

Creation Research Society Quarterly

Haec credimus:

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

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Quotable Quote

"On such a principle, then, depend the heavens and
the world of nature. And it is a life such as the best
which we enjoy . . . If, then, God is always in that good
state in which we sometimes are, this compels our wonder;
and if in a better this compels it yet more. And God
is in a better state. And life also belongs to God; . . .
God's self-dependent actuality is life most good and
eternal. We say therefore that God is a living being,
eternal, most good, so that life and duration continuous
and eternal belong to God . . ."

— From Aristotle, *Metaphysics*, Book XII Chapter 7.
Translation by W. D. Ross.

CONFERENCE HANDBOOKS AVAILABLE

With a few exceptions, lectures delivered at the Third
National Creation-Science Conference sponsored jointly
in August, 1976 by the Bible-Science Association and
the Twin Cities Creation-Science Association are avail-
able still in a specially prepared Handbook. Copies are
priced at \$5.00 (plus 50¢ postage), and may be obtained
by ordering from Creation-Science Conference, c/o
Katherine Sorensen, 2852 - 44th Avenue South, Min-
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COVER ILLUSTRATION

The cover illustration, which was taken by John
Morris, shows a general view of Heart Mountain,
Wyoming. This mountain is remarkable because
geologists claim that "older" rock rests conformably on
top of "younger" rock. Uniformitarian geologists claim
that the older rock was overthrust over the younger.
However, there is no evidence that anything of the sort
happened, and it is very doubtful whether such over-
thrusting is mechanically possible.

Some recent re-examination of this mountain is
described in an article by Clifford L. Burdick, elsewhere
in this issue of the *Quarterly*. He found no evidence that
Heart mountain has been overthrust; but there is
some evidence that there may have been a normal fault.

AUDIENCE RESPONSE: TEACH CREATION AND EVOLUTION

DAVID J. RODABAUGH*

Creationists have held that creation and evolution should both be taught in the public schools. Indeed, they believe that teachers have a moral responsibility to teach both sides of the subject of origins. At a recent presentation of creation at a major university campus the audience was invited to respond to several questions. The overwhelming response was that both creation and evolution should be taught in the public schools. This was the opinion of the students considered separately, the faculty considered separately, and those who were from the community. These responses support the contention that creation and evolution should both be taught in the public school.

1. Introduction

On September 22, 1976, Dr. Duane Gish presented a lecture entitled "Evolution Challenged by Science" on the University of Missouri-Columbia campus. A panel of scientists was invited to critique and react to the presentation. Those who participated were: Dr. Robert T. Marshall, Professor of Food Science and Nutrition; Dr. Thomas J. Freeman, Professor of Geology; Dr. David B. Shear, Associate Professor of Biochemistry; Dr. Olen Brown, Assistant Director of the Dalton Research Center. The program was sponsored jointly by the Missouri Student Association (Columbia Campus) and the Missouri Association for Creation.

There were about 450-500 persons at the program. Members of the audience were each invited to complete and return the comment card reproduced here.

Of the total attendance, 320 people completed and returned the comment cards. Dr. James B. Karnes, Assistant Professor of Industrial Education ran a statistical analysis (SAS program) of the results. Since over 60 per cent of the audience completed and returned the cards, these results are quite significant.

2. Responses

Responses of the entire audience are given in the first two columns of Table 1. On some items there were those who either did not respond or who responded ambiguously. Such were not included in the tabulation. For this reason the responses in each category do not sum to 320.

Responses show that over 90 per cent (267/305) want creation taught in the public schools. Over $\frac{3}{4}$ want both creation and evolution taught in the public schools. Over 93 per cent want more programs of this kind and over half were willing to leave names and addresses in order to receive additional information. In short, respondents overwhelmingly want more information on theories of origins. They do not want evolution to be the only theory of origins that is taught in the public schools.

There are those who will suspect that the audience responded this way because it was "packed" with church people from outside the university. That such is not the case is apparent from Table 1. (In fact, the presentation was on Wednesday evening and most churches in the area held services that evening.)

Columns three and four indicate the responses of the students in the audience. They too are overwhelming in their desire to have more information (more programs) on creation brought to the campus. They too want both evolution and creation taught in the public schools.

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Comment Card

Please Circle the Letter of Your Answer

- I am
 - a student at _____
 - a faculty member at _____
 - a member of the community
- How would you rate the program?
 - Excellent
 - Good
 - Fair
 - Poor
- What is your feeling about the creation-evolution question with regard to the public school curriculum?
 - Both models should be taught
 - Evolution only should be taught
 - Creation only should be taught
- How did the program affect your thinking about creation and evolution?
 - Did not affect it
 - Stimulated me to further inquiry
 - More favorable to evolution
 - More favorable to creation
- I would like to see other programs dealing with this subject brought to the campus.
 - Yes
 - No
- I would like further information on this subject.

Name _____

Address _____

One particularly valuable fact brought out in Table 1 is that the faculty strongly supported having more programs, obtaining more information, and teaching both creation and evolution in the public schools. In fact, the faculty response was the strongest in this last category. Eighteen out of twenty want both models taught. In addition, nearly, half were definitely stimulated to further study the subject.

In the light of the above, why is it then that evolution is taught as fact in the public schools? One conclusion is that dedicated evolutionists are in some way controlling the curriculum.

Unfortunately, this attitude contradicts the popular concept that evolutionists are open minded thinkers and creationists are closed minded bigots. There are, however, many evidences that many evolutionists are very closed minded.

Some evidence is given in Table 2. Here, the responses of the entire audience are compared with those who want only evolution taught, those who felt the program favored evolution, and those who want no more programs dealing with the creation-evolution controversy. Each of these groups are strong in their desire to have no more information on the subject. In fact,

Table 1

		Entire Audience		Students (217)		Faculty (22)		Others (76)	
		Frequency	Per Cent	Frequency	Per Cent	Frequency	Per Cent	Frequency	Per Cent
Program Rating	Excellent	97	33.448	51	25.758	8	40.000	35	50.725
	Good	126	43.448	88	44.444	9	45.000	29	42.029
	Fair	49	16.897	44	22.222	2	10.000	3	4.348
	Poor	18	6.207	15	7.576	1	5.000	2	2.899
School Curriculum	Both Models	237	77.705	162	77.885	18	90.000	55	74.324
	Evolution only	30	9.836	28	13.462	1	5.000	1	1.351
	Creation only	38	12.459	18	8.654	1	5.000	18	24.324
How Program Affected	Did not affect	73	24.172	55	26.570	4	20.000	13	18.056
	Stimulated me	72	23.841	52	25.121	9	45.000	10	13.889
	Favored Evolution	25	8.278	23	11.111	1	5.000	1	1.389
	Favored Creation	132	43.709	77	37.198	6	30.000	48	66.667
Want more programs	Yes	275	93.220	183	91.500	18	90.000	71	98.611
	No	16	5.424	13	6.500	2	10.000	1	1.389
	Indifferent response	4	1.356	4	2.000	0	0.000	0	0.000
Want more information	Yes	160	50.157	101	46.759	14	63.636	41	53.947
	No	159	49.843	115	53.241	8	36.364	35	46.053

their entire pattern of responses differs significantly from the responses of the entire audience. Their attitude might be characterized as, "My mind is made up; please do not confuse me with the facts."

An important conclusion of this survey is that there are a number of faculty and students who genuinely want to hear both sides of the evolution-creation controversy. With the present attitudes in science education, they rarely have the opportunity. It is important—indeed, it is imperative—that this opportunity be granted. It is essential that the careful scientific presentation of evidence for creation be given.

Another remark is in order. Due to fear of ridicule by faculty or colleagues, some who have doubts about the theory of evolution hesitate expressing them.

This survey gives compelling evidence that the vast majority of people truly want to hear about both creation and evolution. It is hoped that this survey can be used at the University of Missouri-Columbia to obtain support for future programs. Here, as at other

places, the student press and most of the local press has ignored completely every program that has been conducted by the Missouri Association for Creation. It is evident that the press has ignored an item of interest to a significant number of readers.

3. Other Surveys

A survey like the one in this report should be conducted whenever possible at presentations of the creation-evolution controversy. Perhaps the combined results of a number of surveys would convince those in charge of science curricula that both evolution and creation should be taught in the science classroom.

A similar survey was conducted at the University of Missouri-Kansas City. A comment card almost identical to the one in this report was distributed to the audience. Out of about 350 in the audience, 168 completed and returned the cards. The responses were even more favorable toward creation than similar responses in Table 1.

Table 2

		Entire Audience		Want Evolution Only		Program Favored Evolution		Want No More Programs	
		Frequency	Per Cent	Frequency	Per Cent	Frequency	Per Cent	Frequency	Per Cent
School Curriculum	Both models	237	33.448	xxx	xxx	9	40.909	4	25.000
	Evolution only	30	9.836	xxx	xxx	13	59.091	11	68.750
	Creation only	38	12.459	xxx	xxx	0	0.000	1	6.250
How program affected	Did not affect	73	24.172	12	41.379	xxx	xxx	6	40.000
	Stimulated me	72	23.841	4	13.793	xxx	xxx	0	0.000
	Favored Evolution	25	8.278	13	44.828	xxx	xxx	8	53.333
	Favored Creation	132	43.709	0	0.000	xxx	xxx	1	6.667
Want more programs	Yes	275	93.220	15	57.692	13	56.522	xxx	xxx
	No	16	5.424	11	42.308	8	34.783	xxx	xxx
	Indifferent response	4	1.356	0	0.000	2	8.696	xxx	xxx
Want more information	Yes	160	50.157	6	20.000	7	28.000	3	18.750
	No	159	49.843	24	80.000	18	72.000	13	81.250

REVERSALS IN THE FOSSIL RECORD: THE LATEST PROBLEM IN STRATIGRAPHY AND EVOLUTIONARY PHYLOGENY†

MARVIN L. LUBENOW*

Evolutionists have often asserted that evolutionary change is irreversible. In fact, that assertion has the status of a law, called Dollo's Law. However, a search of the literature shows that the evolutionists are being forced more and more to admit that, according to their presuppositions, there have been reversals. Once that admission is made, attempts to resolve the order of strata by supposed evolutionary changes in fossils become very questionable. The matter of reversals in the fossil record is an unreported controversy among paleontologists. Even the minority of paleontologists who recognize the fossil evidence for reversals are very obtuse regarding the implications in stratigraphy and phylogeny, both of which have been developed on the concept of the irreversible nature of the fossil record and of evolution.

What has, since 1893, been considered in evolution and phylogeny to be one of the most secure and undisputed of "laws," namely, the "law of irreversibility," now turns out to have exceptions to it, and the entire concept, with its implications, is open to challenge.

Dr. Gerald R. Smith of the University of Michigan has recently reported finding "reversals" in the fossil record of Idaho fishes. He further suggests that there are many such cases of reversals in the fossil record but that they have either gone unreported in the literature or were considered to be "anomalies" and hence were ignored. In other cases, they were ignored even after they were reported.

A preliminary search of the technical literature by the author of this paper turned up a number of such reversals, including a report of reversals in the fossil record of the ammonites. This phenomena of reversals in the fossil record, with far-reaching implications, has not yet been noted generally by creationists. If the research creationists are encouraged to conduct in the technical literature continues to reveal documented evidence of reversals, it could constitute one of the most serious and substantive challenges to evolutionary thinking on the part of creationists in recent times.

The "law of irreversibility," originally put forward by Dollo in 1893, states that "an organism is unable to return, even partially, to a previous stage already realized in the ranks of its ancestors."¹ It is this law or principle that causes evolutionists to speak of evolution as being a directional or "one-way" process in the development of life.

Dollo's Law refers to matters of morphology and specialization. There is a rule in evolution, known as Cope's Rule, which deals with the widespread tendency of animal groups to evolve toward larger physical size. Because numerous exceptions are known, it is now considered only as a loose generalization by most workers. Dollo's Law should not be confused with Cope's Rule, which does not concern us here, because size changes alone have not seemed to be of great consequence in stratigraphic correlation or evolutionary family trees. On the other hand, changes from "generalized" to "specialized" have been almost universally accepted as irreversible and have been used very extensively in both

stratigraphic correlation and in the construction of evolutionary histories.

Law Important for Three Reasons

This law of irreversibility is of utmost importance in evolutionary and geological thinking for three reasons. First, it has been used to explain extinctions. Whereas many creationists believe that extinctions are, at least in large part, the result of Biblical catastrophes such as the Genesis flood, evolutionists have stated the cause of extinction on the part of many organisms to be their gradual evolutionary development from a "generalized" to a "specialized" and then to an "over-specialized" condition.

Specializations are usually found in the feeding and defense mechanisms of organisms, and are said to be their response to the environment. These specializations enable them to achieve a better "fit" in their ecological niche and to utilize the resources more efficiently.

Hence, a specialized adaptation is considered an advancement not only in ability to survive, but also in evolutionary history since these "advanced" or "specialized" forms would be the descendants of more "generalized" ancestors. However, there is a price to pay. With increased specialization comes decreased ability to adapt to changing conditions. Thus, sudden changes in the climate or the environment are perhaps the major evolutionary explanation for the vast extinctions found in the fossil record.

Since, according to the law of irreversibility, the organism cannot go back to a more generalized condition, it becomes extinct being unable to adapt to the new environment. Hence, reversals in the fossil record force the evolutionist to face anew the problem of extinctions.

Second, the geologic record of the sedimentary rocks is correlated on a world-wide basis according to the law of irreversibility. For instance, if Sedimentary Bed A contains the fossils of a certain kind of fish and Sedimentary Bed B, some miles away, contains the fossils of the same kind of fish but a bit more specialized in certain feeding or defense mechanisms, then Bed A is considered to be earlier in time than Bed B.

Bed B is considered to be more recent because the fossils of the same organism are more specialized, and evolutionists have assumed that this was a "one-way" evolutionary process. A significant body of evidence for reversals in the fossil record could call into question the

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†This article is an expanded version of a paper presented at the annual meeting of the American Scientific Affiliation at Wheaton College, Illinois, in August 1976. A similar report appeared in the *Bible Science Newsletter*, 14(11):1-4, November, 1976.

fossil correlation of vast areas of the sedimentary record and the evolutionary system based upon this law of irreversibility.

The third reason for the significance of these fossil reversals is that for years evolutionists have been constructing phylogenetic or evolutionary "family trees" on the basis of the supposed "one-way" character of the fossil record. Using present day specialized forms, they have gone back into the fossil record looking for more generalized ancestors of the present day forms.

There is much paleontological literature which states that fossil reversals cannot occur, and much of the scheme of evolutionary relationships has been developed on this assumption. If fossil reversals prove to be widespread, many—if not most—of the alleged evolutionary relationships can be legitimately challenged by creationists on that basis alone.

