already noted, length and time are not absolute but change in magnitude with motion, i.e., the length of an object, and the rate of a physical process, are affected by motion. Whether the changes are real or apparent is disputed; but according to the special theory of relativity this is the way the real world changes with motion. There is one seemingly inconsistent quirk resulting from the first of Einstein's postulates, namely that one can not really tell whether or not a body is in motion. It is assumed that there is no absolute frame of reference from which to tell that there is any uniform motion. All in all it is indeed an abstraction of strange hypothesized conditions.

One may wish to oppose special relativity on the basis of its abstract and bizarre concepts, felling that such things just could not be true. If, however, special theory is in agreement with the experimental evidence, if it is self-consistent with no logical contradictions, and if there are no reasonable alternatives, then one has no scientific basis upon which to reject its validity. It is the purpose of this treatise, however, to show that there are problems with special theory and that there is an alternative.

This paper will begin by reviewing the present relativistic foundation for electrodynamics and modern physics in the light of its presumed experimental support and internal consistency. It will conclude with the presentation of a new approach which culminates in a new theory of the electron based upon classical concepts.

II. The Special Theory of Relativity

A. An Evaluation of the Experimental Evidence

One of the most important aspects of physical science is experimental investigation. A theory may stand or fall on the basis of a single experiment. Robert Millikan affirmed this in his nobel lecture, "Science walks forward on two feet, namely theory and experiment."⁴ The first inquiry in evaluating a hypothesis is whether or not it is in agreement with the experimental evidence.

To begin with, it must be noted that there is no evidence to support the concept of length contraction. In a book on special relativity Albert Shadowitz states:

"It is an amazing fact that there does not seem to exist any direct or simple experimental verification of the Lorentz-Fitzgerald contraction . . . This very fundamental conclusion of the theory awaits actual proof."⁵

With time dilation the situation is considered different. There are several experiments which are claimed to support time dilation. In one experiment several caesium beam atomic clocks were flown around the world and compared with other clocks of the same type which had been at rest on the earth.⁶ A slight time difference was found which the experimenters attributed to the expected dilation of time.

However, Dr. L. Essen, a well known authority on atomic clocks, pointed out that only some of the data seemed to have been used in calculating the result. A recalculation, using all of the data, gave no evidence for the alleged dilation.⁷

This comment of Essen's was called to our attention by Dr. G. B. Brown, formerly of the University College of London.

The *muon time dilation experiment* is claimed to have established the alleged time dilation as an actual fact.⁸ Mu-mesons (radioactive charged particles also called muons) from cosmic rays, coming down through the atmosphere at speeds close to that of light, are said to take longer to decay than mu-mesons at rest. This is put forth as direct evidence for time dilation.

An initial assumption is that if there were no time dilation a muon travelling at high speeds *should* decay at the same rate as if it were at rest. There is no real basis for that assumption. No one has yet discovered what causes radioactive decay. There may be another

relationship between the process of decay and the motion of a radioactive particle. If properly interpreted, this experiment may give some insight into the causes of decay rather than providing any evidence for time dilation. Also, the motion of the mesons at high speeds in the Earth's magnetic field might have some effect.[†]

A muon travelling at 99% the speed of light possesses about seven times as much energy as at rest and thus might be said to be in an energetic "excited state." Would one expect such a muon to decay in the same amount of time as a less energetic one, one at rest? In a book entitled *Relativistic Kinematics* H. Arzelies affirmed his belief in the dilation of time, but admitted:

"... The results are scattered over a rather wide range of values, however, and it so happens that one is not very certain of the nature of the meson one is working with. The quantitative verification of the relativistic formula [$\delta t = \gamma \delta t_0$] is therefore not very exact, and fresh experiment is necessary."⁹

It must also be noted that an isolated neutron has a radioactive lifetime of about seventeen minutes while a neutron in a helium atom has what we might call an infinite lifetime.¹⁰ This illustrates how the state of a particle can directly affect its decay rate.

The final consideration of the experimental evidence behind special relativity must concern the matter of Einstein's second postulate of the absolute speed of light in all inertial frames of reference. In a well known book entitled *Classical Electrodynamics* the author J. D. Jackson notes:

"It seems clear that most of the early evidence for the second postulate is invalid because of the interaction of the radiation with the matter through which it passes before detection. The phenomenon is encapsulated mathematically in the *extinction theorem* of Ewald (1912) and Oseen (1915) . . . As discussed in detail by Fox (*op cit.*), essentially all of the older evidence and many recent experiments concerning the second postulate are vitiated by the consequences of the extinction theorem."¹¹

The extinction theorem states that light possessing a possible relative speed $c + v$ will be absorbed and re-emitted (as it passes through a medium) with a new speed c characteristic of that medium. A relative speed, if it exists, will thus be cancelled out in this manner, for the medium, in effect, becomes the new source. Jackson then goes on to point out nevertheless,

"There are, however, some recent experiments that do not suffer from the criticism of Fox. The most definitive is a beautiful experiment performed at CERN, Geneva, Switzerland in 1964."¹²

This CERN experiment, however, has also been criticized recently by Wallace Kantor in his book *Relativistic Propagation of Light*:

[†]Indeed, if it is true that the lifetimes of particles which decay in radioactivity increase when the particles are moving rapidly, that might fit in well with the theory developed here. Consider alpha decay. The alpha particle, and the other positive parts of the nucleus, can be considered to repel each other, and ultimately to break apart. Now, according to the discussion under "A resolution of the Force Meter Paradox" the force of repulsion would be less if the particle concerned should be moving rapidly. So it would be quite reasonable that it should take longer for the particle to come apart. (Editor)

"On the basis of an experimentally unsupported and theoretically inapplicable extinction length formula, computations were obtained for an extinction length for the possible relative speed of the γ rays. It was thus *only an assertion* that the modification of the possible relative speed of the γ rays in the various traversed media was negligible. Based on this experimentally unsubstantiated *hypothetical* assertion, it was concluded that the hypothesis of the absolute speed of light was proved from the measured speed of the γ rays, found to be c ... It is empirical ignorance of the actual attenuation effect that renders the CERN experiment and other experiments on the speed of γ rays from high speed particles ambiguous and inconclusive. The substitution of one hypothesis (extinction) to establish another (absolutivity) is *not* conducive to productive results."¹³

Kantor later goes on to point out experimental evidence supporting the relative speed of light:

"The interferometer Kantor experiment, the falling photon experiments, and the rotating disk experiments all provide *direct* kinematic evidence that the speed of light emitted by a moving source *does* depend on the motion of the source."¹⁴

In the light of this discussion, it must be pointed out that the experimental verification of the special theory of relativity is not as strong as one might think. At any rate, it must at least be acknowledged that the empirical issue is open to question!

B. Logical Fallacies in the Present Approach

The British scientist Herbert Dingle is probably one of the greatest authorities in the world on the special theory of relativity. He has studied the theory for over fifty years of his life in addition to having written two books on the subject. He personally discussed the theory with men such as Einstein, Eddington, Tolman, Schrodinger, Born, and others (some of whom he knew very well), and was even asked by *Encyclopedia Britannica* to write the article on relativity for one of their editions. After coming across what he believed to be a fallacy in the theory he cast it aside as being untenable and wrote a book concerning the matter entitled *Science at the Crossroads*.¹⁵ Dingle's argument is simple and has never been satisfactorily answered. Consider two frames of reference A and B moving with respect to one another with constant velocity v and suppose that each frame possesses a clock. Since, according to the first postulate, there is no preferred frame, A may be said to be at rest, B moving with respect to it, and thus B's clock running more slowly than A's. Or vice versa, since neither frame is preferred. As Dingle, (considering, in his argument, a particular relative velocity) pointed out: "The same theory thus requires each clock to work twice as fast as the other, which is contradictory. The necessary conclusion is that that theory must be wrong."¹⁶

Another fundamental fallacy in special relativity may be seen by considering a hypothetical experiment. Let there be two equal charges q , say positive for definiteness, connected by a rigid rod, of length l , as shown in Figure 1. Between them, say at the center of

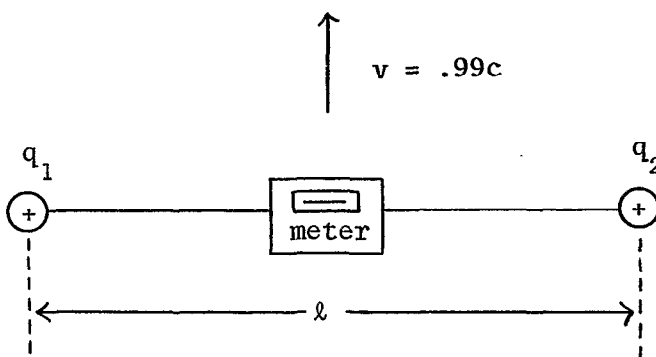


Figure 1: Force meter measures the coulomb repulsion between the charges.

the rod, is a force meter, to measure the force between the charges. In principle, the force meter might be something like a spring balance.

Some caution is necessary here. It might be argued that the calibration of the meter would change with motion, e.g. because of the supposed relativistic contractions of the parts. But it would always be possible to arrange matters so that those effects of the motion, if they exist at all, would compensate one another in the different parts. This would be something like the idea in a chronometer, in which thermal effects in different parts compensate one another. It will be taken, then, that the force meter is not affected by the motion.

One could think of frames of reference, in the relativistic tradition. In regard to the frame S , the charges would be moving at a velocity $v = 0.99c$. Physically, in principle S could be associated with a vehicle, carrying the desired instruments, moving through the laboratory.

Both frames, of course, could be populated by observers in the relativistic tradition.

With regard to the frame S' , the force F' of repulsion between the two charges is given by

$$F' = qE' = \frac{q^2}{4\pi\epsilon l^2} \quad (3)$$

since in that frame the charges are at rest, so there is just the Coulomb repulsion.