The writer was first made aware of the possibility of these fossil reversals in a lecture given by Dr. Gerald R. Smith at the University of Michigan, February 5, 1976. The lecture was part of the Turner Distinguished Lecture Series sponsored by the Department of Geology and Mineralogy at the University. The lectureship brings to the University of Michigan campus some of the most eminent authorities in the world of geology and related subjects.

Dr. Smith is himself the Director of the Museum of Paleontology and Associate Professor of Zoology at the University. His area of specialization is the fishes—both living and fossil. Before coming to Michigan, he was associated with the Museum of Natural History at the University of Kansas. From 1967-1970 he served as Managing Editor of the journal, *Evolution*, the publication of the Society for the Study of Evolution.

Lecture on Lake Idaho

The subject of Dr. Smith's lecture was "Lake Idaho Fossil Fishes: Paleohydrology and Evolution." Lake Idaho—no longer in existence—was a Pliocene Lake located in southwest Idaho in what is now the Snake River drainage basin. In size and depth, a present day analog would be Yellowstone Lake. In climate and ecology, a present day analog would be one of the Great Lakes.

Lake Idaho, however, was unique in that it had more species diversity than has any lake in western North America today. It had more specialization diversity than any lake in all of temperate North America today. It is the amazing degree of specialization of the fauna of this Pliocene lake compared to the present day forms that presents a problem to the evolutionist.

Speaking of the fossil Salmon, *Oncorhynchus salax*, which he found in the Glens Ferry Formation (the sedimentary beds representing the deposits of the ancient Lake Idaho), Dr. Smith remarked about the greater number of gill rakers which this fossil Salmon had compared to any Recent species. Professor Smith stated:

The number of gill rakers is one of the primary characteristics by which Pacific Salmon can be studied and identified. Compared with the fossil species, *Oncorhynchus salax*, the important thing here is that this can be interpreted as evidence that

the fossil species was far more specialized in this particular characteristic than any of the Recent species. And this will be one of the surprising points that I will be trying to make for the next several minutes, that the members of the fish fauna of Lake Idaho are in most respects more specialized (in several senses of that word) than their modern counterparts.

One of the other kinds of fish fossils discovered here are representatives of the whitefish group. The whitefish in the Glens Ferry Formation is not only larger but more specialized in the possession of elongated jaw bones than any other member of the group. Other whitefish in related species are in western lakes. One of them is nearly coarcted, but none of them are as specialized as the one in this lake, and in particular the one that occupies the Snake drainage today is not specialized relative to this one.²

Of the original (Pliocene) fish fauna of Lake Idaho, Dr. Smith stated that one-third of them became extinct altogether. Another third became extinct locally but are represented in some of the other basins. He continued:

The remaining third changed. They *specialized*, but I have to use that word very carefully because we think of all changes to changing environments as specializations. But in this case, if we look at the specializations that were attained by the surviving third of this system that enabled them to survive the temperature fluctuations and the current of the new environment, they are "specializations" to a *generalized* situation and *generalized* characteristics. Now, this is kind of a surprising thing because if you look at it at face value it *indicates a direct evolutionary reversal*.

Theoretically there is no reason not to expect reversals to occur in evolution, but it turns out that the paleontological literature—at least—is full of statements indicating that evolutionary reversals of this sort cannot occur. For example, frequent references in the paleontological literature to the fact that one species, species A, cannot be ancestral to species B because species A is more specialized than species B. Well, I think (at least I'm convinced) that in this situation we've got several inescapable examples of at least minor changes from specializations to generalized morphological conditions.

The number of examples of that may be as high as ten, and I covered about ten. Those that involve drainages other than the Snake River might not be true examples of a direct reversal. At least in three cases (the three evolutionary lines—well, somewhere between two and five evolutionary lines) that are pretty much restricted to that same geographical location, especially the genus *Acrocheilus*, which has never been found anywhere but that spot on the map (That's the thing with the slicing pharyngeal teeth); and the genus *Mylophorodon* (the thing with the mollusk crushing pharyngeal teeth) is also a line that is unknown from any other part of the world. It's just been right on that spot and I take this to indicate that the fossil forms are the direct

ancestors of the Recent forms, and that the changes we observe are direct reversals.

One of the other worrisome aspects about reversals to a paleontologist—and maybe this is why paleontologists don't want to see them when they exist—is that this obviously means that I can't do a thing with stratigraphic markers with these species (if they are reversing in response to whatever ecological conditions happen to be selecting them at any given time) without a whole lot of independent stratigraphic control (which is why Pete and I and Chris are interested in dating ashes) and other paleontological and geological evidence. We just wouldn't be justified in using these fishes as stratigraphic markers. The mammals have been used as stratigraphic markers out there, and there are statements in the literature about the relative ages of beds based on the number of triangles in mouse teeth. But I don't see that the specializations in the mouse teeth are any different or subject to any different rules of evolution than the kinds of things we observe in the fish teeth.

The other interesting point that is of some importance to people who study evolution and phylogeny these days is that if reversals occur in evolutionary history (as I think we have to accept that they do) and if they are undetected, then it would be impossible for zoologists to study only recent animals to reconstruct the phylogeny of those animals without some mechanism for determining where and when the reversals occurred. It occurs to me that the only place where we can get solid evidence, the only place where we can document the occurrence of non-parsimonious evolution, is in the fossil record.² (End of quotation by Professor Smith. Emphasis added)

It is the very limited geographical range of some of the Lake Idaho fossils that seems to establish beyond reasonable doubt that the modern forms are in actuality the descendants of the fossil forms, and that they did indeed experience morphological reversals. This same limited range would make the fact of these particular reversals of very limited importance, for the Lake Idaho fossils are not crucial either in evolutionary phylogeny or in correlation of rock strata.

However, it is Dr. Smith's stated belief that these reversals are widespread in the paleontological record but that they are either unreported as such or else they are reported and ignored because they do not accord with the "law of irreversibility." With this thought in mind, the writer of this paper undertook a very brief and cursory search in some of the evolutionary literature, and located an item in the journal, *Nature*,³ involving reversals in the fossil ammonites which could well be of the greatest general importance and which had been reported originally in *Biological Reviews*.

Ammonite Reversals Discussed

The ammonites are in the class cephalopoda (phylum Mollusca) which include the squids, octopuses, the pearly nautilus, and the extinct ammonoids. Whereas reversals in the Lake Idaho fossils would be of limited importance—except, perhaps, to establish the fact of

reversals—the cephalopods would be of extreme importance since (because of their world-wide distribution and their range from Cambrian to Recent times) they are among the most widely used fossils both for stratigraphic correlation and for the developing of evolutionary family trees.

The ammonites (subclass ammonoidea), and their earlier relatives, the ammonoids, are coiled mollusks similar in appearance to a ram's horn. In fact, their name comes from Ammon, the Greek name for the Egyptian ram-headed deity. They are among the most widely used fossils for correlation—especially in the Mesozoic Era. Stokes has stated:

The ammonites (cephalopods whose shells have complex suture patterns) are unequalled as guide fossils for marine Triassic, Jurassic, and Cretaceous rocks.⁴

The extensive use of ammonites in stratigraphic correlation is indicated by the fact that they are used, according to Stokes, to correlate 29 zones of the European Triassic (mainly in the Alps), 35 zones of the North American Triassic, from 40 to 50 zones of the British Jurassic, 10 zones of the United States Jurassic, 24 zones of the Mexican Jurassic, 20 to 30 zones of the European Cretaceous, and 26 zones of the United States Cretaceous—to mention just a few of the areas. *In fact, it was the ammonites of the British Jurassic that strongly influenced the early development of the science of stratigraphy and correlation, and its resulting use in building up evolutionary sequences.* To say that the possibility to reversals in the history of the ammonites is of great importance is a masterpiece of understatement.

The use of these spiral-shelled ammonites as precise stratigraphic markers is based (along with suture patterns) upon the alleged production of aberrant forms, called *heteromorphs*, in which either the whole shell, or part of it, is unrolled. This unrolling has been almost universally interpreted as a sign of overspecialization resulting in extinction. Hence, this one-way or directional history of these ammonites has been considered a very dependable and precise index for correlation and geologic age determination.

Ammonite Heteromorphs Challenged

The challenge to this commonly accepted evolutionary history of these ammonites has come from Jost Wiedmann of Tübingen University.⁵ After careful study, Wiedmann demonstrated that these heteromorphs were not aberrant forms at all, but that the uncoiling was probably a normal response to the environment.

In fact, if the coiling of these ammonites in the Devonian Period is considered to be primary, there was a trend toward uncoiling on the part of some groups in the Triassic, a trend toward coiling again on the part of some in the Jurassic, Cretaceous, and even into the Tertiary, with some of the re-coiled forms showing a later Quaternary (probably Pleistocene) uncoiling. Further, some of the Jurassic uncoiled forms he discovered were older than their supposed coiled ancestors.

Here, then, is evidence for actually a double reversal in the history of these ammonites—going originally from coiled to uncoiled, then to coiled (the first reversal) and then to uncoiled again (the second reversal). The am-

biguity this injects into stratigraphic correlation is obvious. A coiled form could be either Devonian or late Mesozoic. An uncoiled form could be either Triassic or Pleistocene.

Further, Wiedmann notes that the reversals in these heteromorphs were not limited to a single characteristic, such as the coiling, but also involved a return "... to a phylogenetically older type of suture line" (p. 598). This fact is of no small moment because the alleged "one-way" evolutionary development of the suture is considered the most diagnostic element in all of ammonite phylogeny. Reversals in the suture line of these heteromorphs opens up the possibility that this phenomenon is not limited to them alone, but may be a characteristic of all ammonites. Paleontologists would do well to examine the ammonites afresh with this thought in mind.

Yet, one finds remarks in the paleontological literature such as this one concerning the ammonites: "Regarded as the most distinctive invertebrates of the Triassic period, they are valuable guide fossils for rocks of this age."⁶

In a later lecture in the Turner Lecture series, Dr. Philip D. Gingerich, a curator of the Museum of Paleontology, University of Michigan, and Associate Professor of Geology (formerly of the Peabody Museum, Yale University, where he studied under Elwyn Simons and David Pilbeam), shared Professor Smith's views on fossil reversals. In conversation with him following his lecture, the writer of this paper asked if the evidence for fossil reversals was quite extensive. He replied:

I'm sure it is. It hasn't been well documented largely because of the methods paleontologists have used in analyzing their fossils. It started out with the concept that evolution proceeds from simple to complex, from small to large, and so forth. Instead of going out and finding fossils in well documented sequences where you have beds with fossils close enough together so you have a dense and continuous record, they have taken their individual fossils, put them on the table, and then said: "This one is advanced, this one is not so advanced, and this one is less advanced, and we have one sequence from primitive to advanced, from simple to complex." You read over and over again about how "This is an advanced character," and "This is a primitive character." What Dr. Smith and I are saying is that when you look at the things in a stratigraphically documented temporal perspective, what you find is not only the complicated with the increase in size, but you have lots of cases where things have become simple, things have become small. The point of this is that evolution doesn't proceed in some direction toward increased complication. The goal of evolution is adaptation. If it is to your advantage to become smaller, you'll become smaller. If you are better adapted having simpler teeth, simpler teeth are what result.

But we have a huge school of systematic paleontologists today who don't want to study in stratigraphic context. They want to make simplistic hypothesis about how evolution proceeds, and then

they want to take the anatomical characteristics of each of their species or each of their fossils and then sort these out based on what they think is a natural grouping, and what we see in the fossil record is these natural groups evolving independently.⁷

Professor Gingerich introduced the writer to a booklet written by the Finnish paleontologist, Bjorn Kurten, dealing with the return of a lost tooth in the lynx. Kurten wrote:

The metaconid-talonid complex may be termed a postcarnassial dental element in the sense of Crusafont and Truyols (1958), from its position behind the carnassial shear and within the field of molarization (Butler, 1939). Its presence is usually considered a primitive character, and may probably be so in the majority of cases. It was surprising, however, to find that the condition in the living *Felis lynx* seems to be derived from one in which the complex is absent or almost absent (Kurten, 1957). Even more astonishing is the fact that this seems to be coupled with the re-appearance of M₂, a structure unknown in Felidae since the Miocene. *All of this, of course, is completely at variance with one of the most cherished principles of evolutionary paleontology, namely Dollo's Law.*⁸ (Emphases added)

Later on in the same work, he stated:

This would then be an example of a structure totally lost and then regained in similar form,—which is something that simply cannot happen according to Dollo's Law.⁹

Our knowledge of the early Tertiary Felidae is still too limited to permit reconstruction of the ancestry of the living cats. They must, however, have descended from forms with a molariform M₂. This structure was lost in all known Felidae in the Miocene. It has not been observed in any fossil Lynx. Its presence in an appreciable proportion of the present-day Northern Lynxes may thus be regarded as evidence of an evolutionary reversal of the same type as the return of the metaconid-talonid complex in M₁.¹⁰

More Reversals Found

In his brief search of the evolutionary literature, the author of this paper found another excellent illustration of evolutionary reversals and still another possibility. The possibility has to do with the alleged evolution of wings on insects and their subsequent evolutionary loss. George W. Byers (University of Kansas) has written:

One of the frequently recurring evolutionary questions in entomology is why certain of the Pterygota, or winged insects, which must have required millions of years to evolve wings, have then in the course of further evolution lost the ability to fly, either by extreme reduction of the wings or total loss of them. These modifications may be seen in most orders of pterygotes and among species in a variety of ecological situations, in several species within a genus, or in all the species of a genus or higher taxon, suggesting that wing reduction has occurred at several different times during the evo-

lution of the insects and that it may occur in response to diverse environmental factors.

Loss of wings must have evolved many times independently and from a variety of causes among the large orders . . .¹¹

The case for reversals in the history of the earthworms seems quite well documented. According to G. E. Gates (University of Maine):

This statement, "another instance of a return to a long lost ancestral condition," in a recent manuscript, provoked a referee to deny categorically that any such thing is possible. The various instances, *long known to earthworm specialists*, are buried in systematic literature rarely if ever consulted by other zoologists. A discussion of the subject should then be of general interest especially if the above-mentioned denial is representative of current thought.

Some knowledge of oligochaete phylogeny is essential for understanding the reversions. All specialists have agreed that a major trend in Megadrile evolution has been reduction in number of genital organs, . . .

In conclusion, anatomical evolutionary reversions of earthworms may involve one or more pairs of organs in a single segment or a set of organs extending through several segments. Reversions already are recorded from species with obligatory amphimixis but more often from morphs (or other species) with parthenogenesis obligatory because of male sterility or inability to transfer or to receive sperm. *Further instances of reversion are anticipated* when the hundreds of species presently known only from a holotype or a very short series are more carefully studied.¹² (Emphases added)

Of special interest is the statement by Gates that these reversals ("reversions" as he calls them) have been long known by earthworm specialists, the reports have been buried in the technical literature, they expect to uncover many more instances of such reversals, and the very possibility of such reversals has been met with vigorous denial. Professor Gerald Smith, in private conversation, stated that these reversals in the fossil record are quite well known by paleontologists working at the species level. But, those working at the higher taxonomic levels demonstrate a regrettable obtuseness and lack of responsibility in acknowledging these evidences from the fossil record because of the mischief it works in efforts to develop evolutionary relationships.

As already indicated in some of the quotations in this paper, there is a deep division among paleontologists regarding the matter of reversals in the fossil record. This division has not yet been reported or come to the attention of the informed public. It is one that is touching the emotions as well, for it has far-reaching implications for evolutionary theory at a time when it is already troubled with internal controversy over the roll of mutations and natural selection in the history of life. James R. Beerbower (McMaster University), author of one of the more popular text-books on paleontology, recognizes the possibility of reversals in the fossil record

when he writes: "*Unfortunately, this 'law' [Dollo's] only works a six-day week—on Sunday anything can happen.*"¹³ (Emphases his). However, nowhere in his text does he deal with the ramifications of what can happen on Sunday as far as stratigraphy, phylogeny, and extinctions are concerned.

In contrast to Beerbower is the response of one of the most famous contemporary paleontologists, Zofia Kielan-Jaworowska, Professor of Paleontology and Director of the Paleozoological Institute of the Polish Academy of Sciences in Warsaw. Between 1963 and 1971, she organized and directed eight joint Polish-Mongolian expeditions to the Gobi Desert. The resulting discovery of a number of new types of dinosaurs and late Cretaceous mammals represents some of the most remarkable paleontological finds of the last half century.¹⁴

On November 17, 1976, Professor Kielan-Jaworowska lectured at the University of Wyoming, Laramie. In the question period following her lecture, the writer of this paper asked her if she had come across any evidence for reversals in her work in the Gobi. She acted surprised and amazed that anyone would suggest the possibility, and she demanded to know who was reporting them. She knew of no such thing.

Attention to Hominid Fossils

An area of special interest to the present writer has been the area of the hominid fossils. Upon learning of the possibility of reversals in the fossil record, it occurred to him that this matter of reversals might be the best explanation for the problem that has been troubling paleoanthropologists for many years—the problem of the Neanderthals.

The painful fact is that evolutionary theory—the idea that man and the apes are related and come from a common stock—was not based on fossil evidence. The concept was quite well developed *before* there was any fossil evidence. The theory was, in fact, used to interpret the fossil evidence. It is the most basic historical fact that when Darwin published his *Descent of Man* in 1871, only two fossil discoveries had been made—both Neanderthals. The Gibraltar discovery in 1848 was in a sort of limbo in Darwin's time and did not even figure in the discussions. Even today, few people have ever heard of it.

The famous 1856 discovery in the Neander Valley of Germany, which gave the Neanderthals their name, came just fifteen years before Darwin's work on the evolution of man. It did not figure a great deal in Darwin's concepts nor did it shape his thinking on human evolution. He had never *seen* the fossil (let alone *study* it) at the time he published his work. The concept of the evolution of man was based upon philosophical (or theological?) ideas and the circumstantial evidence of the *similarities in appearance* between man and the other primates.

With the belief (or faith) that man and the apes were related came the idea that any intermediate form would have some features common to both. Thus, the more ape features a fossil had, the more "primitive" it was and the closer it was to the common ancestor. The more a fossil resembled modern man in its morphology,

the more "modern" it was (and the later it was dated). Louis Leakey (in 1960) pointed out the error in this type of thinking.

It has become increasingly clear that our pre-human ancestors must not be expected to exhibit some of the modern ape characters that have in the past been wrongly labelled "primitive," when in fact they are highly specialised.¹⁵

Paleoanthropologists are obsessed with this concept of the "primitive" to the "modern." It is linked with the concept of the "generalized" to the "specialized" and indicates why the search for man's ancestors centers on forms that are less specialized than is modern man. In this sense, the concepts that dominate in human evolution are the same concepts that are deeply entrenched in evolution generally.

To illustrate this fact, the world-wide correlation of the Pliocene/Pleistocene deposits containing the hominid fossils has been worked out by Vincent J. Maglio (Professor of Geology, Princeton University) using as a guide the fossils of elephants and assuming the "law of irreversibility."¹⁶ To successfully challenge this "law" could enable creationists to place in jeopardy the entire concept of the evolution of Man. Ever since 1932 there has been evidence of reversals in the fossil record of man.

Reversals in Human Fossils

In 1932 at Mount Carmel in Israel human fossils were found in two caves just feet apart. However, the fossil skulls found in the Skhul cave, although very modern in appearance, were actually considered to be older than the fossil skulls found in the Tabun cave which were quite Neanderthal-like in appearance.

The actual report, written by the great evolutionist scholar, Sir Arthur Keith, and his associate, Theodore D. McCown, indicated (p.11) the physical evidence demands that the more advanced Skhul form be dated earlier than the more primitive Tabun skulls. This is just the opposite of what evolutionary theory would predict, and represents a reversal in the fossil record of man. Keith and McCown wrote:

Further, both the archaeological and the palaeontological evidence now at our disposal make it plain that the Skhul people were antecedent to the various fragmentary individuals recovered from Layer B of the Tabun cave. On anatomical grounds the latter appear to be later members of the human type which we know from our study of the skeleton of the Tabun woman and of the massive male mandible.¹⁷

Yet, having stated at the beginning of their work (p.11) that the physical evidence demands that the more modern Skhul skulls be dated earlier in time than the more primitive Tabun forms, at the conclusion of their work (p.373) they stated that they were rejecting that evidence on morphological grounds in order to maintain a proper evolutionary sequence. They wrote:

In rejecting the idea that the Tabun people came after those of the Skhul type we are guided by the very primitive features of the mandible known as Tabun II and the similarity of its teeth to those of the Tabun woman; it is hard to believe that the

mandible of the Tabun man could represent people which lived later than the Skhul people.¹⁸

Thus, as is so often the case in evolutionary studies, the "theory" determines how the facts are to be interpreted rather than the "theory" being based upon the facts.

In 1947, at Fontchevade, France, a second reversal in fossil man was found. Mademoiselle Henri-Martin, daughter of a famous archaeologist and an accomplished scientist in her own right, discovered two human fossil skull fragments that were very modern in morphology and yet pre-dated more Neanderthal-like fossils.¹⁹

Perhaps one of the most remarkable cases of reversals in the fossil record of man was revealed by William S. Laughlin (then Professor of Anthropology, University of Wisconsin; now at the University of Connecticut). Working in the Aleutian Islands, Laughlin discovered that the Aleut skulls in the lower levels of his excavations were very modern in morphology—not noticeably different from those of modern man. He refers to them as Paleo-Aleuts.

In great contrast, the crania of those he calls Neo-Aleuts, found at the upper levels of his excavations, are very low, very broad, and are the most capacious of any in the world.²⁰ Their morphology is extremely similar to that of the Neanderthals. What is most remarkable of all is that these dramatic changes in Aleut morphology took place in just 4,000 years.

Thus there is remarkable evidence—based upon the reversals in the human fossil record—that "primitive" man and "modern" have lived in certain areas of the world as contemporaries, rather than the one necessarily being ancestral to the other, as evolution demands.

It is also obvious by the remarkable changes from the Paleo-Aleuts to the Neo-Aleuts in just 4,000 years, that the morphological changes between the *Homo erectus* Neanderthal populations and that of modern man could take place in a recent creation context in accordance with the time constraints of the Genesis narrative. (*Homo erectus* is morphologically very similar to Neanderthal Man, but a small version).

Further, the evidence set forth here for reversals in the fossil record is suggestive of a larger body of evidence that could place in jeopardy one of the basic tenets of evolution—its directional nature—and the time demands of that concept.

Conclusions

A search by creationists of the technical literature to build up a body of paleontological evidence for reversals (if such a large body of evidence does indeed exist) would not only be most supportive of the creationist position, but would be a genuine contribution to geology in calling for a reevaluation of those stratigraphic correlations and phylogenetic trees that were developed on questionable evidence.

It is for this reason that I make this report to the creationist community and express my willingness to act as a coordinator or depository for any additional evidence which creationists bring to light.

All evidence should be of reversals reported by recognized workers in the field of paleontology and reported by established scientific journals or publications.

(continued on page 230)

THE FATHER OF EVOLUTION†

A. G. TILNEY*

Charles Darwin (1809-1882) had roots—his taproot being the influence of his learned, terrific and overpowering grandfather Dr. Erasmus Darwin (1731-1802) of Tichfield and Derby whom of course he never saw.

Charles R. Darwin was named after the first son of Erasmus (whose untimely death as a brilliant medical student at Edinburgh he called the cruelest blow of his life) and the third son Robert, who himself became a famous doctor.

In *Zoonomia* (or “The Laws of Organic Life”) Erasmus argued that all organisms may be descended through “millions of ages” from a single ancestral filament. He was scornful of organized religion and included credulity, superstitious hope and the fear of hell in his catalogue of diseases.

In Coleridge’s opinion, Erasmus Darwin had “a greater range of knowledge than any other man in Europe”. He “won fame in his own lifetime for a variety of accomplishments which has never since been equalled”. He was the finest physician in his day. As a poet of some renown, he influenced Wordsworth, Coleridge and Shelley.

The subjects to which he contributed most were geology, meteorology, agricultural chemistry, plant physiology and, above all, biology, where he propounded the first satisfactory theory of evolution with examples in support, thus anticipating his grandson Charles, whose work is closely linked with his own.

His second long poem, *The Temple of Nature*, traces the evolution of life from its origin as microscopic specks in primeval seas to its present culmination in man. Creation and the Creator had been largely ruled out in the Darwin family without any serious study of the textbook on creation, or correction of any competent defenders of the Faith. At the same time, an unproved and unprovable theory, revived from the ancient and pagan Greeks and Romans had been substituted, almost without effective challenge.

The youthful Charles’ mind was sown with the ideas and suggestions of his grandfather, which he sorted out rather than thought out, and half fancied he had himself originated. During the centenary celebrations of *The Origin of Species*, Prof. C. D. Darlington, was almost the only writer who did not join in the chorus of praise. His thoughtful and informed book, *Darwin’s Place in History*, is a corrective of the fulsomeness accorded Charles Darwin’s epoch-making discovery of natural selection and evolution.

Darlington analyzed the factors leading to the myth,

It was no accident of heredity that remarkable gifts reappeared in Erasmus’s grandchildren. For the character of Darwin’s descendants no less than the character of his work depended on the companions he gathered around him. The “Lunar Society” he assembled was intellectually the most effectual group that has ever come together in England. Its members and their friends were all Fellows of the Royal Society of London. But it was in the Midlands that they established the Industrial Revolution, and it was largely through the pen of Erasmus Darwin, when he moved to Derby, that they illumined the century which followed. The fact that their children and grandchildren intermarried was another consequence of their friendships of continuing significance for our society.

Erasmus Darwin’s works enjoyed success at home and abroad. *Zoonomia* appeared in French, German, Russian and Italian, with a pirated edition in New York. Also it prompted Malthus’s *Essay on Population* four years later. Then 40 years later it helped to give Charles Darwin as well as Wallace the idea of natural selection. Samuel Butler supposes that it was Darwin’s *Loves of the Plants* which, translated in 1800 into French, converted Lamarck to a belief in the transformation of species.

These were the works which Charles Darwin read as a young man at the University of Edinburgh. *It was from them that he learned about the theory of evolution.*

He gave minimal and reluctant recognition to his grandfather and thus deceived three generations into believing in his originality, whereas in fact his very slogans—*evolution, natural selection, and survival of the fittest*—were adopted from Herbert Spencer.

By virtually disowning his predecessors, Charles was declaring himself a pioneer and creator, claiming the fame he so ardently desired. No wonder Darlington accuses him of having “damned Lamarck and also his grandfather for being very ill-dressed fellows at the very moment that he was engaged on stealing their clothes”.

There are plenty of parallels between *Zoonomia* and *The Origin of Species*. Almost every topic discussed in *Zoonomia*, and every example given, reappears in *The Origin*. As to sexual selection, “Every point which Charles made in *The Origin of Species* was to be found in Erasmus’s analysis.”

*Pastor A. G. Tilney, B.A., was for 20 years Hon. Secretary of the Evolution Protest Movement in England. He has written against evolution, and on the investigation of prophecy and on other Christian topics. A report of his death was received just shortly after return of galley proof of this article.

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SOLUTION AND DEPOSITION OF CALCIUM CARBONATE IN A LABORATORY SITUATION II†

EMMETT L. WILLIAMS* AND RICHARD J. HERDKLOTZ*

This article is the second in a series of interim reports on attempts to produce cave-like CaCO_3 structures, i.e. simulated stalactites and stalagmites, in the laboratory. The effects of such things as differences of temperature, and acetic acid in the water, were investigated. It was found that it is indeed possible for limestone to be dissolved, and the CaCO_3 later precipitated, very quickly.

It is evident that this matter of dripstone must be investigated in conjunction with the process of formation of caves, and also the formation of limestone. Some suggestions are made about these matters; clearly more research is needed.

Original Laboratory Apparatus

The laboratory apparatus used to obtain the results reported previously¹ is shown in Figure 1. The solution box on the left contained chunks of Indiana limestone. Demineralized water and CO_2 were introduced into the solution box from the top through separate pieces of tygon tubing. The water was allowed to drip into the container from a large plastic bottle. A pinch clamp on the entrance water hose controlled the water drip rate. The tygon tubing through which the CO_2 flowed was coiled at the bottom of the solution box. Many very small holes in the tubing allowed the escape of the gas through the coils. Gas bubbles rose up through the water and around the limestone chunks.

The precipitation box is on the right in Figure 1. It was connected to the solution box by two pieces of tygon tubing. The upper tubing allowed excess CO_2 from the solution box to go into the precipitation box to maintain a CO_2 -rich atmosphere there. The lower piece of tubing was used to transport the water-calcium bicarbonate solution into the precipitation box. The rate of flow was controlled by an adjustable pinch clamp. Twelve strings, prepared as previously reported,¹ were suspended below the solution box. The strings were knotted in holes in the box and the solution drips down them. A fan provided air movement around the strings.

In the natural situation, a calcium bicarbonate solution would have moved as droplets or as a small stream over a large amount of surface area. This would allow the necessary time to lose CO_2 and cause the precipitation of CaCO_3 . The strings were intended to simulate a six inch path for a droplet to travel before it fell into a pool of water below the strings.