With regard to the frame S the charges are moving. So there is a magnetic effect, and the total force if F_m given by

$$\mathbf{F} = q[\mathbf{E} + (\mathbf{v} \times \mathbf{B})] \quad (4)$$

Since $\mathbf{v} \times \mathbf{B} = -\beta^2 \mathbf{E}$, and $\mathbf{E} = \gamma \mathbf{E}'$, the force F reduces to

$$F = \frac{qE'}{\gamma} = \frac{F'}{\gamma} \quad (5)$$

so that F is less than F' by the factor $1/\gamma$. Since $v = .99c$, by the definition given earlier $\gamma = 7$, so that F in this case is one-seventh of F' . The obvious contradiction is that it is physically impossible for two observers to see a different reading on the *same* force meter. The absurdity would be especially blatant if the force meter were just a link whose breaking strength would be say $3F$.

III. A Classical Foundation for Electrodynamics

Having considered the problems in the experimental basis and logical consistency of the present approach, one may return a moment to the beginning of the twentieth century. It has already been said that the three alternative facing physicists were: 1) Maxwell's equations were incorrect, 2) the Galilean transformations were wrong, or 3) a preferred frame of reference somehow existed. Einstein of course chose alternative number two and later stated:

"In classical physics it was always assumed that clocks in motion and at rest have the same rhythm, that rods in motion and at rest have the same length. If the velocity of light is the same in all coordinate systems, if the relativity theory is valid, then we must sacrifice this assumption. It is difficult to get rid of deep-rooted prejudices, but there is no other way."¹⁷

One might wish to say that special relativity solved the ether paradox by sacrificing the classical conceptions of space and time. The term "classical" will be defined as being that portion of physics to which Galilean or "common sense" principles apply.¹⁸ At any rate, is there "no other way"? Suppose for an instant that one could choose alternative number three, save the Galilean transformations as well as Maxwell's equations, and restore unto physics the classical concepts of space and time! This paper attempts to realize that objective, that is, to present a classical foundation for electrodynamics.

A. The Michelson-Morley Experiment

One might think of light as being an electromagnetic wave whose medium of propagation is the field of the charge which was its source. Thus an accelerated charge sets up a "light wave" in its own electric field which propagates with respect to that charge at the speed of light c . In the Michelson-Morley experiment, the light waves moving across the two arms of the Michelson interferometer are both traveling with respect to the same light source and thus with respect to the same medium of propagation. With this interpretation of light, one would not expect any difference in time for the two light beams and the Michelson-Morley experiment should come out precisely as it did. Likewise Trouton and Noble's experiment, etc.

B. The Electromagnetic Field Transformation Equations

The electric field of a stationary charge may be expressed as

$$\mathbf{E} = \left[\frac{q}{4\pi\epsilon r^2} \right] \mathbf{u}_r \quad (6)$$

whereas the electric field of a moving charge is altered according to the relation

$$\mathbf{E} = \frac{q}{4\pi\epsilon r^2} \left[\frac{1 - \beta^2}{(1 - \beta^2 \sin^2 \theta)^{3/2}} \right] \mathbf{u}_r \quad (7)$$

The magnetic induction due to a moving charge is thus

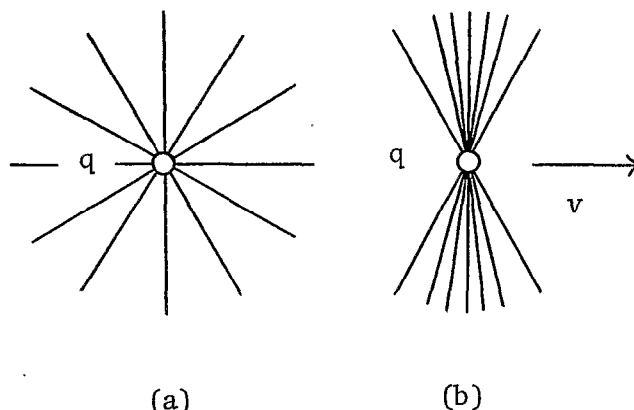


Figure 2. This diagram shows the effect of motion on electric field lines. Part (a) shows the electric field of an elementary charge q at rest while part (b) illustrates the electric field of the same charge q in uniform motion with $v = .94c$.

$$\mathbf{B} = \frac{qv \sin \theta}{4\pi\epsilon c^2 r^2} \left[\frac{1 - \beta^2}{(1 - \beta^2 \sin^2 \theta)^{3/2}} \right] \mathbf{u}_\phi \quad (8)$$

Equation (7) is perhaps the most important transformation in electrodynamics. As is illustrated in Figure 2, the electric field lines of a moving charge are shifted toward the direction transverse to the velocity.

In special relativity equation (7) is derived from the Lorentz transformations and is interpreted as a length contraction effect.¹⁹ It has been shown in a previous paper, however, that this equation could also be derived assuming a feedback field mechanism.²⁰ In this approach the "ambient field" through which the charge is moving produces the mechanism which "feeds back" the induced electric field into the moving frame of reference of the charge. The resultant electric field of the charge is thus a superposition of its original electric field plus the induced electric field which is fed back onto it. Equation (7) was derived in this manner.

The ambient field which produces the feedback mechanism is considered to be the preferred frame of reference. This field is not a mental construct but is a physical entity associated with the matter at rest with respect to the moving charge, and therefore one is not allowed to choose just any frame of reference as being preferred over another—the preferred frame must be the one which contains the ambient field. This entire concept is in need of further investigation, but the remarkable thing about this postulate is that it resolves the force meter paradox of special relativity—a paradox which makes the relativistic approach untenable. Something more will be said about this point later.

C. A Resolution of the Force Meter Paradox

In this new, classical approach to electrodynamics the relativistic modifications of the ideas of space and time may be eliminated. In addition, as will now be demonstrated, the previously mentioned paradox of the force meter having two different readings at the same time can be resolved.

Equations (3) and (5) give the readings of the force meter in Figure 1 as seen by the S' and S frames of

reference. In this new approach, equations (7) and (8) of the electric and magnetic fields as observed in the fixed frame of reference will hold exactly the same as in special relativity. The resultant force F of the S frame will therefore be exactly the same as in equation (5).

The fundamental difference between the two theories can be observed by viewing the results as seen in the S' moving frame. In special relativity there is no state of absolute motion and one may always consider his own frame of reference to be at rest. The resultant force between the charges in the S' frame is therefore given by equation (3). In this new approach, however, no length contraction has been assumed and therefore equation (7) holds in the S' frame as well as in the S frame.

Since both charges are moving relative to the preferred (ambient field) frame of reference, each is traveling in the magnetic field laid down by the other and thus experiences a magnetic effect, so that the net force is decreased in magnitude by the factor $1/\gamma$.

This is because the magnetic field of a moving charge does not itself move with the charge but is continually being induced in the fixed frame of reference. Each charge therefore travels at a velocity v with respect to the magnetic field continually being generated by the other. Equation (4) thus applies in the same manner to both frames of reference, and so the two observers will end up seeing the same reading on the force meter. This "thought experiment" demonstrates the necessity of a preferred frame of reference when speaking of motion.

D. The Preferred Frame of Reference

The proposed preferred frame of reference is different from the ether of the last century. Moreover, a distinction must be made between an electromagnetic wave (photon) and a charged particle such as an electron.

The frame of reference, or medium, of an electromagnetic wave is the field of the charged object (e.g. electron) which is the source of the wave. This frame of reference moves along with the charge. Thus, if the charge is moving at a velocity v , the light proceeding from it would have a velocity $c + v$.

A charged particle, however, is different. Its own field of course, moves with it; but one may think of an ambient field through which it travels. This ambient field is not a mental construct but a physical entity associated with the matter which is at rest with respect to the moving charge.

A little reflection on this matter will show the fundamental difference between speaking of an electron on the earth moving around the sun at a velocity of 18.5 miles per second and speaking of an electron moving in a high-energy particle accelerator at the same velocity, the accelerator as a whole being fixed to the earth.

In the first case the electron is at rest in relation to the ambient field, and no effects of motion would be seen by any observer. This case corresponds to the M-M experiment. In the second case the electron is moving with respect to the ambient field and effects of the motion are observed. This case corresponds to laboratory experiments with high-speed electrons.

It must be remembered, then, that, since the ambient field has its origin in matter, the preferred frame of

reference to be considered in a particular case will depend on one's situation in the universe.

IV. An Electromagnetic Model of the Electron

Apart from saving Maxwell's equations, the most important results of Einstein's special theory of relativity were the equivalence of energy and mass, and the prediction of the increase of mass with velocity, as expressed in Equations (1) and (2).

If suitably interpreted, the Lorentz transformations will yield those results; but they do not give any physical insight into the reason why. For that one must look to the theory of elementary particles, as it joins up with electrodynamics. That theory, however, has never been complete. Arnold Sommerfeld pointed out in his work *Electrodynamics*,

"... In the present volume we must limit ourselves to the *theory of the individual electron*. It is true that the basic question regarding the *nature* of the electron will remain unclarified. *The electron is a stranger in electrodynamics*, as Einstein has said on occasion . . . The forces which, opposing the Coulomb forces, prevent its explosion are unknown to us . . ."²¹

This paper will now proceed to present a new theory of the electron which explains equations (1) and (2) and which clarified some of the problems mentioned by Sommerfeld.

A. The Static Electron

When at rest the electron is assumed to be a non-rigid sphere of radius a_0 with total charge q distributed over the surface. The rest energy of the electron is known to be $.819 \times 10^{-13}$ joules, but of what specifically does this energy consist? The electric field of this electron may be expressed as

$$\mathbf{E} = \left[\frac{q}{4\pi\epsilon r^2} \right] \mathbf{u}_r \quad (9)$$

The total energy in this electric field, denoted by V , may be found by use of the equation

$$V = \frac{\epsilon}{2} \iiint E^2 dV \quad (10)$$

In this expression for V , E is the electric field as given by Equation (9) and dV is the volume element for spherical coordinates equal to $r^2 \sin \theta dr d\theta d\phi$. Noting this and substituting the necessary limits of integration results in

$$V = \frac{\epsilon}{2} \int_0^{2\pi} \int_0^\pi \int_{a_0}^\infty \left[\frac{q}{4\pi\epsilon r^2} \right]^2 r^2 \sin \theta dr d\theta d\phi \quad (11)$$

which when integrated yields

$$V = \frac{q^2}{8\pi\epsilon a_0} \quad (12)$$

for the total energy in the field of the static electron. Is this quantity, however, the total energy of the electron at rest?