Excess Supply of Carbon Dioxide

Experimental equipment was arranged to ensure that excess CO_2 was present at all times to go into the solution in the water. The volume of the box (216 in.³) was the total volume allowed for the solution process; whereas natural soil water might pass through jointed limestone for miles, dissolving material before finally entering a cave.

It is felt that the solution water did not contain an unnaturally large amount of CO_2 as compared to soil water that enters and dissolves limestone. For instance,

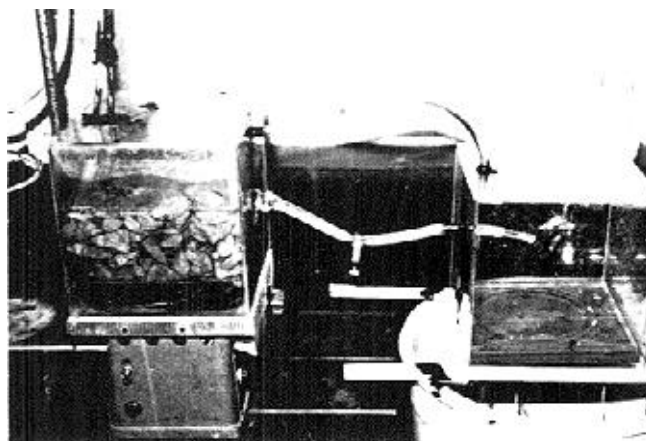


Figure 1. Two-part experimental apparatus (Figure 1 of Reference 1 was a schematic representation of this apparatus.)

Adams and Swinnerton² have claimed that air from humus-poor soil contains at least 25 times as much CO_2 as atmospheric air. Air from humus-rich soil contains 90 times, and that from recently manured soil 250 times that of atmospheric air.

It was found in India² that under monsoon conditions, CO_2 in soils rose 16-20% in cultivated, forest, or swamp soils. This suggests that CO_2 may be selectively absorbed by soils. When the air supply to soil is cut off by excessive rain the CO_2 content may rise to very high percentages. It has been noted that CO_2 content of soil rose 167% after a rain.² Adams and Swinnerton concluded that "... soil generates CO_2 in sufficient abundance to yield enriched CO_2 -water solutions of the appropriate dissolving effectiveness."³

In investigating the CO_2 content of water at three separate cave locations, Holland, et. al.⁴ found that soil water adsorbed large amount of CO_2 . At Luray Caverns water entering the cave contained so much calcium and magnesium that, if solubility data for dolomite was correct,⁵ it would require impossibly high CO_2 pressures in the soil zone. It was felt that the capacity of rain water to dissolve limestone increased by more than two orders of magnitude during passage through the soil zone.⁶

Water has been analyzed in Luray Caverns after a rainstorm had occurred the night before. The water contained one-half of the maximum amount of calcium and magnesium ever observed in a sample during the study.⁷ Bögle⁸ has stated that soil air contains 10-100 times as much CO_2 as atmospheric air. He felt that CO_2 was supplied by plant respiration and decay of humus. Free air contains 0.45mg of CO_2 per liter at 25°C

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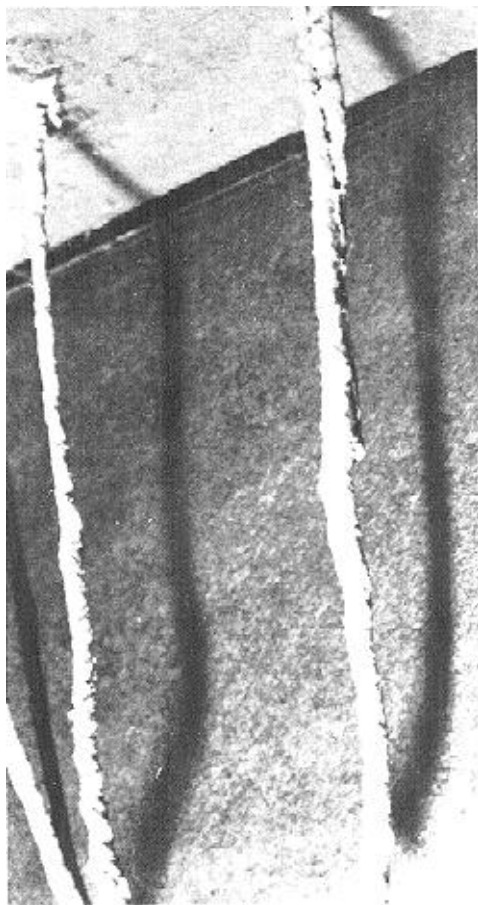


Figure 2. Strings exposed to a dripping solution for 700 hours.

whereas air near the surface of the earth has been found to contain 2.5mg CO₂ per liter at 22°C.⁹

It is clear that water percolating through soil can pick up enormous amounts of CO₂. Such water can dissolve large amounts of limestone and precipitate it later. Therefore the laboratory apparatus used in this study may not supply enough quantities of CO₂ to duplicate natural conditions. Certainly there is not an overabundance of CO₂ in the test water.

Cave Formation

Although the original purpose of this project was to determine the conditions under which stalactite and stalagmite-like structures could form rapidly in the laboratory, it became obvious that cave formation must be considered also. Therefore both cave formation and CaCO₃ precipitation will be discussed in this article and a tentative model will be proposed to include both.

Jointed Limestone and Cave Formation

As mentioned earlier, it is assumed that as water moves through jointed limestone it enters a cave and CaCO₃ precipitates from the water. Moneymaker¹⁰ observed from his studies in the Tennessee Valley that limestone formations extensively jointed were more cavernous than the less jointed limestone a few miles away. Swinnerton¹¹ claimed that the absence of joints

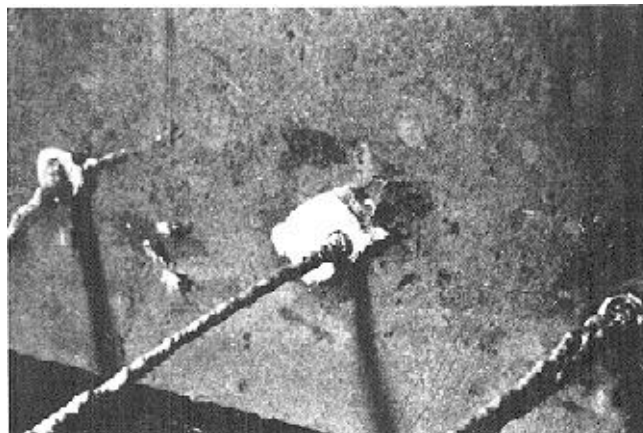


Figure 3. Precipitate on plastic box around strings.

in limestone does not allow the concentration of water flow to one particular area and accounts for the absence of caves in porous rocks.

It may be considered questionable that water-filled conduits in limestone leading to a cave would not eventually be closed because of the precipitation of CaCO₃ in the conduit itself. Bogli¹² stated that the gas phase (CO₂) is not present in the conduit; and all of the materials in solution, even if it is highly concentrated in CaCO₃ remain in internal equilibrium. So CaCO₃ does not precipitate.

Went¹³ reported that stalactite growth is only possible in a ventilated cave because the CO₂ concentration in the cave atmosphere must be lowered to get the bicarbonate-carbonate equilibrium shifted so that the carbonate will precipitate. Obviously, if this is true, there would be no chance of CaCO₃ precipitation in water-filled limestone conduits.

Precipitation of Calcium Carbonate

The use of demineralized water and CO₂ as a test solution resulted in the solution of some of the Indiana limestone and the subsequent precipitation of CaCO₃ on and above the strings in the precipitation box.¹⁴ Some of the precipitate can be seen on the strings and on the plastic box in Figure 2. A close-up of the precipitate on the plastic box is seen in Figure 3. No photographs are available of the strings that were used with the NaCl-CO₂-H₂O test solution.

Use of Acetic Acid Solution

A series of experiments was run using 1% acetic acid, CO₂, and water to simulate humic acid solutions.¹⁵ It is known that humic acid can dissolve concrete.¹⁵ Murray and Love¹⁶ claimed that organic acids formed by bacterial decomposition of humus have the same effect as carbonic acid (CO₂ + H₂O) in developing caves in limestone. They allowed dry leaves inoculated with bacteria to stand in water for several days.¹⁷ By the seventh day the solution tested acid by litmus paper and had the odor of sour milk or stale butter. A small amount was poured over powdered calcite which effervesced readily.

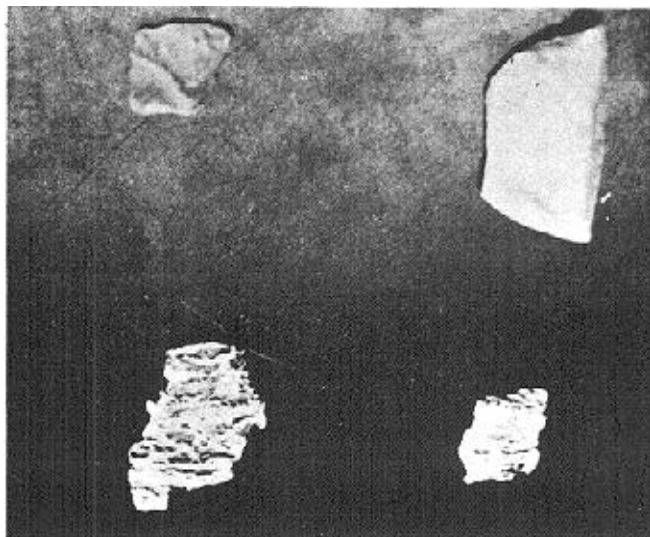


Figure 4. Pieces of mineral not tested (above) and pieces of mineral after exposure to acid solution (below).

It was hoped that once the $\text{CH}_3\text{COOH}-\text{CO}_2-\text{H}_2\text{O}$ solution dissolved limestone and was exposed to the atmosphere, CaCO_3 would precipitate from it. The dissolving power of the acid solution is absolutely amazing. One experimental apparatus had to be filled three times because all of the chunks of limestone were completely dissolved. Of the three types of material tested, Indiana limestone, dolomite from the Beekmantown formation, and dolomitic material from Pennsylvania (formation unknown), all dissolved excessively. An interesting comparison of materials exposed to the test solution is shown in Figure 4.

The acid solution appeared to channel through the material. One of the rigs used in this series of tests was equipped with strings hung from holes drilled into Indiana limestone. As the acid water solution dripped through the holes around the strings, the holes were enlarged considerably.

If the holes were partially plugged to slow down the flow of solution through them, within just a few hours they would have to be plugged again to slow the flow of water. The solution continually enlarged the holes until the completion of the test. Any acidic water going into natural limestone joints would certainly cause enlargement. If this process continued naturally the formation of large joints and eventually a cave could be imagined to occur *quite rapidly*.

However no CaCO_3 precipitate could be obtained using the acetic acid solutions. The solubility for calcium in the solution was so high that the loss of CO_2 upon exposure to air, did not result in any precipitation. At the end of each drying period (100 hour intervals), some precipitate did form on the strings. An interesting helicitic-appearing formation is shown in Figure 5. The precipitate was found to be calcium acetate as suspected.

Murray and Love¹⁸ stated that calcium acetate will break down into CaCO_3 and CH_3COOH by the action of ground water and contacting rocks. The continued action will eventually cause the acid to be decomposed into CO_2 and water. If this is true, some CaCO_3 should

have precipitated in our apparatus. Possibly the test solution was too concentrated. However, McCauley and Abdullah¹⁹ stated that CaCO_3 fails to deposit in pipes in the presence of organic inhibitors such as sewage or decayed vegetable matter. Our experimental results agree with this observation.

Clay Formation

During the tests with the CH_3COOH solutions, large amounts of insoluble colloidal material formed in all of the experimental rigs.* The insoluble material was particularly plentiful in the apparatus filled with Indiana limestone. Some of the insoluble material trapped in a flask is shown in Figure 6. A chemical analysis of the material is given in Table 1.** This is a typical clay composition.

Table 1. Insoluble Residue From Indiana Limestone*

SiO_2	45.9%	Ni	~ 100 ppm
Fe	2.9%	Pb	~ 100 ppm
Ca	2.6%	Zn	~ 100 ppm
Mg	0.4%	B	~ 20 ppm
Na	0.11%	Ag, Cr, Cu, Mn	< 10 ppm ea.
Ti	> 1000 ppm	Sn, V	trace
Al	1000 ppm		

*Spectroscopic and wet chemical methods used.

Obviously the clay was trapped in the limestone when it hardened. Large amounts are present in the samples used in this experiment. Three samples of Indiana limestone were dissolved in a solution of 50% glacial acetic acid and 50% water. The insoluble material was filtered and washed several times with demineralized water. The amount of clay in the samples is given in Table 2.

Table 2. Percentage by Weight of Clay in Indiana Limestone

Sample Weight (g)	Weight % Clay
102.63	1.2
110.81	2.3
117.29	2.1

An average of 1.9% by weight of clay is present in the stone. The effect of this material on the subsequent precipitation of CaCO_3 would be great because of the large surface area of the colloidal particles. It has been claimed²⁰ that the presence of colloidal dispersions stabilize calcium bicarbonate solutions and prevent the precipitation of CaCO_3 . Observations from this study tended to verify this; so it was decided not to use Indiana limestone in the tests again.

Large amounts of clay are present in most limestone caves. How it got there has been the subject of scientific speculation. Davis²¹ suggested that clay on cavern floors may not be due to deposition by inflowing

*Insoluble material formed in the bottom of all of the rigs no matter what type of test solution was used.

**All chemical analyses were done by Dr. Lee Kent of Commonwealth Laboratories of Greenville, S. C. His help is gratefully acknowledged.

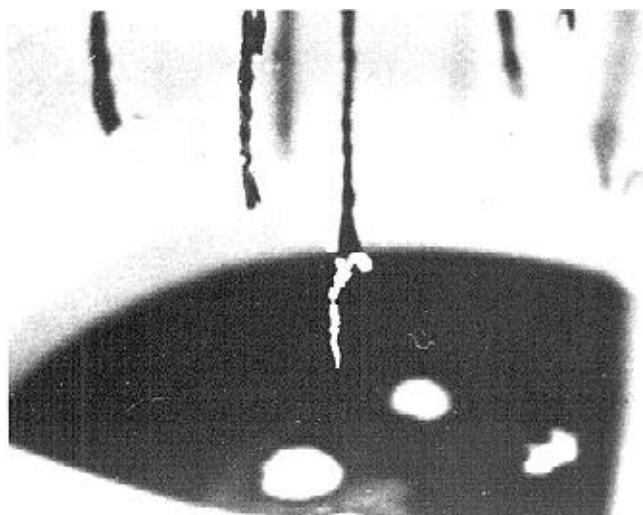


Figure 5. Calcium acetate precipitate on the end of a string.

streams but are of local origin and were possibly deposited when the cavern was water-filled. Bretz,²² after investigating many caves, postulated a separate epoch of clay filling between the formation of the cave and before the formation of dripstone. Hack and Durloo²³ found stratified deposits of mud in Luray Caverns and such stratification is not uncommon in limestone caves.

It seems possible according to this experiment, for the clay to come from the limestone that is being dissolved rapidly by corrosive solutions forming a cave. However, Bretz considered it impossible to completely account for clay fills from the insoluble material in limestone.²⁴

There was not as much insoluble material from Beekmantown dolomite as from the Indiana limestone, but rapid attack by the acid solution produced large amounts of dark insoluble material. Chemical analysis of the insoluble material from Beekmantown dolomite is given in Table 3.

Table 3. Insoluble Residue From Beekmantown Dolomite*

SiO ₂	67.4%	Zn	0.62 %
Ca	7.05 %	Cu	.0098%
Fe	5-10%	Pb	<.0035%
Ti	< 5%	Mn	< 0.2%
Al	3.4%	Cr	< 0.1%
Na	0.52%	K	< 0.07%

*Scanning electron microscope and wet chemical methods used.

Simpler Laboratory Apparatus

Starting with tests employing CH₃COOH-CO₂-H₂O solutions a simple apparatus was used. A typical rig is shown in Figure 7. The solution and precipitation box have been combined as one. CO₂ and test solution were fed into the apparatus as before. However, the solution dripped directly onto the strings through holes in the bottom of the box. All tests reported in subsequent sec-

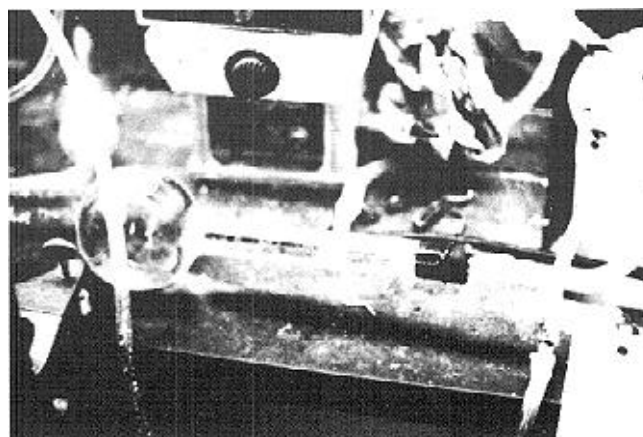


Figure 6. Insoluble material from Indiana limestone.

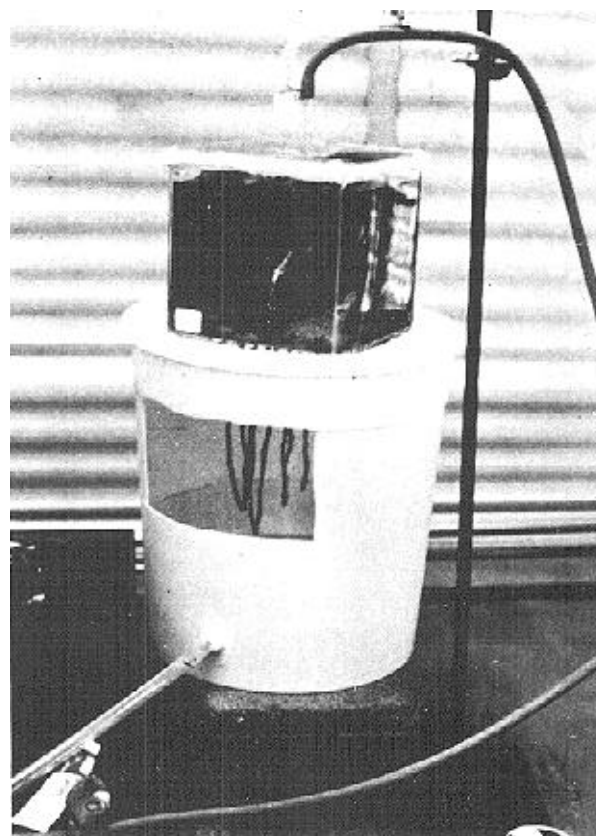


Figure 7. Simpler test apparatus.

tions of this article were obtained from an apparatus similar to this one. No stirring was used in the plastic box and no fan was used to blow air across the strings.

Temperature Difference as a Mechanism for Precipitation

A series of tests was run using a heat lamp directed toward the area around the strings underneath the plastic box. the experimental arrangement is shown in Figure 8. A top view of the apparatus is shown in Figure 9.

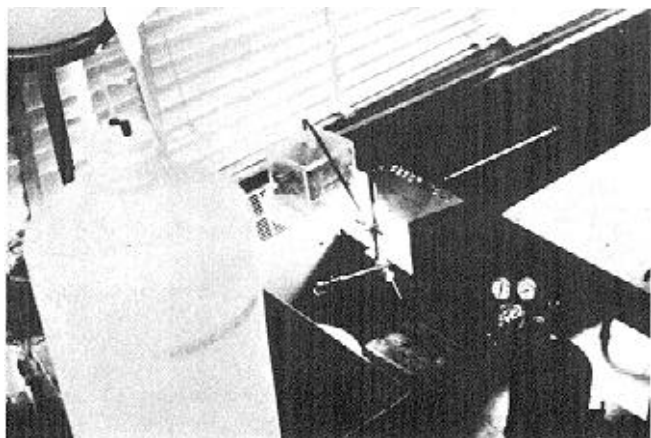


Figure 8. Experimental apparatus with heat lamp.

The precipitation reaction of CaCO_3 from bicarbonate solutions is endothermic.²⁵ Thus, heating the solution increased CaCO_3 precipitation as CO_2 was driven out of the solution. Such a natural mechanism is possible where cold solution waters enter the warmer atmospheres of the cave or in an area where there is unusual geothermal activity. The latter possibility was suggested by R. H. Brown.²⁶ also, it may have been possible that, if a cave formed as the Flood waters receded from the earth, considerable plant and animal remains could have been washed into it. Decomposition of the remains could have generated considerable heat in the cave, and this could have aided in stalactite growth.

The experiment was very successful. Massive amounts of white calcite were deposited on the strings (See Figure 10). Many of the strings had growth layers of calcite on them, similar to what is found in natural stalactites.²⁷

Demineralized water entered the plastic box from a reservoir at a temperature of 25°C . The water and limestone in the box remained at 45°C . The temperature around the area of the strings was 50°C . Thus droplets falling down the strings went through no more than a 5°C temperature gradient. Actually the drops moved so rapidly that it is unlikely that an individual droplet even attained a temperature of 50°C . The flow of water to the apparatus was shut off every 100 hours as a drying cycle in the first run. The flow of water was not shut off during the second run. Test results are recorded in Table 4.

It may be thought at first that the heat would cause a great deal of precipitation by evaporation of the solution. However, it is felt that actually very little evaporation took place. The limestone chunks were weighed before and after testing. It was found that the rocks lost 32.8g of weight in run 1, and 30.8g in run 2, for a deposition efficiency on the strings of 19.6 and 26.7% respectively. Also during run 2 a limestone slab was placed under the strings for a period of 13 days. This slab increase in weight 3.4g due to the formation of flowstone on it from the solution dripping from the strings.

Evaporation is considered responsible for the formation of "moonmilk" in caves.²⁸ Evaporation as a

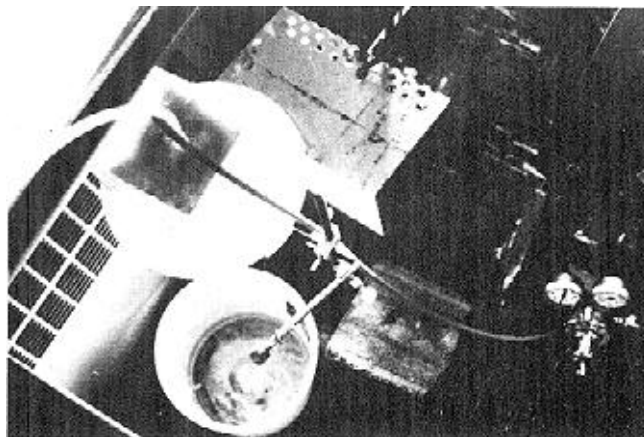


Figure 9. Top view of experimental apparatus.

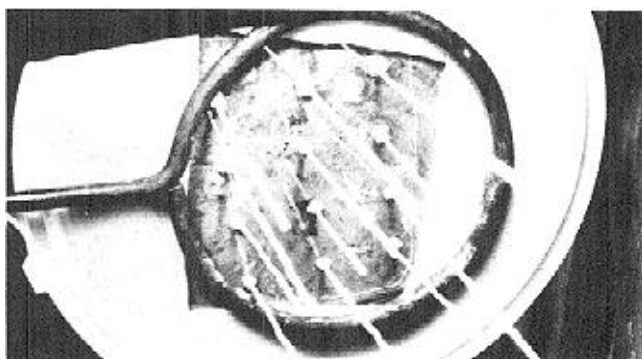


Figure 10. Calcite precipitate on strings.

Table 4. The Deposition of Calcite Under a Temperature Gradient From Solution Intended to Simulate Ground Water

String	Run 1	String	Run 2
	Weight of Deposited CaCO_3 (g)		Weight of Deposited CaCO_3 (g)
1	0.3494	1	0.5429
2	0.2651	2	0.3734
3	0.6017	3	0.9779
4	0.4835	4	0.7133
5	0.6225	5	0.7930
6	0.3453	6	0.4037
7	0.5520	7	0.9050
8	0.6638	8	1.3107
9	0.4132	9	0.5722
10	0.8443	10	0.8216
11	0.3282	11	0.6622
12	0.9723	12	1.3529
Total	6.4413	Total	9.4288

Run 1 - 450 hours of water flow, 65 liters of water passed through apparatus

Run 2 - 600 hours of water flow, 63 liters of water passed through apparatus

mechanism for the growth of stalactites can be checked experimentally. If the corrosive solution comes through dolomitic material both magnesium and calcium carbonates are taken into solution. As the solution enters the cave only the CaCO_3 precipitates out* and subsequently the magnesium content of the solution rises. Evaporation would cause the precipitation of both magnesium and calcium. Therefore the magnesium content of the water dripping from the strings is a good indicator of evaporation as a mechanism of formation.³¹ A chemical analysis of the water will be performed in later experiments.

Experiment Using Cold Water

To investigate further the idea of temperature gradient as a mechanism of CaCO_3 precipitation, it was decided to conduct an experiment using a cold water and CO_2 solution to dissolve the limestone. The cold water dissolved more CO_2 which in turn increased the solubility of limestone in the water.³² Rain water at 0°C dissolved twice as much CaCO_3 as rain water at 25°C .³³ Also melt water from snows³⁴ and glaciers moving into limestone and hence into a warmer cave would satisfy the experimental conditions.

The string length was increased to 18 inches in this experiment to increase surface area over which the drops flowed. Initially the water in the plastic box was at a temperature of 8°C while the area around the strings was at 25°C . However, as the experiment proceeded, a deposit formed on the strings and clay settled in the bottom of the plastic box. These conditions restricted the flow of water down the strings causing the water temperature to rise slowly until it corresponded to room temperature. Although CaCO_3 was deposited on the strings the effect of the experiment was nullified. The results are given in Table 5.

Tentative Model for Formation of Dripstone

A. Scope of Model. This discussion will include the formation of limestone, caves in the limestone, and the precipitation of CaCO_3 . The entire discussion will center around the assumed conditions of the Flood and the aftereffects.

B. Deposition of Limestone. It is assumed that the majority of limestone layers were deposited during the Flood. The authors liken the deposition of limestone to the setting of Portland cement. Both are based on the chemistry of calcium. One can imagine dead organisms particularly those with shells, and various forms of debris such as stones, as an aggregate upon which calcium compounds precipitated. In other cases a cementing-precipitation reaction out of water could possibly have occurred. Deposition of limestone may be a chemical rather than a geological problem.³⁵ Johnson and Williamson claimed that precipitation of calcium carbonate can occur when a current of water saturated with calcite is warmed.³⁶

Also the decomposition of organic materials during the Flood could have generated conditions favorable for the precipitation of CaCO_3 . Weeks³⁷ cited evidence to show that decomposition of nitrogen-bearing substan-

Table 5. The Deposition of CaCO_3 from a Solution Intended to Simulate Melt Water* (500 hours of water flow, 141 liters of water passed through apparatus)

String	Weight of Deposited CaCO_3 (g)
1	0.8827
2	0.7817
3	2.1181
4	0.2891
5	0.6776
6	0.5593
7	1.2784
8	0.4953
9	0.3654
10	0.7313
11	0.3274
12	1.3944
Total Deposition	9.9007

*Water actually varied from 8 – 25°C .

ces, such as proteins, by releasing ammonia or amines, increased the pH of the water. This would favor deposition of CaCO_3 .

Creationists need to do research on the formation of sedimentary materials from a chemical standpoint. The uniformitarian concept involving millions of years of deposition has stultified any research efforts in this direction. It would seem that an inexpensive project could easily prove fruitful.

C. Cave Formation. As the Flood waters began to recede off the earth, it is postulated that they would contain humic acid and CO_2 from the decomposition of living organisms. The solution would attack recently-consolidated jointed limestone causing cave formation in many areas. Immediately after the formation of limestone, water could seep through the joints enlarging conduits and forming larger passages. Davis³⁸ discussed the formation of certain caves under phreatic conditions. Many of the caves found in the Tennessee Valley were found under the water table.^{39, 40}

As receding Flood water went through an ever-increasing opening in limestone the velocity of the water would have had an effect.⁴¹ Considering a depth of water of only 1000 ft. above the cave and using Torricelli's theorem, $v = \sqrt{2gh}$, where v = velocity of fluid falling from a height (h) with g taken as 32 ft/sec^2 , the velocity of water would be 80 ft/sec . Rapid erosion as well as corrosion could occur. It would seem that recently-consolidated limestone would not be as stable as it is today and the effects of moving water would have been much more damaging.

Swinnerton⁴² considered the adequacy of water-table drainage as an adequate explanation for the formation of caverns. He cited evidence⁴³ that indicated rain-water tends to collect and flow through a selected drainage in limestone. If 15% of 40 inches of rain per year were available for limestone solution, then

$$5280 \text{ ft/mile} \times 5280 \text{ ft/mile} \times \frac{40 \text{ in. of rain} \times .15}{12 \text{ in/ft}}$$

*There is evidence of dolomite speleothems in caves however.^{29, 30}

≈ 13,939,000 cubic feet of water/square mile is available to dissolve limestone. This means that in one year a cave of 3 ft. × 6 ft. cross section × 120 ft. long would be formed per square mile of surface.⁴³ Imagine the water available during and after the Flood available for limestone solution and cave formation! During this period it is felt that much clay filling of caves would have occurred.