This question may be answered with various considerations. The electric stress (force per unit area) on the surface of the electron due to the electrostatic coulomb repulsion can be shown to be

$$\frac{dF}{dA} = \left[\frac{\epsilon E^2}{2} \right] \mathbf{u}_r \quad (13)$$

which may also be expressed as

$$\frac{dF}{dA} = \left[\frac{q^2}{32\pi^2\epsilon a_o^4} \right] \mathbf{u}_r \quad (14)$$

Equation (14) turns out to give approximately 10^{26} lb./in² as the pressure seeking to blow the electron apart! If the electron is to remain in stable equilibrium there must exist some force, other than electrostatic, holding it together. With this force, or field, can be associated a binding energy, just as the electrostatic energy, considered above, is associated with the electric field. The binding energy, moreover, can be considered distributed throughout a volume, presumably the volume of the electron, just as the electrostatic energy was in the volume outside the electron. Moreover, it can be calculated by integrating the force, or field, treated suitably, as will be done soon.

It is tempting to speculate whether this binding energy might be like that binding nucleons into an atomic nucleus; but to discuss that question would lead too far afield.

To compute the magnitude of the electron's binding energy U_b , it must be noted that the inward pull of the binding force at the surface must exactly balance the outward tension of the charge. From equation (14), one may express this inward force on an element $dA = a_o^2 \sin\theta d\theta d\phi$ of the electron's surface as

$$dF = - \left[\frac{q^2 a_o^2 \sin\theta d\theta d\phi}{32\pi^2\epsilon a_o^4} \right] \mathbf{u}_r \quad (15)$$

The relation just given holds at the surface of the electron; indeed, it must do so for equilibrium. What happens farther in?

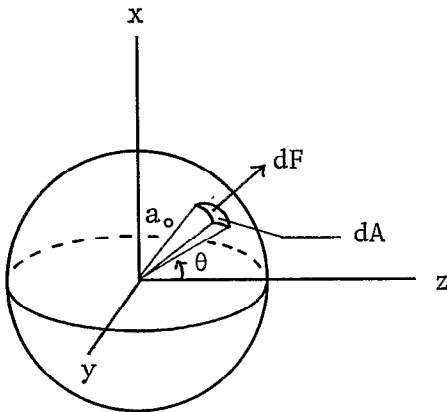


Figure 3. Element of surface charge dq pushes out with a force dF due to electric tension while the binding field pulls in with an equal and opposite force $-dF$. The surface area dA of dq is given by $a_o^2 \sin\theta d\theta d\phi$.

There is no very apparent analogy to guide one here; it will be a matter of speculation, and, eventually, of seeing what will work. Since the binding force has been taken to be proportional to the element of area, one might expect it to vary with r , as r ranges from 0 to a_o , according to:

$$df = - \frac{q^2 a_o^2 \sin\theta d\theta d\phi}{32\pi^2\epsilon a_o^4} \left[\frac{r^2}{a_o^2} \right] \mathbf{u}_r \quad (16)$$

So the inward force is proportional to (r^2/a_o^2) as one moves in from the electron's surface toward the center. Note that dF meets the necessary boundary conditions: it is zero at the electron's center and given by (15) at the surface. The binding energy dU_b of each element can therefore be found from the relation

$$dU_b = - \int_0^{a_o} dF \cdot d\mathbf{r} \quad (17)$$

which after a substitution of equation (16) becomes

$$dU_b = \frac{q^2}{32\pi^2\epsilon a_o^4} \left[\int_0^{a_o} r^2 dr \right] \sin\theta d\theta d\phi \quad (18)$$

or, after integration,

$$dU_b = \frac{q^2 \sin\theta d\theta d\phi}{96\pi^2\epsilon a_o} \quad (19)$$

To arrive at the total binding energy one must integrate over the angles θ and ϕ ; that over r having been done.

$$U_b = \frac{q^2}{96\pi^2\epsilon a_o} \int_0^{2\pi} \int_0^\pi \sin\theta d\theta d\phi \quad (20)$$

This gives:

$$dU_b = \frac{q^2}{24\pi^2\epsilon a_o} \quad (21)$$

The total rest energy of the electron, U_o , is therefore a combination of the electrostatic field energy, (12), and the binding energy (21):

$$U_o = V + U_b = \frac{q^2}{6\pi\epsilon a_o} \quad (22)$$

Since the rest energy of the electron is known to be $.819 \times 10^{-13}$ joules, one may easily solve for the electrostatic radius a_o which turns out to be 1.87×10^{-15} m. Note that the binding energy (21) is one-fourth of the total energy U_o —this is not surprising in view of the tremendous forces opposing the electron's equilibrium.

B. The Dynamic Electron at Low Velocities

Consider a slow-moving electron with a velocity much less than the speed of light: $v \ll c$. Its total energy may be expressed as

$$U = V + U_b + T \quad (23)$$

where T is the magnetic field energy (like kinetic energy) induced as a result of the electron's motion. The electric field energy V and the binding energy U_b will remain essentially unaltered at low velocities.

The magnetic field energy T may be computed from the relation

$$T = \frac{\mu}{2} \int \int \int H^2 dV \quad (24)$$

H is of magnitude $v\epsilon E \sin\theta$; also $\mu = 1/\epsilon c^2$ and $dA = r^2 \sin\theta dr d\theta d\phi$, so equation (24) becomes

$$T = \frac{1}{2\epsilon c^2} \int_0^{2\pi} \int_0^\pi \int_0^{a_o} [v\epsilon E \sin\theta]^2 r^2 \sin\theta dr d\theta d\phi \quad (24')$$

With the value of E from equation (9), this expression for T results in

$$T = \frac{1}{2} \left[\frac{q^2}{6\pi\epsilon a_0 c^2} \right] v^2 \quad (25)$$

From expressions (12), (21), and (25) equation (23) becomes

$$U = \frac{q^2}{6\pi\epsilon a_0} + \frac{1}{2} \left[\frac{q^2}{6\pi\epsilon a_0 c^2} \right] v^2 \quad (26)$$

In classical mechanics, the total energy U of a slow-moving body must be equal to the sum of its rest of potential energy and kinetic energy. In other words,

$$U = U_0 + \frac{1}{2} m_0 v^2 \quad (27)$$

A comparison of equations (26) and (27) gives

$$m_0 = \frac{q^2}{6\pi\epsilon a_0 c^2} \quad (28)$$

for the rest mass of the electron and

$$U_0 = \frac{q^2}{6\pi\epsilon a_0} \quad (29)$$

for the rest energy of the electron. Equation (29) is identical to equation (22) as would naturally be expected. A simple algebraic manipulation of (28) and (29) yields

$$U_0 = m_0 c^2 \quad (30)$$

the equivalence of energy and mass!

Upon examination of equations (25) and (26) one may note that for a slow electron the magnetic field energy and the kinetic energy are equivalent. This is reasonable; since by definition, the kinetic energy is the added energy which results from motion; and the only added energy for a slow electron due to its motion is that of the magnetic field induction energy. In other words, the mass of the electron is entirely of electromagnetic origin.

An alternative proof of equation (28) for the mass of the electron may be arrived at by computing the electromagnetic field momentum of a slow moving electron. Denoting $\mathbf{G}$ as the electromagnetic field momentum, one must make use of the following expression:

$$\mathbf{G} = \frac{1}{c^2} \int \int \int [\mathbf{E} \times \mathbf{H}] dV \quad (31)$$

Assuming the electron's velocity to be in the z direction, this equation becomes

$$\mathbf{G} = \frac{v\epsilon}{c^2} \int \int \int [E_x^2 + E_y^2] dV \quad (32)$$

Since $E_x = E \sin \theta \cos \phi$, $E_y = E \sin \theta \sin \phi$, and $E = -q/4\pi\epsilon r^2$ equation (32) may be written as

$$\mathbf{G} = \frac{q^2 v}{16\pi^2 \epsilon c^2} \left[\int_{a_0}^{\infty} \frac{dr}{r^2} \right] \left[\int_0^\pi \sin^3 \theta d\theta \right] \left[\int_0^{2\pi} \cos^2 \phi d\phi + \int_0^{2\pi} \sin^2 \phi d\phi \right] \quad (32')$$

which reduces to

$$\mathbf{G} = \frac{q^2 v}{6\pi\epsilon a_0 c^2} \quad (33)$$

Assuming the total momentum of the electron itself to be possessed by the field one finds $\mathbf{G} = q^2 v/6\pi\epsilon a_0 c^2 = \mathbf{p} = m_0 \mathbf{v}$, so that

$$m_0 = \frac{q^2}{6\pi\epsilon a_0 c^2} \quad (34)$$

in agreement with (28).

C. The Equivalence of Energy and Mass

Equation (30) of the last section gave the famous result of mass and energy equivalence. In the previously expressed interpretation of the Michelson-Morley experiment it was noted that light may be considered an electromagnetic wave in the field of an accelerated charge. A photon may therefore be thought of as a "wave packet" or "bundle of energy" which moves at speed c with respect to the charge which was its source.

Accordingly, a photon has a mass equivalence, but no rest mass since it has no rest; i.e., if it stops (i.e., is absorbed) it ceases to exist. An electron, on the other hand, is different. When it stops it does not cease to exist since its charge and binding energy can still be thought of as a separate entity localized in space. Thus there is a fundamental distinction between the mass-energy relationships of the photon and the electron.

D. The Dynamic Electron at High Velocities

In this section the state of the electron will be considered for speeds v close to that of light. The results will be the most interesting and also the most general since they will reduce to the same outcome of sections A. and B. in the proper limits of v .