D. Deposition of CaCO₃. Once the water-table falls below the level of the cave, deposition of stalactites and stalagmites could proceed. Again how rapidly structures like these grow in a cave depended primarily on the amount of water seeping through the jointed limestone into the cave.

Consider all of the results obtained so far, as tabulated in Table 6. These indicate a very rapid deposition of CaCO₃ if there were a continual supply of water dripping into the cave. Incidentally, some filling in with clay may have continued during this stage.

It is felt that the deposition of limestone, cave formation and subsequent precipitation of dripstone occurred rapidly in recent time. There is evidence to support such a claim.

In radiocarbon dating of calcite deposits in a cave⁴⁴ it was found that the material had an excessively high radiocarbon content. Considering the standard interpretation, CO₂ from decaying soil vegetation rich in radiocarbon combines with H₂O and CaCO₃ from limestone (supposedly free of radiocarbon) to produce bicarbonate ions.

If this material precipitated in a cave it would be expected that the radiocarbon content of a stalactite would be 50% of that of the decaying vegetation.⁴⁵ The stalactites tested contained about 90% of the radiocarbon content of modern vegetation! One possible interpretation is that the limestone is not very old, and it still has radiocarbon in it. This whole area could be very profitable for creationist research.

Conclusions

It appears that under certain conditions, CaCO₃ can be precipitated easily in the laboratory. More work needs to be done to investigate the variables involved. Various speculative aspects of the creationist model offered here need to be explored.

Appendix I

One kind of evidence offered for the quick growth of stalactites is that they are found under and around concrete structures. Moore⁴⁶ claimed that such measurements are not valid since the Ca(OH)₂ in cements is more soluble in water than CaCO₃ and will dissolve more readily in rain water. This brings up another interesting aspect that should be investigated by creationists. Would calcium-rich cements precipitated from the Flood waters contain Ca(OH)₂ which later combines with CO₂ to form CaCO₃ as it ages, just as Portland cement does?

If the sedimentary layers contained any of the more soluble Ca(OH)₂ in certain areas one could imagine an even faster rate of cave formation and subsequent dripstone formation.

Table 6. Experimental Results of Deposition Rates of CaCO₃ Under Various Conditions

Test Conditions	Total Weight of CaCO ₃ deposited on strings (g)	Time of Test (hrs)	Amount of Water (l)	Rate of Deposition (grams of CaCO ₃ per year per liter of water)
Demineralized Water + CO ₂ at 25 °C	1.7962	700	?	?
5% NaCl solution + CO ₂ at 25 °C	4.4554	500	209	0.373
1% CH ₃ COOH solution + CO ₂ at 25 °C	none	—	—	—
Demineralized Water + CO ₂ at 45 °C — strings at 50 °C	6.4413	450	65	1.929
Demineralized Water + CO ₂ at 45 °C — strings at 50 °C	9.4288	600	63	2.185
Demineralized Water + CO ₂ at 8-25 °C — strings at 25 °C	9.9007	500	141	1.230

Acknowledgements

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GOD DOES NOT DECEIVE MEN

LEWIS H. WORRAD, JR.*

Those who hold the doctrines of uniformitarianism and evolution usually do so because of such things as the fossil record, or other supposed evidence for a very old earth. Those, moreover, who want to combine evangelical Christianity and uniformitarianism may argue that if the earth is not very old, God would be deceitful in making it appear so. It is maintained here, however, the God does not deceive men; it is much more likely that they deceive themselves. Moreover, the essence of deceitfulness lies in the intent. God, in creating the world as it is, did not make it thus for the purpose of deceiving men, but for very good reasons, which, of course, may or may not be apparent to men at the present.

Introduction

One of the questions that continually comes to the forefront in discussions among evangelicals about science and scientific findings is the question of the age of the earth. Members of the evangelical community are the most concerned with this question and similar types of questions because evangelicals are most concerned with the accuracy of the Biblical accounts. Accuracy at this point means literal rather than mythological accuracy.

Thus, given the Genesis account, an elementary knowledge of mathematics, and a little guessing about the age of Terah at the time of Abraham's birth, one may well arrive at the conclusion that the age of the earth is not a very advanced age when compared with the age that many scientists declare. Herein lies the crux of the evangelical's dilemma: Biblical data and geologic data are in apparent conflict. But if the Bible

is true and God is author of both the Word and the world, then this apparent conflict must be resolved.

There have been many attempts to reconcile this rift between geologic and biblical data: the so-called gap theory, flood geology, day age concepts are but a few of the attempted reconciliations made by persons of conservative theological persuasion. More radical approaches have attempted reconciliation by such hermeneutical devices as mythological interpretations.

The latter approach, it would appear, is more of a radical bifurcation between spiritual and empirical statements than it is a reconciliation. The purpose of this study, however, is not hermeneutical nor is it the purpose of this paper to discuss relative merits or limitations of such interpretations.

It can be generalized however that the approaches listed above either become too biblical to suit the scientist or too naturalistic to suit the biblicist. Thus, there is room for an approach that is more satisfactory to both sides. This is not a search for a compromise position, but rather for a more satisfactory position because it is a more accurate position.

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Search for A "Holy Alliance"

One methodology that is presented to the evangelical community as being a more satisfactory, sensible, and accurate position is based on the doctrine of uniformitarianism. The goal of the uniformitarian is to settle the apparent conflict between theological data and geologic data. It is worth noting that the approach of the uniformitarian evangelical is an academically sophisticated settlement of the conflict by combining certain principles of theology and science to arrive at what would hopefully be a "holy alliance".

It is the contention of those who hold to uniformitarianism that the geophysicochemico data have chronometers written into them. There are certain causal relationships that have been observed by the scientist, in time. This being the case, if the causal sequence has a constant temporal sequence then the causal sequence or chain may be used as a measure of time.

By taking these causal, now temporal chains, and looking back upon the geologic data, one ought to be able to make accurate statements about the elapsed time in or the necessary time for that geologic data. This it should be noted is the commitment of the uniformitarian position. It accepts that principle of uniformitarianism in nature: as it happens now, so it happened before. The inductive principles of science are taken to be as relevant to past events, even prehistoric events as they are to present events.

As was mentioned earlier, the uniformitarian position as assumed by some evangelicals, being basically an attempt at reconciliation, has not only a commitment to science but to theology as well. The theological principle that the uniformitarian most wants to utilize is a central aspect of God's nature: the inability of God to deceive.

In answer to the question, "Is it necessary for there to be as much time as the geologic data appear to indicate?", the uniformitarian evangelical responds by saying, "If there is not as much time as the geologic data seem to indicate then God is deceiving us." To put it another way, if God created the world in a short period of time while the physical data can be interpreted to support the necessity of a long period of time, then God is deceiving us into believing that there was time when in fact there was no time.

The reader should be aware of the fact that this paper in no way will make an attempt to establish the age of the earth. The main concern of this paper is the examination of both the theological and philosophical premises of uniformitarianism for they may or may not be correct. Furthermore, if those principles are correct, or at least are treated as if they were correct, they may be more potent than the uniformitarian evangelical can either allow or accept.

Two Principles Are Basic

As has been declared to this point, the uniformitarian evangelical position rests on two principles: 1) The causal/temporal principle and 2) The theological principle of God's inability to deceive. It is contended here that the causal principle in the Uniformitarian's argument actually gains support from the theological prin-

ciple. The fact that God cannot deceive is the guarantee that the causal/temporal record must be accurate.

This being the case, it is necessary to examine the theological principle first and then attention can be given to the causal principle, and then only if it is necessary. It will also be noted that no criticism of the uniformitarian's conception of time will be made. However, there certainly are significant questions that can be raised about the relationship of time and deception within the character of God.

The uniformitarian evangelical position, as has been shown, holds that if God created in a short period of time what the geologic data seem to indicate took a long period of time, then God is a deceiver. Furthermore, if God deceives then there is a manifest moral blemish in the character of God. Traditional evangelical theologians following in the steps of Anselm and Descartes have held to the doctrine of the absolute perfection of God.

Furthermore, deception and perfection are incompatible attributes. Thus, if God is not perfect, He cannot be God. Since deception is an imperfection, if God deceives then He cannot be God. To this point there is no argument with the uniformitarian evangelical's theology. Certainly there is both credence and value in asserting that God cannot be perfect and deceive at the same time.

However, to assert that God cannot deceive therefore the earth is as old as geologic data appear to indicate does not follow. The reasoning is simple.

Elements of Reasoned Position

Deception refers to motives, not actions. For an act to be a deceptive act, it must be an act that is done with the intent of making a person believe that something is the case when in fact it is not the case. Thus, to say that God is a deceiver because geologic data seem to indicate more time than in fact there was would necessitate the accuser's knowing the motives of God at the time of creation. God would be a deceiver if and only if He meant human beings to believe that there was more time than there actually was, and that for the sake of deception.†

Apart from the fact that, philosophically speaking, it is difficult to reason from an act to the motivation for that act; given that difficulty, one might still be tempted to call God a deceiver if there were no other reasonable method of explaining why there appeared to be time when in fact there was no time.

But, that most certainly is not the case. It might well be the fact that God so designed the world with events and sequences that never happened, though totally consistent with the presently occurring regularities, for revelatory purposes; to understand more clearly how the world functions and will continue to function.

†A simple illustration might be helpful here. In former times many believed that the earth was flat. (I am not saying, nor do I believe, that the earth is flat according to scripture.) Such was one's natural first impression. Was God deceitful, then, in making a spherical earth which would appear flat at a casual look? Of course not. For the flat appearance arose from the relative sizes of men and of the earth, and from the laws of optics. And these things are necessarily as they are, or at least it is desirable, for reasons far more important than those connected with mere appearances. —Editor

It might simply be the case that God created in such a fashion to demonstrate His tremendously complex and awe inspiring designing capabilities lending credence to the teleological argument for God's existence. The point here however is not to explain why God did create within less time than geologic data supposedly indicates.

In fact, that is not even being asserted. What is being stated is this: One can believe that God is truthful without necessarily believing that the current interpretation of geological data is true. The nature of God is no guarantor of the causal/temporal assertions of the uniformitarian evangelical.

But, the argument is not yet finished. Suppose that the previous discussion of deceit and God's nature is incorrect. Suppose for a moment that the uniformitarian evangelical position is true. Suppose that God, in the most strict sense of the word, cannot deceive. What would be the consequences of such a position?

It will become obvious that such a position though apparently pure in science and hopefully pure in theology should be of necessity totally unacceptable to any evangelical including the uniformitarian evangelical. The fact is that given the uniformitarian evangelical presuppositions about the nature of God and the temporal aspect of causality, God would never have been able to create.

1. If God alone existed, then if God created, He created something from nothing.

2. If God created something from nothing, He created it in some stage of completion, for to be is to be in some state.

3. If God created something in some stage of completion, there is from the inductive *ex post facto* perspective an implication of prior time in the created object to bring it to that stage of completion.

But,

1. since there was no time in which those causal factors could have worked, and

2. since God cannot deceive it becomes obvious that God could not create for any creation will imply that

time existed when in fact it did not exist, or that causal sequences were taking place when in fact they were not taking place.

The scientist looking back on the geologic data via the mechanism of his causal/temporal sequences will never be able to find a beginning, for whatever object he observes will always imply a preceding causal factor. Therefore, the uniformitarian evangelical can never in a meaningful manner speak of creation.

Thus, as hinted earlier, if one accepts the uniformitarian position as true, as a Christian one arrives at a conclusion that is not at all Biblical. In fact the best condition one may maintain is the eternal coexistence of matter and spirit, a position which has been labeled as heresy from the beginnings of church history.

Conclusion

In conclusion, one might note that since the basic premise of uniformitarianism does not work, the uniformitarian evangelical can say little about the age of the earth. It may make sense to some to believe in an advanced age for the earth, but not on the basis of uniformitarian principles.

It must be noted here too that no criticism of the inductive principle and no criticism of the concept of the constancy of time were made in this analysis. Both of these issues and many others as well, certainly could have been explored and possibly, if not probably, would have even further enhanced the case of this article. But those analyses were not necessary and therefore as indicated earlier were not pursued.

What in fact then promised to be a "holy alliance", uniformitarianism and God's creative acts, ends up being an illegitimate relationship. Uniformitarianism is not the academician's delight. It is not the evangelical's panacea. It is simply: an *ad hoc* "hypothesis" supported by unclarified theological assumptions. As such it is a failure in an attempt to reconcile biblical and geologic data.

New Printing of Greek Received Text

Persons who read Greek may be interested to know about a new printing of the Greek Received Text of the New Testament. This text, which is that in the majority of manuscripts, was used for the translations made at the time of the Reformation.

Many later translations, however, were much influenced by a few manuscripts, considered to be very old, which had been found in the meantime. Many students, however, while admitting that those manuscripts are old, maintain that they are corrupt, having been made when heresies, such as Arianism,

were rife. So they believe that the Received Text is better.

This new printing is being distributed by the Trinitarian Bible Society. The price is about \$5.00 for ordinary binding; a leather-bound Testament is also available. The printing, it may be said, is excellent; and the Greek type is about as clear as any ever seen.

Addresses of the Society are: in Britain: 217 Kingston Road, London; in Canada: 26 Gracey Boulevard, Weston, Ontario; and in the United States: 2046 Dean Lake Road, N.E., Grand Rapids, Michigan 49505.

— The Editor

COULD THE FLOOD WATERS HAVE COME FROM A CANOPY OR EXTRATERRESTRIAL SOURCE?†

ROBERT E. KOFAHL*

Various tentative models for an atmospheric canopy of water in vapor or other form, as well as proposed extraterrestrial sources of water or ice, have had four purposes in the overall creation-flood model of origins. These have been explanation of a pre-flood semitropical climate, provision of substantial waters for the flood, explanation of glacial action and catastrophic freezing after the flood, and possible reduction in the pre-flood rate of carbon-14 production. The usual aim has been to provide explanations which involve only natural forces without divine miraculous intervention. Critical analysis of these models shows that the provision of a substantial part of flood waters or of ice either from a canopy or from extraterrestrial sources is impossible apart from special divine miraculous intervention. All of the models fail to meet the requirements of the laws of physics and/or physiology. Preliminary guidelines for the quantitative modeling of a limited water vapor canopy are offered.

Introduction

Creationists often deplore, and rightly so, the adventurous speculations often practiced by evolutionists. Classic examples of such speculation are to be found in *The Origin of Species* in which Darwin, to use W. R. Thompson's words, "engendered those fragile towers of hypothesis based on hypothesis, where fact and fiction intermingle in an inextricable confusion."¹ Thompson went on to suggest that "these constructions correspond to a natural appetite" common to man, and in particular to evolutionists.