In Figure 4 the electron is shown to have a velocity v in the z -direction. The expression for the electric field of a moving electron, as previously noted, may be written

$$\mathbf{E} = \frac{q^2}{4\pi\epsilon r^2} \left[\frac{1}{\gamma^2 (1 - \beta^2 \sin^2 \theta)^{3/2}} \right] \mathbf{u}_r \quad (35)$$

where $\beta = v/c$ and $\gamma = (1 - \beta^2)^{-1/2}$. The electric stress (force per unit area) on the surface of the electron is

$$\frac{d\mathbf{F}_e}{dA} = \left[\frac{\epsilon E^2}{2} \right] \mathbf{u}_r \quad (36)$$

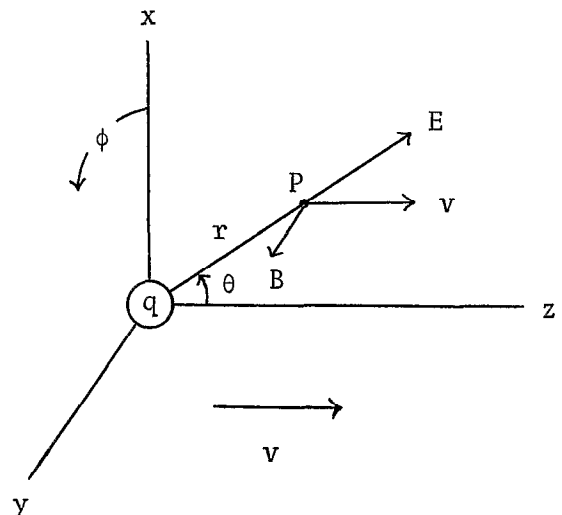


Figure 4. The electron, an elementary charge q , is here shown to have a velocity v in the z -direction.

as before; only E is now given by (35) instead of by (9). At high speeds there also exists a magnetic "pinch-effect" on each element of surface charge dq so that in addition to the electric stress there is also a magnetic stress which may be represented by the equation.

$$\frac{dF_b}{dA} = -\beta^2 \sin\theta \left[\frac{\epsilon}{2} E^2 \right] \mathbf{i} \quad (37)$$

where $\mathbf{i}$ is a unit vector in the x -direction as illustrated in Figure 5. Due to azimuthal symmetry one may arbitrarily consider a particular point P (for a given angle θ) on the electron's surface on the x - z plane; although the results are valid in general.

If the electron is to remain in stable equilibrium as in the static case, the inward pull dF of the binding force at the surface must exactly balance the electric and magnetic stress forces. Thus, for each unit area $dA = a^2 \sin\theta d\theta d\phi$ on the electron's surface the following equation must hold for the inward pull of the binding field:

$$dF = -\frac{\epsilon}{2} E^2 [\mathbf{u}_r - \beta^2 \sin\theta \mathbf{i}] a^2 \sin\theta d\theta d\phi \quad (38)$$

Due to the transformed electric tension, the added magnetic stress, and the altered binding energy the shape of the electron is changed. Suppose that the change is given by:

$$a = \frac{a_0}{\gamma \sqrt{1 - \beta^2 \sin^2\theta}} \quad (39)$$

i.e., the radius a is now a variable function of v and θ . This makes the electron an oblate spheroid for velocities approaching the speed of light; although for velocities $v \ll c$ it is for all practical purposes a perfect sphere. Substitution of equations (35) and (39) into (38) results in

$$dF = -\frac{q^2 a^2 \sin\theta d\theta d\phi}{32\pi^2 \epsilon a_0^4 (1 - \beta^2 \sin^2\theta)} [\mathbf{u}_r - \beta^2 \sin\theta \mathbf{i}] \quad (40)$$

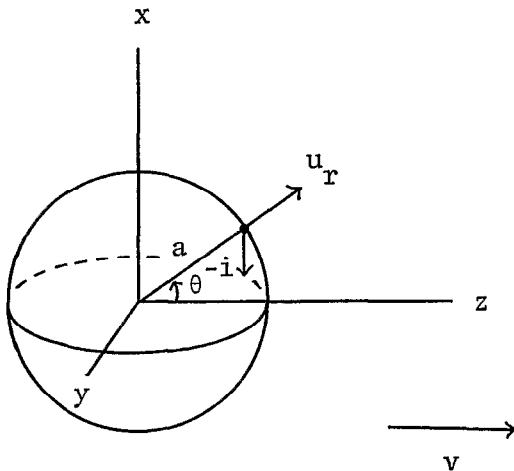


Figure 5. Directions of the electric and magnetic stress on the surface of the electron.

for the inward-pulling force of the binding field at the surface of the electron. The force dF on each element due to the binding energy is proportional to the factor r^2/a^2 so that in general,

$$dF = -\frac{q^2 r^2 \sin\theta d\theta d\phi}{32\pi^2 \epsilon a_0^4 (1 - \beta^2 \sin^2\theta)} [\mathbf{u}_r - \beta^2 \sin\theta \mathbf{i}] \quad (41)$$

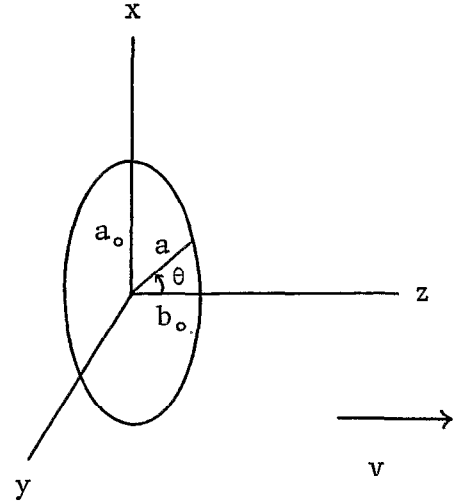


Figure 6. Elliptical cross section of the electron in the x - z plane with constant velocity $v = .83c$. The semi-minor axis $b_0 = a_0/\gamma$ and thus contracts with velocity while the semi-major axis a_0 remains constant.

where r is the distance from the center of the electron. Note that dF in (41) is zero at the center and agrees with (40) at the surface. The total energy dU_b in each element due to the binding energy may therefore be found from the equation

$$dU_b = - \int_0^a dF \cdot d\mathbf{r} \quad (42)$$

Since $[\mathbf{u}_r - \beta^2 \sin\theta \mathbf{i}] \cdot d\mathbf{r} = (1 - \beta^2 \sin^2\theta) dr$, equation (42) becomes, after substitution of (41),

$$dU_b = \frac{q^2}{32\pi^2 \epsilon a_0^4} [\int_0^a r^2 dr] \sin\theta d\theta d\phi \quad (43)$$

Integrating this expression and noting the value for a as given in (39) results in

$$dU_b = \frac{q^2 \sin\theta d\theta d\phi}{96\pi^2 \epsilon a_0^4 \gamma^3 (1 - \beta^2 \sin^2\theta)^{3/2}} \quad (44)$$

The total binding energy U_b may therefore be found by integrating the energies dU_b of all the elastic elements (as in the static case). Doing this yields

$$U_b = \frac{q^2}{96\pi^2 \epsilon a_0^4 \gamma^3} \int_0^\pi \int_0^\pi \frac{\sin\theta d\theta d\phi}{(1 - \beta^2 \sin^2\theta)^{3/2}} \quad (45)$$

or after integration over ϕ :

$$U_b = \frac{q^2}{48\pi \epsilon a_0^4 \gamma^3} \int_0^\pi \frac{\sin\theta d\theta}{(1 - \beta^2 \sin^2\theta)^{3/2}} \quad (46)$$

Since the integral in (46) is equal to $2\gamma^2$ the final expression for the binding energy is

$$U_b = \frac{q^2}{24\pi \epsilon a_0 \gamma} \quad (47)$$

Note that the binding energy actually diminishes with velocity by the factor $1/\gamma$. As would be expected, equation (47) reduces to (21) in the static case.

Now that the binding energy U_b has been calculated, the next step is to compute the general expressions for the electric field energy V , the magnetic field energy T , the total energy U , and the electromagnetic momentum G .

To find V , one may substitute equation (35) into the general expression for the electric field energy, equation (10). This results in

$$V = \frac{q^2}{32\pi^2\epsilon\gamma^4} \int_0^{2\pi} \int_0^\pi \int_a^\infty \frac{\sin\theta dr d\theta d\phi}{r^2(1 - \beta^2 \sin^2\theta)^3} \quad (48)$$

which easily reduces to

$$V = \frac{q^2}{16\pi\epsilon\gamma^4} \int_0^\pi \int_a^\infty \frac{\sin\theta dr d\theta}{r^2(1 - \beta^2 \sin^2\theta)^3} \quad (49)$$

Since a (one of the limits of r) is a function of θ , one must perform the integration over r before the integration over θ , and this gives

$$V = \frac{q^2}{16\pi\epsilon\gamma^4} \int_0^\pi \left[\frac{1}{a} \right] \frac{\sin\theta d\theta}{(1 - \beta^2 \sin^2\theta)^3} \quad (50)$$

which from equation (39) becomes

$$V = \frac{q^2}{16\pi\epsilon a_o \gamma^3} \int_0^\pi \frac{\sin\theta d\theta}{(1 - \beta^2 \sin^2\theta)^{5/2}} \quad (51)$$

Since

$$\int_0^\pi \frac{\sin\theta d\theta}{(1 - \beta^2 \sin^2\theta)^{5/2}} = \frac{2\gamma^4}{3} (3 - \beta^2) \quad (52)$$

the final expression for the electric field energy turns out to be

$$V = \gamma \frac{q^2}{6\pi\epsilon a_o} \left[\frac{3}{4} - \frac{\beta^2}{4} \right] \quad (53)$$

As was previously noted, the magnetic field energy may be written as

$$T = \frac{\mu}{2} \int \int \int H^2 dV \quad (24)$$

Since $H = vE \sin\theta$, $\mu = 1/\epsilon c^2$, and $dV = r^2 \sin\theta dr d\theta d\phi$; (24) becomes, after substitution of the proper limits of integration,

$$T = \frac{1}{2\epsilon c^2} \int_0^{2\pi} \int_0^\pi \int_a^\infty [vE \sin\theta]^2 r^2 \sin\theta dr d\theta d\phi \quad (54)$$

After substituting equation (35) and integrating over ϕ and r , (54) becomes

$$T = \frac{q^2 v^2}{16\pi\epsilon a_o c^2 \gamma^3} \int_0^\pi \frac{\sin^3\theta d\theta}{(1 - \beta^2 \sin^2\theta)^{5/2}} \quad (55)$$

The integral in (55) is $(4/3)\gamma^4$; and since $\beta = v/c$ the magnetic field energy turns out to be

$$T = \gamma \frac{q^2}{6\pi\epsilon a_o} \left[\frac{\beta^2}{2} \right] \quad (56)$$

The total energy U of the electron may now be computed from the relation

$$U = U_b + V + T \quad (57)$$

which from equations (47), (53), and (56) becomes

$$U = \gamma \frac{q^2}{6\pi\epsilon a_o} \left[\frac{1}{4\gamma^2} + \frac{3}{4} - \frac{\beta^2}{4} + \frac{\beta^2}{2} \right] \quad (58)$$

which easily reduces to

$$U = \gamma \left[\frac{q^2}{6\pi\epsilon a_o} \right] \quad (59)$$

From equation (22), (59) may also be expressed as

$$U = \gamma U_o \quad (60)$$

so that the total energy of the electron increases with velocity by the factor γ . If mass and energy are

equivalent then one would immediately expect the rest mass m_o to also increase with velocity by the factor γ . This indeed turns out to be the case!

The electromagnetic momentum G may be computed from the previously utilized expression

$$G = \frac{1}{c^2} \int \int \int [E \times H] dV \quad (61)$$

The velocity was assumed to be in the z -direction, Equation (61) therefore becomes

$$G = \frac{\epsilon v}{c^2} \int_0^{2\pi} \int_0^\pi \int_a^\infty [E_x^2 + E_y^2] r^2 \sin\theta dr d\theta d\phi \quad (62)$$

In going through the integration one must be careful to integrate over r *before* θ ; the expression (62) turns out to be

$$G = \gamma \left[\frac{q^2}{6\pi\epsilon a_o c^2} \right] v \quad (63)$$

Assuming again that the total momentum p of the electron itself is equal to the electromagnetic momentum of the field one arrives at

$$P = mv = G = \gamma \left[\frac{q^2}{6\pi\epsilon a_o c^2} \right] v \quad (64)$$

Solving (64) for the electron's mass m results in

$$m = \gamma \left[\frac{q^2}{6\pi\epsilon a_o c^2} \right] \quad (65)$$

which from equation (28) may be written as

$$m = \gamma m_o = \frac{m_o}{(1 - v^2/c^2)^{1/2}} \quad (66)$$

This shows the increase of the electron's rest mass with velocity by the factor γ ! From equations (59), (65), and (66) it follows that

$$U = mc^2 = \gamma m_o c^2 \quad (67)$$

As would logically be expected, the energy and mass of the electron are equivalent regardless of the electron's velocity. The increase of mass with velocity according to equation (66) is therefore an electromagnetic effect, that is, the field energy of the electron increases by a tremendous amount at high velocities and this shows up experimentally as an increase of its mass equivalent, or inertia. Experiments performed in 1939 by Rogers, McReynolds, and Rogers seem to have confirmed this mass-velocity relationship,²² and also the results of others, e.g. Kaufmann and Bucherer about the turn of the century.

E. In Retrospect

Thus we have completed the development of a new, classical theory of the electron. Is this model the final truth, the utmost picture, of what an electron really is? Perhaps not. The electron can not be seen; one can only hunt for models which fit what can be observed. As Alfred Romer stated with regard to atomic theory in general:

"Do not think for a moment, though, that you know the 'real' atom. The atom is an idea, a theory, a hypothesis; it is whatever you need to account for the facts of experience . . . A good deal will happen in the future and the changes in the atom will continue. An idea in science, remember, lasts only as long as it is useful."²³

At any rate, the results obtained for the electron are very encouraging in view of the comments made by John Slater and Nathaniel Frank:

"A simple model of an electron, which was supposed before the quantum theory to represent its actual structure, was a sphere of radius R , on the surface of which the charge is distributed . . . The total electrical energy is the volume integral of $(e^2/32\pi^2\epsilon_0)(1/r^4)$ over all space outside the sphere . . . $(e^2/8\pi\epsilon_0 R)$.

"In the classical theory of the electron, which we have mentioned, it is this quantity which is interpreted as being the actual constitutive energy of the electron, though a correction must be made of an additional energy of a nonelectromagnetic nature that is required to keep the sphere in equilibrium. Neglecting this correction, we can compute the mass of the electron . . . Now, if this electron moves, it will produce a magnetic field, as a current would, and hence will have a certain magnetic energy. Since the magnetic field is proportional to the velocity (or the current), the magnetic energy is proportional to the square of the velocity. This can be shown to be the kinetic energy. Further, there will be a Poynting vector, pointing in general in the direction of travel of the electron, and representing the flow of energy associated with the electron. All these relations prove on closer examination to be more complicated than they seem at first sight, but they are suggestive in pointing one possible way to an eventual theory of the structure of the electron, which even the present quantum theory is unable to supply completely."²⁴

V. Conclusion

This paper began by reviewing the special relativistic approach to electrodynamics and modern physics. It was found that the experimental side of the issue is open to question while several fundamental fallacies in the theory actually appear to exist. If these fallacies cannot be reconciled, then the entire special theory of relativity must be rendered untenable.

The latter portion of this treatise dealt with the presentation of an alternative theory in which the

previously mentioned fallacies are resolved. This new approach was found to yield most of the same useful theoretical results as the special theory of relativity. In addition, a new theory of the electron based upon classical concepts has been unveiled.

VI. Acknowledgements

The authors wish to express their appreciation to Professor Herbert Dingle whose writings, courage, and scientific integrity inspired them in the undertaking of this task.

Special thanks must also be given to Professor Harold Armstrong for his helpful comments and suggestions.

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BEOWULF: CREATIONIST IMPLICATIONS IN OUR EARLIEST ENGLISH EPIC

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It is shown that the Old English epic Beowulf may embody traditions going back to times not long after the Flood, and thus may provide additional evidence for a universal Flood and subsequent dispersion.

Beowulf, our earliest English epic, has long been recognized as a paradox and puzzle. The Old English tale is recognized by many as "the earliest and the greatest epic in our literature," yet one of its translators admits candidly, "no one knows when *Beowulf* was composed, or by whom, or why."² Only one manuscript exists, and it is a copy, in two distinct handwritings,³ now housed in the British Museum library. The sole survivor of Henry VIII's war on monasteries and their libraries, the manuscript is in poor and ever deteriorating condition due to careless binding and a fire in 1731 in the London building in which was housed the collection of Medieval English manuscripts made by Sir Robert Bruce Cotton.⁴ Some words are known only through ultraviolet photography, some through transcripts made in 1786-87 by the Danish scholar Thorkelin.⁵

Beowulf is of great interest from a Creationist perspective, for it contains a myriad of references to Genesis 1-6, with an abrupt cut-off at that point. Most critics have called it an odd mixture of Christianity and paganism. Bloomfield, for instance, calls it "an old Scandinavian tale . . . changed into a Christian poem,"⁶ Garnett and Gosse say that "traces of Christianity—perhaps interpolated—are not absent from it,"⁷ pointing out that modern criticism has dated it over a hundred years after the mission of Augustine. Thus, they claim it "is and is not pre-Christian."

After studying the *Beowulf* epic and comparing it with Genesis references, I feel certain that the oral tradition *Beowulf* reflects is not only pre-Christian, but pre-Judaic as well. Long says, "there existed, at the time the poem was composed, various northern legends of Beowa, a half divine hero, and the monster Grendel."⁸ Most critics recognize that it represents an oral tradition earlier than its writing.

God is frequently referred to in the epic, but never in distinctly Christian or Judaic terms. Deity is called God, the Lord of Life, the Ruler of Heaven, the Lord, the Judge of Deeds, the Lord God, the Protector of Heaven, the glorious King, the Father, Holy Lord, the King of Glory, the Guardian of Heaven, the wise Lord, Eternal Prince.

Cain is referred to frequently; a race of monsters is said to have been kin to him, and condemned by God, a seeming allusion to Genesis 6:1-4. Cain's slaying of Abel is spoken of in several places. From Cain is said to have descended "all bad breeds, trolls and elves and monsters—likewise the giants". Cain's exile is mentioned twice.

The monster Grendel seems to be equated with the devil. He is called "the fierce spirit," "he who dwelt in the darkness," "a hellish enemy," "the creature of evil," "the enemy of mankind," "dark doer of hateful deeds in the black nights," "the demon," "the wild ravager," "fosterer of crimes." It is said that "he was at war with God" and surrounded by a host of invisible hell demons.

Giants are described—they are reported to have been destroyed by the Flood. The golden hilt (sword) is said to be the ancient work of giants; on it was supposed to have been written "the origin of ancient strife, when the flood, rushing water, slew the race of giants—they suffered terribly: that was a people alien to the everlasting Lord."

Reference is also made to creation itself. The scop, the Anglo-Saxon minstrel who recited poetic stories to the accompaniment of a harp, related "the beginning of men far back in time, said the Almighty made earth, a bright field fair in the water that surrounds it (Genesis 1:6?), set up in triumphs the lights of sun and moon to lighten land-dwellers (Genesis 1:16?), and adorned the surfaces of the earth with branches and leaves, created also life for each of the kinds that move and breathe ("after its kind"?). Thus, most of the major events in Genesis 1-6 are alluded to, many in striking detail.