But does it not appear that creationists have often evidenced a tendency toward excessive speculation? Creationist literature is replete with speculations, far-out theories, and rather extreme models. A common characteristic of many of these speculations of creationists is the effort to explain some aspect of creation or deluge history in naturalistic terms which involve no direct divine intervention. Creationists have been at times almost as ingenious as evolutionists in devising explanations which exclude divine miracle, as much as possible, from prehistory.

An important area of creationists' speculative concern has been that of atmospheric canopy models and extraterrestrial sources of flood waters. A brief catalogue, probably incomplete, of speculations relative to an atmospheric canopy or an extraterrestrial source of water or ice at the time of the flood includes the following:

1. A water vapor canopy which possibly provided a substantial portion of the flood waters.²
 2. A rigid, spherical ice shell around the earth, supported due to structural strength, which finally collapsed to produce flood and glaciation, or a spinning ice shell supported by centrifugal force, which collapsed to produce flood and glaciation.³
 3. Water or ice in orbit around the earth which descended to produce flood and glaciation.⁴
 4. Water vapor or ice from deep space which collided with the earth to produce flood and glaciation.⁵
- All of these ideas have been offered in the past as *scientific* models which supposedly could explain the source of flood waters, pre-flood climate, or post-flood

deep-freezing and glaciation effects *by natural rather than supernatural causes*. However, all of them suffer from conflicts with established physical law or physiological limitations. They are all impossible without special divine intervention to overrule the laws of physics, and some of them, even with miraculous intervention, would require such drastic reconstruction of the earth environment as to make them seem most untenable as models for the pre-flood earth. It is proposed to examine these ideas with respect to the most obvious flaws, some of which have no doubt been recognized by other students of the subject.

Critical Examination of Canopy and Other Models

1. A water vapor canopy containing a substantial part of the flood waters

For purposes of discussion let it be assumed that the vapor canopy contained on the order of 1000 feet of liquid water equivalent. If clouds were present they could only account for a small fraction of the total water, for clouds containing large amounts of water (i.e., a few inches) can only continue suspended in the atmosphere through the effect of violent thermal convection currents. Therefore, the model is that of an earth surrounded by an envelope of clear water vapor which when condensed would produce a layer of liquid water 1000 feet deep to account for an appreciable portion of the waters of the flood of Noah. A number of serious problems arise in such a canopy model.

a. The problem of light transmission

Studies made in the clear, pure waters of Crater Lake in Oregon indicate that at a depth of 1000 feet the downwelling irradiance is only about 0.2 percent of that in the surface layers of the lake water.⁶ Of course in liquids, absorption is the main effect which reduces light penetration, whereas in gases scattering is the major effect except in the wavelength ranges of absorption bands of the particular gas.

Theoretical calculations of scattering of sunlight in the atmosphere by water vapor show that with only one centimeter liquid water equivalent in the atmosphere, the attenuation due to scattering by water vapor is two to four percent in the visible range.⁷ But in this hypothetical model the atmosphere would contain 30,000 times this amount of water vapor. Thus it is doubtful that more than a few percent of the sun's light could

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reach the surface of the earth. And it is certain that no stars would be visible, although Genesis 1:16 implies that stars were visible.

b. The problem of increased atmospheric pressure

Very serious difficulties would also result from the increased air pressure produced by the load of water in the upper atmosphere. This additional pressure would be equivalent to that 1000 feet beneath the surface of a body of water, about 29.5 atmospheres or 450 lbs/inch². It has been thought by some that since scientists have lived under high pressures in undersea laboratories, it is conceivable that such conditions existed on the earth prior to the flood. But there are at least two seemingly unsolvable problems associated with this idea.

1) First, at depths greater than 150 feet the nitrogen in air begins to have a narcotic effect upon divers.⁸ This makes it impossible to use air at great depths. The practice is to replace the nitrogen with helium. Therefore, to make the idea work in the pre-flood world the earth's atmosphere would have to have all of the nitrogen replaced by helium. This is a gross absurdity, especially since the plant world needs the atmospheric nitrogen.

2) The higher pressures required at greater depths make the oxygen in air toxic, even deadly, because living tissues cannot stand the effects of oxygen at partial pressures greater than 0.65 atmospheres.⁹ Therefore, at great depths the oxygen content of the gas sent to the diver is much reduced, even to as low as one percent at a depth of 1000 feet. So a canopy model would require that the oxygen content of the atmosphere be reduced to this very low level.

c. Further difficulties

In addition, rudimentary consideration of such a model for the pre-flood atmosphere soon reveals other embarrassing difficulties. First, the additional pressure of 29.5 atmospheres would compress an atmosphere like the present into a layer only about 1000 feet thick. Above this there supposedly would be the canopy of water vapor equivalent to 1000 feet of liquid water. The pressure at the lower part of this canopy, 29.5 atmospheres, would require a temperature no less than 234 °C or 453 °F to prevent the water vapor from condensing into liquid form.¹⁰

Under such conditions the world would be a treacherous place in which to live. Mountain climbing would be a dangerous sport, and birds dare not fly high. And just a slight "cold snap" in the canopy might precipitate rain at a temperature of over 400 °F!

It seems obvious that any model of the pre-flood atmosphere requiring such modifications of the earth's air supply is unacceptable. A vapor canopy may well have existed in the antediluvian world, but its total water content could only supply a very minor part of the flood waters, on the assumption, of course, that the canopy was sustained by natural forces rather than supernatural.

To this author's knowledge there is no way that any gas can be added to the earth's atmosphere without increasing the surface pressure correspondingly. There is no force known to physics which could suspend a large

amount of water vapor in the outer atmosphere without increasing the surface pressure proportionately to the total mass of the water vapor. With an assumed canopy water vapor temperature of 453 °F, then 99 percent of the water vapor would be within 68 miles of the earth's surface, and half would be within 10.3 miles.¹¹

It has apparently been assumed by some that if the water vapor were raised to a very high temperature, this would somehow help to keep the water vapor suspended without increasing surface atmospheric pressure. Such is not the case. The effect of raising the temperature is to expand the vapor envelope against the attracting force of gravity, but the resulting decrease in surface pressure would be minor.

For example, if the temperature of the vapor canopy were raised to 2000 °K (3140 °F), half of the water vapor would be within 40.5 miles and 99 percent within 270 miles of the earth's surface. This is calculated neglecting the fact that the earth's gravitational field diverges, so that the equipotential surfaces are spherical rather than planar.

However, in this atmospheric model three-quarters of the mass is within about 80 miles of the earth's surface, which is only about two percent of the radius of the earth. Since the force of gravity varies inversely as the square of the distance from the earth's center, the decrease in gravity corresponding to an altitude of 80 miles would only be about twice two percent, or four percent. Consequently, the alteration of a canopy model due to the divergence of the actual gravitational field of the earth would be an expansion of not more than about four percent.

Thus these conclusions are not substantially affected by the simplifying assumption of a uniform gravitational field. A model for the water vapor canopy which features a very high temperature does not solve the problem of excessive surface pressures resulting from a large amount of water vapor in the canopy.

Another idea that some have entertained is that water in an ionized form could possibly account for large amounts of water in the canopy without a large resulting surface pressure. However, for this to work, all of the suspended water molecules would have to be ionized. But the mutual repulsion of ions in a space charge so huge (2.5×10^{36} statcoulombs) would blast the ionized water completely out of the galaxy and explode the galaxy in the process.¹² The ionized water scheme is entirely untenable.

It can be concluded from all of the above considerations that a pre-flood water vapor canopy model which postulates a water content sufficient to account for an appreciable part of the flood waters is unacceptable, unless special divine intervention is postulated to maintain the canopy prior to the flood and to deliver it to the earth as water at the appointed time.

2. A rigid, spherical ice shell around the earth, supported either by structural strength or by centrifugal force, which finally collapsed to produce flood and glaciation

It has been supposed by some that such a shell could be supported due to structural strength. However, calculation of the compressional force upon such a shell shows this model to be impossible also.

If M is the mass of the earth; G , the universal gravitational constant; ρ , the density of ice; and r , the radius of the shell, then the crushing pressure on the ice in the shell is $P = MG\rho/2r$. Taking the radius of the shell to be 4160 miles (i.e., 200 miles above the earth's surface), then $P = 3.9 \times 10^6 \text{ lbs/inch}^2$. But the crushing strength of granite, surely stronger than ice, is only 34,000 lbs/inch². The ice shell would crumble instantly. It could never exist supported by structural strength. And, of course, the problem of light absorption would be about the same as or greater than that for water considered above.

Others have supposed that a spinning ice shell could be suspended by centrifugal force against the force of gravity. However, only a rudimentary knowledge of physics is required to see that the centrifugal force is directed radially outward, perpendicular to the axis of rotation of the shell. Thus there would be a force to suspend the ice shell only around the equator, and the rest of the ice shell would immediately collapse. Also, the crushing stress at the equator would be the same as for the stationary shell.

Another problem vitiates the idea of a spinning shell, for such a shell would carry a vast amount of kinetic energy. The average amount of this kinetic energy per gram of the ice shell is given by the formula $KE = MG/3r$, if the spin rate is just sufficient to make the centrifugal force equal to the opposed force of gravity at the shell's equator. Given the same shell as that hypothesized above, according to this formula one could predict a kinetic energy of $KE = 4740 \text{ calories/gram}$. But to convert a gram of ice at 0 °K (i.e., 273 °C below zero) into steam at 100 °C requires only about 860 calories. Therefore, if such a spinning ice shell were to collapse onto the earth, it would produce neither a flood nor any freezing effect. Containing over five times the energy needed to vaporize the ice, it would instead scourge the earth with a scalding hot, superheated steam bath.

3. *Water or ice in any kind of orbit*

The results of delivery to the earth from orbit would be the same as for the spinning ice shell considered above—a scalding hot, superheated steam bath, not a flood or freezing.

4. *Water vapor, water, or ice from deep space*

The escape velocity from the earth's surface, given by the formula $V = \sqrt{2MG/r}$, is about 6.95 miles/sec, when r is the radius of the earth. Any object falling from deep space will attain at least this velocity by the time it strikes the earth's surface. The corresponding kinetic energy is $6.25 \times 10^{11} \text{ ergs/gram}$ or 14,900 calories/gram. This is about 17.5 times the amount of heat required to convert ice at absolute zero to steam at 100 °C. Again, a steam bath would result instead of a flood, or a deep freeze effect, or glacial ice caps.

One widely discussed model has a "visitor" to earth's vicinity from deep space which brings with it an icy satellite. Supposedly the icy satellite collides with the earth to produce flood, deep freeze, and glaciation effects. Consider the following model, which is something like Patten's in Reference 5.

Assume that the mass of the visitor is one-tenth that of the earth, that its apogee distance is 10,000 miles, that its orbit about the earth is parabolic, and that the satellite orbits the visitor at a distance of 10,000 miles. Then the following data on the orbits are obtained: apogee velocity of the visitor relative to earth is $7.0 \times 10^5 \text{ cm/sec}$; velocity of the satellite in its orbit relative to the visitor is $1.6 \times 10^5 \text{ cm/sec}$.

Without making a computer study of a three-body problem, which is beyond the current abilities of this author, it does appear that the satellite could not possibly arrive at the surface of the earth with a relative velocity less than $(7.0 - 1.6) \times 10^5 = 5.4 \times 10^5 \text{ cm/sec}$. It would surely be more, but this velocity corresponds to a kinetic energy of $KE = 3500 \text{ calories/gram}$, sufficient to vaporize 0 °K ice four times over.

It has also been proposed that the ice from deep space was electrically charged so that it could interact with the earth's magnetic field. Protons, electrons, and ionized atoms from space do so interact and are strongly deflected, but their charge-to-mass ratio is millions of times greater than could possibly be the case for any charged ice crystal. Thus any deflection would be small; and kinetic energy would not be affected anyway. Electrical charge on the ice crystals could not prevent a heat catastrophe upon their collision with the earth.

Non-supernatural Models Fail

This critical examination of models which hypothesize the provision of substantial amounts of water or ice by means of a water vapor canopy, ice or water in orbit, an icy shell, or ice or water vapor from deep space, strictly in accord with natural law and without miraculous supernatural intervention into the natural order, shows that all models are doomed to failure. They cannot be made to fit with the established laws of physics or with the physiological requirements of life.

There were numerous supernatural aspects of the deluge, notably the divine announcement and purpose, the divinely given plans for the ark, the perfect timing and coordination of various geological and atmospheric events, the voluntary gathering of the animals, the maintenance of those animals for a year on the ark, and the preservation of the ark and eight souls during a year of global violence unequalled in the history of the world since creation.

Why, then, should creationists feel inadequate if they cannot devise a detailed natural mechanism for other aspects of that great cataclysm? God is not inadequate, after all, for any need or circumstance. There is no need for naturalistic speculation in the attempt to explain these events, when each speculation can be negated as shown.

Suggested Guidelines for Canopy Models

The earlier considerations do in no way rule out an antediluvian atmospheric regime far different from the present conditions, a regime which may have been maintained by natural and/or supernatural means. The pre-flood atmosphere may have and (in this author's

opinion) probably did have a water vapor canopy which produced a powerful "greenhouse effect" upon global climate.

The history of canopy models has thus far been marked by highly speculative discussions with little effort at quantitative modeling. Perhaps efforts at quantitative modeling can now proceed since some idea of the limitation that must be placed upon the total water content of the atmosphere can be known. Consider now a very simple model.

The total water content of the present atmosphere is about equal to only one inch of liquid water.¹³ If this were increased to no more than, say, six inches of water, the effect upon the global climate pattern would certainly be radical. Even in the present atmosphere the water vapor and clouds account for the major part of the absorption of energy by the atmosphere. Addition of five inches of water to the atmosphere would result in only a negligible increase in surface pressure.

For a highly simplified initial model, then, let us assume that the atmosphere contains six inches of water and that the dry air has a composition at sea level of 21 percent oxygen and 79 percent nitrogen. Assume further that the uniform temperature is 27°C (80.6°F), that thermodynamic equilibrium is maintained throughout, and that all gases obey the perfect gas law. (The six inches of water corresponds to a water vapor partial pressure at sea level of 11.2mm Hg.)

If total pressure at sea level is 760mm Hg, the partial pressures of oxygen and nitrogen will be 157mm Hg and 591mm Hg, respectively. With a water vapor partial pressure of 11.2mm Hg, since the saturation vapor pressure of water at 27°C is 26.74mm Hg, the sea level relative humidity will be 42 percent.

Assuming that all of the gases obey the perfect gas law, that acceleration due to gravity is uniform, and that thermodynamic equilibrium prevails, the partial density of each constituent gas varies as an inverse exponential function of the altitude. (See Reference 11 again.) In the upper regions of the atmosphere the relative amounts of the lighter gases will be increased over present sea level values.