Rexroth says *Beowulf* is "the Gilgamesh motif come to the far north across 4,000 years."⁹ The Gilgamesh epic is "the Babylonian Genesis", another record of the early earth as the Babylonians perceived it. In many ways, *Beowulf* may be considered an Old English remembrance of the early events recorded in the Gilgamesh and in Genesis, interwoven, probably, with later Germanic history.

Another striking reference in *Beowulf* is the description of the dragon. Many creationists have expressed the viewpoint that the almost universal tales of dragons in early literature represent remembrances or traditions of actual encounters of humans with dinosaurs. The dragon in *Beowulf* dwells on a high heath keeping watch over a hoard of gold over a stone barrow, a pile of stones on an ancient grave. He is described as "the smooth hateful dragon who flies at night wrapped in flame. Earth dwellers much dread him." When angered, the dragon begins to vomit flames. He has sharp fangs, and strikes at Beowulf's neck. He is measured to be fifty feet long after he is killed.

God, Creation, Cain, Abel, Giants, Dragons, Demons, the Flood—the epic is full of Genesis 1-6 imagery. Why the abrupt break? If the *Beowulf* epic represents Christian teaching of even the most elementary type, why is there not one reference to Christ, Christianity, or the New Testament? Why not one clear Old Testament reference after the Flood? Why such an obsession with

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antediluvian themes? Why no references to Jewish history? Most conservative Bible scholars consider the Germanic peoples to be descendants of Japheth. Could it be that remnants of the story of the creation, the flood and the early earth with its giants and dinosaurs were preserved among these northward migrating peoples even before the coming of Christianity? Cut off from the influence of Judaism to the south, such stories undoubtedly were embellished through continual retelling. Yet, as they were set down in the at least partly historical poem, they are amazingly accurate, as judged by the Scriptural account.

If we adopt the earliest dated name that can reasonably be identified with one in the poem, the epic must have been written about 520 A.D., or a little earlier, when Chochilaicus, identified with Hygelac in the poem, raided the Frisian coast,¹⁰ leading a huge plundering expedition up the Rhine. The battles of the hero Beowulf are historically identified with these raids.¹¹ But the legends that form its background and framework are much, much earlier.

Whether *Beowulf* was brought from Jutland by Saxon invaders and then Anglicized, or whether it was com-

posed in England itself, *Beowulf* is intriguing as an early linguistic document, as a rare archaeological relic, and as a testimony to the preservation of the creation and flood accounts among our Germanic ancestors.

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EVIDENCE OF GLACIATION IN WISCONSIN

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Some Creationists have doubted whether there ever was a glacial age, since they find it hard to see how it could fit in with an Earth as young as Scripture would indicate. On the other hand, there is certainly evidence which would seem to point to a former glaciation. Here some of that evidence, as it is found in Wisconsin, is described.

In this article, I shall for the most part present the usual glacial interpretations of various feature, without stopping to try to justify them. The matter is one in which I feel an interest, having been born and brought up near the southern terminal moraine of the Green Bay lobe, which crosses between Milton and Janesville.

Figure 1 shows a general picture of the motion of the glaciers over North America. Figures 2 and 3 show, to larger scales, the features peculiar to Wisconsin. The directions of flow of the ice, as shown by arrows, have been deduced from striations on the rock, and from the orientation of drumlins. The latter are oval hills, of which there are several thousand in Wisconsin. They are ascribed to the glaciers, their long axes indicating the direction in which the ice was moving.

The ice, which was an extension of the Labrador ice sheet, completely covered the Eastern Ridges and Lowlands. Near its borders, the sheet broke up into lobes, as determined by broad valleys and lowlands. See Figures 2 and 3. The Lake Michigan lobe advanced southward down the shallow river valley which was then where the lake is now, and westward across the Niagra upland. The Green Bay lobe, a branch of the Lake Michigan glacier, advanced down the Green Bay—Lake Winnebago—Rock River lowland.

Effects on Topography

Not only did the glaciers carve out the basins of the Great Lakes, as has been held for a long time; but they also sculptured eastern Wisconsin, greatly modifying the topography. The contrast between the glaciated and driftless, i.e. unglaciated, parts of Wisconsin is indeed striking. But even greater glacial sculpture is known to have occurred in Alaska, Greenland, Norway, the Alps, and elsewhere.

Lake Michigan, with its broad, flat bottom and abrupt walls, descending to a depth of 500 to 800 feet, appears to be a basin excavated by ice, not a river valley formed by erosion. The lowland, no doubt, was occupied by a master stream, which probably flowed southward.

Green Bay, which looks like a thumb on Lake Michigan, is comparable with a hanging valley in any glaciated mountains. It is shallow compared with the lake, and where it joins the lake the bottom falls off rapidly.

Differences in Surface Materials

In the driftless portion of Iowa and southwestern Wisconsin the Richmond shale is about 200 feet thick. In eastern Wisconsin it is missing, except only on the slope at the base of the Niagra escarpment, evidently having been eroded away by the glaciers.

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Figure 1. This shows the relevant parts of North American during the Glacial Period. The deduced directions of flow of the ice are shown. The Driftless Area is shown on the map as the dark island. (p. 85, slightly adapted to fit here)

Again, the driftless area has from 8 to 13 feet of residual soil. Eastern Wisconsin has none, and no weathered rock to speak of. Evidently the glacier planed all of these away, leaving the firm unaltered rock which had been beneath.

In parts of Rock and Walworth counties, eastern Wisconsin, the older glacial drift is found. There the glacial topography is less rugged, because of erosion by streams. The limestone pebbles at the surface give evidence of weathering; they are leached away until they can be picked apart with the fingers. In later Wisconsin drift, on the other hand, the limestone is still unaltered.

Features Ascribed to the Glaciers

Drumlins have already been mentioned. Their average width is about a quarter mile, their lengths extend up to 2 miles, and some are as much as 140 feet high. They are composed mostly of unstratified glacial drift; but some material in a few is considered to have been deposited by water.

The ground moraine of eastern Wisconsin, having the slightly rolling topography of drift-mantled plains, is made up of till, with stratified sand and gravel. The till itself, which was deposited in a broad sheet by the melting ice, is mostly unstratified. The ground moraines vary in thickness from a few feet on the hilltops to over 400 feet in valley bottoms. They cover a much larger area than the terminal moraines, which lie in long narrow belts.

Boulder trains, composed of quartzite boulders scattered by the glacier, are abundant. One, the Waterloo boulder train, is fan-shaped, increasing in width from 20 miles near Lake Mills to 50 miles wide near White-water and Milton; and it is about 60 miles long. The quartzite rocks, called erratics, are unique in a place where the underlying rock is limestone or sandstone.

As well as the boulders, the glacier brought large amounts of soil from Canada, which helps to make Wisconsin fertile. Also there are nuggets of copper, one having weighed 3,000 pounds; and even diamonds, up to 15 carats, some having been found near what is now Green Bay as long ago as 1670 by the Jesuit fathers.

Kettle moraines, as they are called, are found near Whitewater and near Eagle, Waukesha county. They derive their name from the deep round depressions, which remind one of an old-fashioned black iron kettle, and are considered to have been left upon the melting of blocks of ice which had become trapped in the ground moraine.

Eskers, snake-like winding ridges, are found especially in southern Wisconsin. The deposits are usually stratified; and they are ascribed to glacial streams flowing beneath the ice, which deposited sand and gravel along their beds.

The Driftless Area Contrasted

The driftless area, shown in Figure 2, seems not to have been glaciated. Admittedly, it is not clear why it

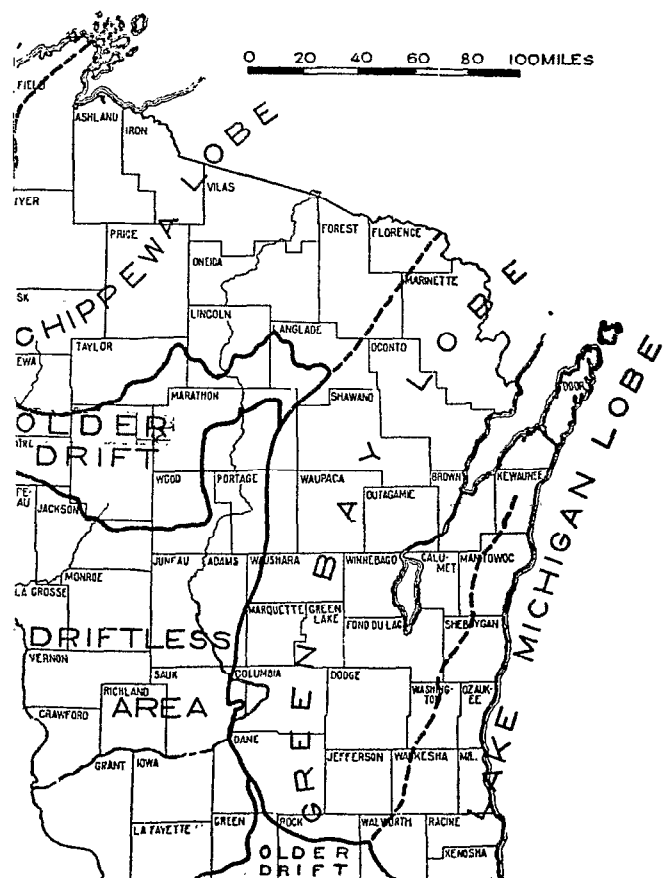


Figure 2. This shows the various glacial lobes, and the Driftless Area, in Wisconsin. (p. 87, slightly adapted to fit here)

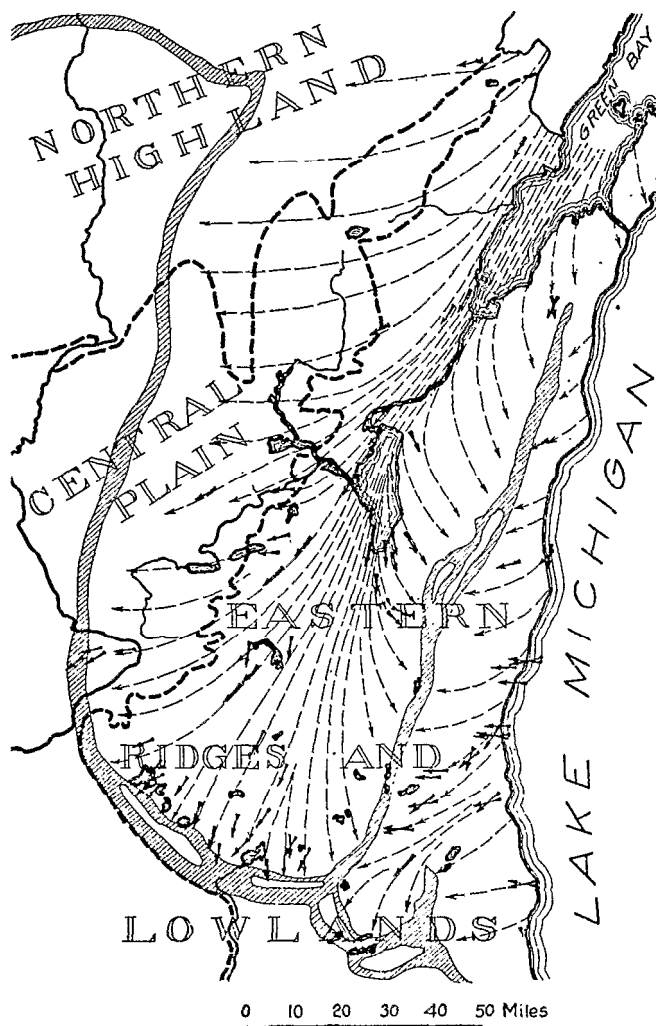


Figure 3. This shows the Green Bay lobe and the Lake Michigan lobe of the continental glacier. The arrows show the directions of striations on the rock, which are considered to be the directions of flow of the ice. (p. 234)

should have remained an island in a sea of ice. But certainly it differs from the glaciated part.

In the driftless area, as already mentioned, is a deep mantle of residual soil, which presumably existed before the glaciation. In the glaciated parts that soil was scraped away, and some transported soil left. It is believed that the removal of 100 feet of limestone by weathering leaves about 10 feet of residual soil, consisting chiefly of fine brown or reddish clay, containing numerous fragments of flint or chert.

In the driftless region caves and sink-holes are abundant, going down maybe 50 or 75 feet to the limit of ground-water. They are common in the Galena-Black River and Lower Magnesian limestone. Also natural bridges, and picturesque rocks, crags, and pinnacles are found in the driftless region. See Figure 4. These contrast with the rounded kames and drumlines in the glaciated parts.

It seems likely that at one time caves, etc., were common all over Wisconsin. But in the glaciated parts the ice removed the rock containing these features.

In the driftless area the normal dendritic drainage pattern is found. In the glaciated part the system was obliterated, the multitude of glacial lakes having been formed by dammed-up drainage systems.

Finally, the erratics, drumlins, and such signs of glaciation are not found in the driftless part.

Conclusion

Some Creationists have doubted whether there ever was a glacial age, thinking that Scripture does not leave time for one. Of course, they are right in trying to follow Scripture. Yet, I suggest that in places like Wisconsin, the evidence of glaciation is so strong as to convince one that there must have been something of the sort. I suggest that the solution may be that the glacial age was very short, and that in places like Wisconsin it ended much more recently than has usually been thought.

Acknowledgements

I should like to take this opportunity to express my indebtedness to Dr. R. G. Thwaites, one of the world's leading glacial geologists, under whose direction I studied at the University of Wisconsin.

The illustrations in this article are from the book *The Physical Geography of Wisconsin*, by Lawrence Martin, published by the University of Wisconsin Press, Madison, Wisconsin, 1966, and are used here by permission. Page or plate numbers with illustrations refer to this book.



Figure 4. This is a crag in the Driftless Area, near Readstown, Kickapoo valley. The columns are of sandstone, the cap, limestone. Presumably this form is due to weathering and erosion by wind. Such features are not found at all in the glaciated parts. (Plate VII)

PANORAMA OF SCIENCE

Human Speech and Chimpanzee Communication—
Just More of the Same?

In a milestone experiment, Susan Goldin-Meadow and Heidi Feldman recently traced the development of communication in deaf children who had not been exposed to manual sign language training.¹ Six deaf children ranging in age from 17 to 49 months were studied in their homes by one or two experimenters for 1 to 2 hours at intervals of about 6 to 8 weeks.

During the study period, the child was given a standard set of toys and interaction between mother, child, experimenter, and toys was videotaped. These workers found that "... each of our deaf subjects developed a structured communication system that incorporated properties found in all child languages ... They developed a lexicon of signs to refer to objects, people, and actions, and they combined signs into phrases that express semantic relations in an ordered way."²

These children devised gestures which refer to an object or person in the present—like the spoken counterparts "this" or "there." They invented signs for actions—a closed fist bobbed in and out near the mouth signifying the eating of a banana. "Two hands flapped up and down at shoulder height referred to a bird or the act of flying."³

The deaf children also succeeded in creating sequences of symbols referring to relationships between objects and action. "For example, one child pointed at a shoe and then pointed at a table to request that the shoe (patient) be put on the table (recipient.) On another occasion, the child pointed at a jar and then produced a twisting motion in the air to comment on mother's having twisted open (act) the jar (patient)."⁴

The children were able to produce longer phrases: "For example, David pointed at a picture of a shovel, pointed downstairs where a shovel was stored, produced a digging motion in the air with two fists, and finally pointed downstairs a second time."⁵

These experimenters were convinced from the results that it was the children and not the mothers who invented the signs. In summarizing the report, they wrote:

"We have shown that a child can develop a structured communication system in a manual mode without the benefit of an explicit, conventional language model."⁶

Several years ago I had a short article in *CRSQ* asserting that human speech and communication differed qualitatively (not just quantitatively) from communication patterns evident among social insects, birds, and mammals. Since then many interesting experiments have been performed demonstrating that chimpanzees can learn to communicate and even produce simple "sentences" by means of a special console designed for the experiment. But human communication stands at a higher level than that seen among chimpanzees or other animals. Human speech is innate and quite likely part of what is succinctly called the "image of God" in the Bible.

Susan Goldin-Meadow and Heidi Feldman concluded their comparison of communication in humans and chimpanzees with these telling remarks:

"This achievement is cast into bold relief by comparison with the meager linguistic achievements of chimpanzees. While chimpanzees seem to learn from manual language training ..., they have never been shown to spontaneously develop a language-like communication system without such training—even when the chimp is lovingly raised at a human mother's knee ... On the other hand even under difficult circumstances, the human child reveals a natural inclination to develop a structured communication system."⁷

I am indebted to Professor Armstrong for bringing this article to my attention.

Noted Physicist Sees Limitations To Science

A carpenter uses a plane to trim down wood and a hammer to drive nails realizing that each tool is fit for its own functions. Patterns of thought are like tools—each is fit for its own purposes. *Science*, as a mode of thought, is like a tool equipped to deal with repeatable events and processes which can be observed and studied directly. *History* is another mode of thought by which one may sift evidence and come to conclusions about human culture in years past. History differs from science as much as a hammer does from a plane.

We could go right on listing other modes of thought such as *art*, *philosophy*, and *theology* and we would see that each is adequate for examining one class of problems and not very well suited for dealing with other questions. This is no more surprising than the fact that a hammer is useful for driving nails whereas the plane is clumsy and even useless at that same task. Also, no successful craftsman would decide that hammers are the "best" tools or the "only acceptable tools" and then proceed to try doing all constructive tasks with hammers alone!

Can *science* answer all questions and explain all phenomena? Some workers believe so, like foolish carpenters who refuse to use any tool except the hammer—no matter what the job demands. This belief in the supremacy of science is called "scientism"—a philosophy in which science become the only valid approach to all knowledge. Certain of the most popular science writers have adopted scientism as a way of life and have deeply influenced American thought.

But Dr. Victor F. Weisskopf, distinguished physicist, has very different views and recently wrote that science has definite limits beyond which it cannot speak with authority.⁸ One could examine a Beethoven concerto in terms of chemistry, physiology, and all other branches of natural science while missing the whole point and impression of the music! Thus science become a rather useless and even a harmful tool in composing, performing, or evaluating symphony concerts. Weisskopf points out that the total "experience of a sunset or starlit sky likewise escapes the scrutiny of science.

Weisskopf mentioned a mathematician, Goedel, who proved that a system of axioms must be based on something outside the system and thus science "... is possible only within the larger framework of non-scientific issues and concerns."⁹ Weisskopf has called this the

"Goedel Theorem of Science." Indeed, if scientism were true—if there were no other valid method than the methodology of science—then there could be no science at all!

The two powerful quotations which follow illustrate the force of Weisskopf's argument:

"The intrinsic value of science would be enhanced if both scientists and nonscientists were more aware of the other ways of dealing with human experience, such as art, poetry, literature, and other forms of expression or impression, some of them analogous to religion and mythology. If this awareness were fostered, the prejudice against science and technology would lose much of its force."¹⁰

"But science and technology are only one of the avenues toward reality: others are equally needed to comprehend the full significance of our existence. We will need all approaches to deal with the predicaments of humanity that prevent so many of our fellow beings from having a life worth living."¹¹

One omission or "blind spot" mars the paper—Dr. Weisskopf might have gone just a bit further with his own good logic. Here and there throughout the article he treated the evolutionary concept of origins as if it were a verified item of science. But the study of origins actually requires much more than science as it cuts across such fields as history, philosophy, religion, and the interpretation of revelation. Anyone who analyzes origins by means of science alone loses perspective and falls into the same error as the one who tries to fathom Beethoven by studying neurophysiology.

—These two items contributed by George F. Howe

Footprints and Feet in Oklahoma

When footprints are mentioned, many Creationists immediately think of Glen Rose, Texas, and the Paluxy River. However, footprints have been found in many other places.¹²

Some footprints, believed to be human, have been found in stone in Oklahoma, in the Oklahoma Panhandle; and these have been mentioned in the magazine

Oklahoma Today.¹³ There are also tracks of dinosaurs and other animals.

Mr. Truman Tucker, of Kenton, Oklahoma, who has investigated many of these tracks, has found also what seems to be, not a footprint, but a foot, in stone. This piece of rock, which is shaped like a right foot, has been described in the *Bible-Science Newsletter*.¹⁴ It is believed that a man, likely fleeing from a volcanic eruption, left a deep footprint in mud of a suitable consistency; and that the print was soon filled with lava. Thus a cast of the foot was formed.

So far, these footprints have been used largely for what might be called apologetic purposes: as evidence, for instance, that men and dinosaurs existed at the same time, contrary to what evolutionary theory would have. May there not, however, be another use? Is it not possible that careful study of these prints may reveal something of the conditions under which they were made? Then, if, as many suppose, they date from the Flood, that information may reveal something about the details of what happened during the Flood.

—Contributed by R. Truman Tucker

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- ³*Ibid.*, p. 402.
- ⁴*Ibid.*, p. 402.
- ⁵*Ibid.*, p. 402.
- ⁶*Ibid.*, p. 403.
- ⁷*Ibid.*, p. 403.
- ⁸Weisskopf, Victor F., 1977. The frontiers and limits of science. *American Scientist* 65 (4):405-411.
- ⁹*Ibid.*, p. 411.
- ¹⁰*Ibid.*, p. 411.
- ¹¹*Ibid.*, p. 411.
- ¹²See Rusch, Wilbert H., Sr., 1971. Human footprints in rocks. *Creation Research Society Quarterly* 7 (4):201-213.
- ¹³"BB", with photographs by R. Truman Tucker, 1975. Human footprints in stone. *Oklahoma Today* 25 (2):2-4. (Spring Number). *Oklahoma Today* is published by the State of Oklahoma at the Will Rogers Memorial Building, Oklahoma City, Oklahoma 73105.
- ¹⁴R. Truman Tucker, 1977. Cast of foot. *Bible-Science Newsletter* 15 (9):4. (September).

LETTERS TO THE EDITOR

Advice About Studies

The following excerpts from a memorandum, headed "Opportunities in Christian service for students majoring in the College of Arts and Science", circulated to academic advisors and others at Bob Jones University, may be of interest to readers of the *Quarterly* generally:

The following information is being made available for your use when . . . students ask you what they can do with the particular major . . . The same holds true . . . concerning the minor.

English

There is a need for these majors in the field of Christian writing and publishing; Textbooks and other educational materials; periodicals; essays; fiction for

adults, adolescents, and children; church and Sunday School materials, etc. The student will be better prepared if he combines his English major with a journalism minor.

Modern Languages

With their language and linguistic skills, modern language majors should be prime candidates for the mission field, both as on the field missionaries or in some administrative capacity. There are also opportunities as translators for Christian publishing houses, translating everything from the Bible to tracts to scripts for Christian films and slide series. There is also research of old and new foreign materials in the field of religion to determine suitability for translation into and

publication in English. Sales representation for foreign or domestic Christian booksellers and publishers here in the States or overseas is another service possibility.

Prelaw

Of these majors, we like to see as many as possible in law school that they may serve as Christian lawyers after completing their programs. Christian lawyers can have a real impact on society by working to have laws changed which discriminate against Christians; by maintaining high Christian standards in their practice of law and contacts with their clientele; by providing legal aid and counsel to Christian schools, churches, and parents; and perhaps by serving full time in a Christian legal aid society.

Science

Science graduates should affiliate themselves with the Creation Research Society where they will have the opportunity to make significant contributions in the increasingly heated battle between creationists and evolutionists. A solid foundation in the sciences and an ability to communicate will allow the Christian graduate to be instrumental in advancing the cause of truth.

Home Economics

Beyond preparing these majors for roles as Christian wives, mothers, teachers of their children, etc., the

home economics majors can look for full-time Christian service as nutritionists (cooks, dietitians, food directors) of Christian camps, schools, nursing homes, etc. Those gifted in the area of clothing construction may also consider opening their own shop or store where Christian women can buy tasteful and modest attire as a welcome alternative to patronizing secular stores. A specialist in child development may create her own lectures and other educational materials to be delivered at camps, retreats, rallies, workshops, etc. Pastors' wives with a home economics background will find many opportunities to place their knowledge and skill at the disposal of the women congregation members.

Humanities

Many humanities majors could fill their electives with sociology and psychology courses, perhaps a few church administration courses as well, to prepare for careers in Christian school counselling, camp work, social work undertaken by Christian agencies, etc. Public relations work for Christian companies and schools is also a possibility for the humanities major with a selection of appropriate courses in his electives.

Yours sincerely,
Guenter Salter

Dean of the College of Arts
and Science

Bob Jones University
Received 13 September 1977

NEW AUSTRALIAN CREATIONIST ORGANIZATION

Word has been received of the formation, during November 1977, in South Australia, of a new Creationist organization the Creation Science Association. The aim of the society is to promote the awareness of special creation as a valid scientific explanation of origins.

Membership is open to anyone who can subscribe to the statement of belief, which is substantially the same

as that of the Creation Research Society. The work of the Creation Science Association, however, is envisaged as being somewhat different from that of the Creation Research Society, so that it would not be duplication if one were to be a member of both societies.

The mailing address of the Creation Science Association is 37 Anzac Ridge, Bridgewater, South Australia.

NOTICES OF BOOKS

The Biology of the Holy Spirit by Robert C. Frost. 1975. Published by Fleming H. Revell Company, Old Tappan, New Jersey. 160 pages, price \$2.95. This book is not one about biology; it uses examples drawn from biology, to explain many points concerning Christian doctrine and life. Because of the examples, many readers of the *Quarterly* will find that it strikes a familiar note, and is very helpful.

The First Nine Months of Life, by Geraldine Lux Flanagan, 1962. Published by Simon and Schuster,

New York. 149 pages, price \$6.95. Here is an authoritative, yet brief and readable, account of the development of the foetus, from conception to birth, with a number of illustrations. In a few places some evolutionary dogma is assumed, but, on the other hand, it is pointed out that the notion that the foetus ever has gill slits, or a tail, is false. The work could be useful for general biological information; and it could also provide useful evidence in the consideration of the matter of abortion.

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CREATION RESEARCH SOCIETY

History The Creation Research Society was first organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a real need for an association devoted to research and publication in the field of scientific creationism, with a current membership of about 500 voting members (with graduate degrees in science) and over 1600 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and is now recognized as probably the outstanding publication in the field.

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

Membership Voting membership is limited to scientists having at least an earned graduate degree in a natural or applied science. Dues are \$10.00 (Foreign, \$11.00 U. S.) per year and may be sent to Wilbert H. Rusch, Sr., Membership Secretary, 2717 Cranbrook Road, Ann Arbor, Michigan 48104. Sustaining membership for those who do not meet the criteria for voting membership, and yet who subscribe to the statement of belief, is available at \$10.00 (Foreign, 11.00 U. S.) per year and includes subscription to the Annual Issue and Quarterlies. All others interested in receiving copies of these publications may do so at the rate of the subscription price for all issues for one year: \$13.00 (Foreign, \$14.00 U. S.).

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

We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. In 1970 the Society published a textbook, *Biology: A Search for Order in Complexity*, through Zondervan Publishing House, Grand Rapids, Michigan 49506. Subsequently a Revised Edition (1974), a Teachers' Guide and both Teachers' and Students' Laboratory Manuals have been published by Zondervan Publishing House. All members of the Society subscribe to the following statement of belief:

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.

2. All basic types of living things, including man, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The great Flood described in Genesis, commonly referred to as the Noachian Flood, was an historic event worldwide in its extent and effect.

4. We are an organization of Christian men of science who accept Jesus Christ as our Lord and Saviour. The account of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Saviour for all mankind. Therefore, salvation can come only through accepting Jesus Christ as our Saviour.

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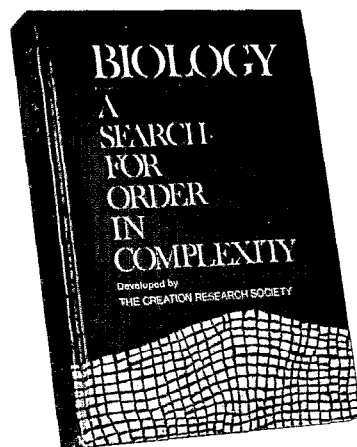
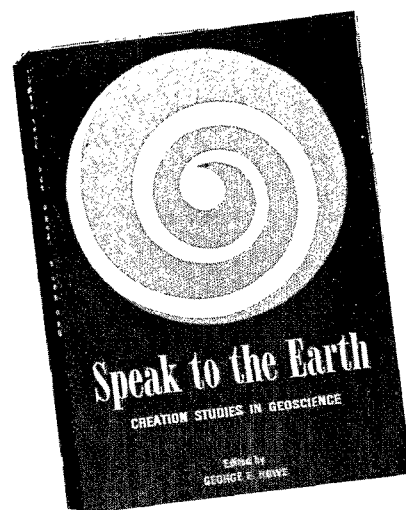
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The primary purpose of the Creation Research Society is to carry out, or to encourage, Creationist research in the natural sciences, and to publish the results of such research. In an article in the June, 1975 issue of the *Creation Research Society Quarterly*, Dr. Duane T. Gish published a summary report of Creationist research in the last decade.

His report was organized under these headings: Geology, General Geological Reports, Genetics, Natural Selection, General Biology, Taxonomy, Thermodynamics, and A Research Challenge.

So that members of the Creation Research Society and other interested persons might distribute this summary of a decade of Creationist research a special reprint of the Gish article has been made available. The 16-page reprint is priced at 75 cents per copy, with price reduced to 50 cents each for orders of 100 copies. Orders for the reprint may be placed through the College Bookstore of Concordia College, 4090 Geddes Road, Ann Arbor, MI 48105. Postage will be paid by the bookstore.