Thus in this model the sea level water vapor content is 9.4×10^{-3} grams per gram of dry air. But at an altitude of 30km (18.6 miles) the water vapor content is increased to 33.6×10^{-3} grams per gram. In the present atmosphere the water vapor content in the stratosphere is much lower, about 2×10^{-6} grams per gram.¹⁴ Thus in this model the water vapor content of the upper atmosphere is increased by a factor of about 17,000.

With this highly oversimplified model as a starting point, estimates can be made of the energy absorption and radiation characteristics of the atmosphere, and some preliminary conclusions can be drawn about how the dynamic model would have to differ from the beginning equilibrium model. It might then become evident whether or not such a model has the potential for producing the type of climatic regime which creationists have postulated from the Biblical record of the pre-flood era and from the data of paleontology. To do so here would make this article far too long; the matter must be followed up later.

It can be noted in passing that the degree of increase postulated above for upper atmosphere water vapor would not substantially alter the rate of carbon-14 production by neutrons generated by cosmic rays. There would have to be an additional increase by a factor of 10 to 100 before a large-scale effect on carbon-14 production would occur, with correspondingly large effects upon carbon-14 age estimates.

Quantitative modeling of atmospheres is an exceedingly complex enterprise, one which this author is not at all qualified to undertake. The sliderule estimates in this paper are only offered as a preliminary approach to the problem in the light of the rough limitation on total water content which has been established. Certainly in a detailed model other atmospheric constituents such as carbon dioxide and ozone would have to be taken into account, along with water vapor, in radiation and absorption calculations.

It would seem that the most difficult problem in modeling the type of atmosphere generally assumed by creationists for the pre-flood world would be the maintenance of stability on a rotating planet receiving radiation from the sun. No doubt many other difficulties would arise in such a modeling effort. However, if creationists are going to continue assuming the effects of a pre-flood water vapor canopy, it is time to get the models bounded by the known physical requirements and proceed to work on quantitative details.

Waters from the Windows of Heaven

A final remark concerning the source of flood waters is in order. The language of the Scriptures seems to suggest supernatural provision. For example, Stanley Udd has presented exegetical and grammatical evidence for the view that the "waters above the firmament" of Genesis 1:7 were liquid waters.¹⁵ If this be the case, these waters were sustained in some arrangement in space by supernatural fiat, and they may have been the source of waters supernaturally delivered through the "windows of heaven" as recorded in Genesis 7:11.

Acknowledgement

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$$\rho(0)e^{-ah}$$

where

$$\rho(0) = \frac{Mp(0)}{RT}$$

$$a = \frac{Mg}{RT}$$

M = molecular weight

R = gas constant

T = absolute temperature

$p(0)$ = surface pressure

g = gravitational acceleration

The formula for the altitude below which a given fraction f of the total

$$\text{atmospheric mass resides is } h(f) = \frac{-2.303 \log(1-f)}{a}$$

¹²The electrostatic energy of a charge Q placed on a sphere of radius r is $E_e = Q^2/r$. To concentrate a charge $Q = 2.5 \times 10^{30}$ statcoulombs on a sphere of radius $r = 8000$ km would require energy input of 7.8×10^{63} ergs. The gravitational self energy of the galaxy is of the order $E_g = GM^2/R$, where G is the gravitational constant, M the mass, and R the average radial distance of mass from the center. The magnitude for our galaxy is about $E_g = 1.3 \times 10^{58}$ ergs. So such a hypothetical charged earth could blow up 10,000 galaxies!

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WHAT ABOUT DENDROCHRONOLOGY?

HARRY V. WIAINT, JR.*

The field of dendrochronology is reviewed and probable sources of error, especially for the bristlecone pine chronology, are indicated.

Creationists are interested in all dating schemes, including dendrochronology.¹ An attempt will be made in this paper to outline the state of this science, based on a very readable work by Avery², and point out probable sources of error in a tree-ring chronology.

Origin of Dendrochronology

Andrew E. Douglass, an astronomer in Arizona, became interested in the early 1900s in the cyclic nature of solar activity, especially sunspots, as possibly related to climatic variations on earth. He surmised that variations in the width of tree rings might indicate past climatic changes.

Studies by Douglass showed that precipitation is the most limiting climatic factor affecting tree growth in the southwestern United States, with narrow rings associated with years of low precipitation. As climatic variations tend to encompass large regions, narrow rings in two or more trees may be matched although they grew over 200 miles apart. This matching of corresponding growth rings is called crossdating.

Crossdating

By matching tree-ring patterns of old living trees and long-dead wood, with special attention to narrow rings, a chronology can be established reaching far into the past. A wood sample, from an Indian ruin, for example, may be found to match that chronology at some point, thereby indicating the date the tree was felled and the structure was built.

Ring patterns of ancient wood which do not fit the "absolute chronology" established from the present

backwards provides a "floating chronology". The discovery of a wood specimen which bridges the gap between an absolute chronology and a floating chronology is of great value.

Generally, trees growing under adverse conditions provide more distinctive ring patterns. Most studies in the United States have used ponderosa pine (*Pinus ponderosa*), pinyon pine (*P. edulis*), limber pine (*P. flexilis*), bristlecone pine (*P. aristata*), Rocky Mountain juniper (*Juniperus scopulorum*), Douglas-fir (*Pseudotsuga menziesii*), and giant sequoia (*Sequoia gigantea*). Conifers tend to display "sensitive" ring patterns in contrast to the more "complacent" ring patterns of hardwoods.

Methods of Ring Pattern Matching

The matching of ring patterns is usually done by one of three methods: (1) memory, (2) skeleton plots, (3) graphic plots of ring widths. Also, computer-programmed correlation routines are sometimes used to evaluate all possible matches between two series of ring indices.

How reliable are these techniques? This is an important question to creationists, for by these techniques the oldest living bristlecone pine (≈ 4000 years) and dead wood have been crossdated to provide a chronology assumed to extend back 8200 years, about twice the time allowed in some creation models.

Few workers would claim much reliability for the **memory method**, which requires committing entire ring series to memory; although it appears Douglass had unusual ability in this respect.

Skeleton plots consist of a graphic representation of relative ring widths over dates, with the greatest value assigned to "missing rings", almost as great a value for a microscopic ring; and average ring widths are often

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ignored. Extremely wide rings may be noted. Ring widths are judged in relation to nearby rings, thus removing the effect of the tendency of tree rings to decrease in width as trees age.

Missing rings occur when portions of a tree stem show no discernible growth during years of severe environmental stress. The subjective judgement exercised to determine where missing rings should occur in a skeleton plot casts doubt on the bristlecone pine chronology.³

Ring widths can be accurately measured under magnification with machines designed for this purpose. Hamilton⁴ has described an instrument which can be built in the average university shop. These measurements can then be graphed for visual or statistical comparisons. Visual comparisons, again, inject a subjective element reducing the reliability of assumed chronologies.

Correlation coefficients calculated between all possible matches for two series of ring indices tend to be randomly distributed around "zero", except at the match point where a highly significant positive correlation may be obtained.

Attention to Some Problems

Baillie and Pilcher⁵ recommended the transformation of ring-width data for this analysis by (1) expressing the ring width as a percentage of the mean of the five ring widths of which it is the central value, and (2) normalizing by taking the log to the base *e* of the percentage figures. They emphasized, however, that this analysis is valid only where no missing or double rings occur. Again, the bristlecone pine chronology, with many missing rings⁶, would not be useful in this less subjective statistical approach.

Also, A. C. Barefoot⁷, a professor at North Carolina State University, working with oaks in England found correlation coefficients of .99 between ring-width series

known to be wrong while those known to be correct were .90. I conducted a preliminary study with oaks in West Virginia and noted the same tendency. The probability of this type error can be calculated of course, and increases with poorer correlations.

Double, multiple, or false rings may occur when suitable growth periods are interrupted by droughts, defoliation by insects or late frosts or other unusual conditions.⁸ False rings appear to occur more frequently in *Pinus* as one moves south, presenting a serious problem in tree-ring studies in Mexico. The unusual climate which must have followed the deluge may have caused the formation of many false rings in the older bristlecone pines in what is now the southwestern United States, increasing their apparent age.

Conclusion

Dendrochronology, as all dating schemes, is based upon certain assumptions and subjective procedures, and creationists need not be dismayed by the long chronologies claimed to have been established. This field should be a fruitful area for more study by those accepting the young-earth model.

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HEART MOUNTAIN REVISITED

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At the Heart Mountain formation, Wyoming, and at other places, strata are in the wrong order, according to the uniformitarian view, supposedly older rocks being on top of supposedly younger ones. Such formations have been ascribed to the overthrusting of older rock over the younger. However, at many of these formations, including Heart Mountain, there is no physical evidence for such sliding; nor is there any proof that such motion is mechanically possible. Some recent investigation has again failed to provide any evidence that Heart Mountain was overthrust; but there is evidence that a normal vertical fault was involved.

Introduction

Structural geologists have long recognized low-angle faults or thrust faults as one of the effects of tectonic activity in the crust of the earth, along with normal faults and strike-slip faults.

Regardless of the type of fault, where there has been differential movement along a fault plane, there is bound to be a grinding action, as is the case with the

plates of any mill. Contact metamorphism may be one effect, especially where heat and pressure are involved. Other physical criteria resulting are:

1) Ground up rock, or mylonite, a layer between the moving blocks.

2) Tectonic breccia, or large fragments of broken, angular rock.

3) Slickensides, or fluting or grooves where the rough or angular projections have grooved the other plate.

Some early paleontologists were not well versed in structural geology and were inclined to ignore structure. They believed that the fossil evidence was so

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overwhelming that it was a waste of time to check the physical criteria; and, as one paleontologist put it:

It may even be said that in any case where there appears to be a clear and decisive discordance between the physical and the paleontological evidence as to the age of a given series of beds, it is the former that is to be distrusted rather than the latter.¹

What a strange infatuation with deductive reasoning as against inductive reasoning—pitting an unprovable hypothesis against field evidence! Sir Archibald Geikie,² one time director of the Geological Survey of Great Britain, described the so called overthrusts of the Alps:

“The strata could scarcely be supposed to have been really inverted, save for the evidence as to their true order of succession supplied by their included fossils.”

It is with this thought in mind that so-called overthrusts or low-angle faults should be examined. It is not maintained that all such structures are misnamed; but one should be on guard to examine all cases critically, to see if the physical evidence, mylonite, tectonic breccia, and slickensides along the thrust contact accompany the fossil evidence.

It is not denied that some actual overthrusts have all the physical criteria of thrusts—such structures do exist.

The Heart Mountain Thrust

I have spent some time in the field in northwest Wyoming examining the so called Heart Mountain Thrust, a few miles north of Cody, Wyoming. This is an isolated capping of Madison (Mississippian) limestone (See Figure 1).

William G. Pierce³ of the U. S. Geological Survey has written up the Cathedral Cliffs formation. He imagined igneous rocks moving on the Madison limestone as it was supposedly thrust southeastward by the Heart Mountain detachment fault which scattered isolated blocks of Madison limestone for many miles in northwest Wyoming. Pierce has also written concerning the Heart Mountain thrust.

This thrust movement is supposed to have taken place in Eocene time, along a nearly horizontal surface; whether as a compressional thrust or as a gravitational slide is not clear, although the mechanics of either is still more obscure. Geological maps show the Heart Mountain Madison limestone resting on Tertiary limestone or dolomite. In other blocks it rests on Cambrian Grove Creek formation, the intervening Devonian, Silurian, and Ordovician formations being missing.

If the missing formations are the only criteria for calling Heart Mountain a thrust, then by the same token the Mississippian Redwall formation in the Grand Canyon could be called a thrust, though I have never heard it so called. In the case of the Grand Canyon, in most places along the trails the Redwall rests directly on the Cambrian, the intervening Devonian, Silurian, and Ordovician being missing.

Some geologists interpret the Heart Mountain structure with several missing formations as a case of gravitational gliding, where the Mississippian formations erased the intervening Devonian, Silurian and Ordovi-

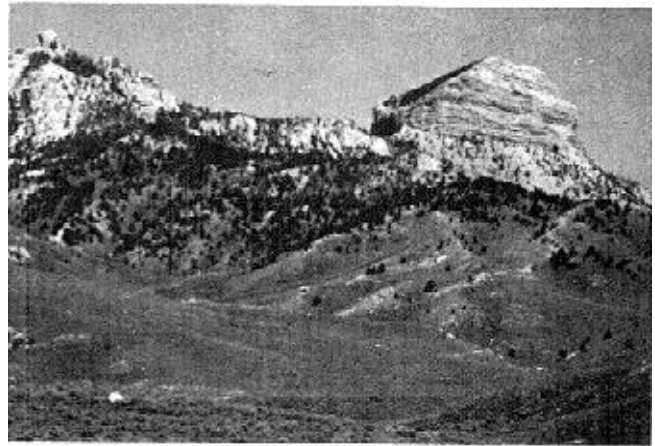


Figure 1. Heart Mountain, a few miles north of Cody, Wyoming.

cian formations, and left the Madison resting directly on the Cambrian or Tertiary as the case may be. But just as at the Grand Canyon that explanation just does not fit the case; for not a sliver of the intervening formations remain. The contact seems conformable; that is, a normal sedimentary contact in the case of Heart Mountain or the Grand Canyon.

Window Rock, Arizona

In the Window Rock area of Eastern Arizona, there is a still more anomalous contact; this time the Permian Supai formation rests on the Older Precambrian, Archeozoic quartzite. The standard explanation is that for a billion years or so the area was just enough above water to avoid both deposition and erosion.

This would appear to be a far-fetched explanation at best; for Twenhofel⁴ has said that the crust of the earth is never really at rest for very long. At Glen Rose, Texas along the Paluxy river about 20 years ago I photographed some perfect dinosaur tracks. When I attempted to rephotograph the same tracks, they had been eroded away.

Difficulties with the Motion of Thrusts

A major objection to both the thrust and gravitational gliding theories is that the thrust contact is practically level; also there is no down grade to explain the gliding, nor rock competency sufficient to allow pushing these blocks over long distances without fracturing and making breccia and rubble. Furthermore, no source has been found from where such a thrust could have started. Authorities readily admit such deficiencies in the whole thrust hypothesis. They seem unable to visualize that the defect is in the fossil sequence dogma rather than in rock structure.

Isolated blocks of Mississippian Madison limestone are scattered over many miles of northwest Wyoming. According to Pierce⁵, “Were it not for the absence of some formations the presence of a fault might not be, recognized.”

This is tantamount to an admission that a principal basis of designating this structure as a thrust is the absence of intervening formations. If that is a valid argument, then most of Arizona is a giant thrust, for in

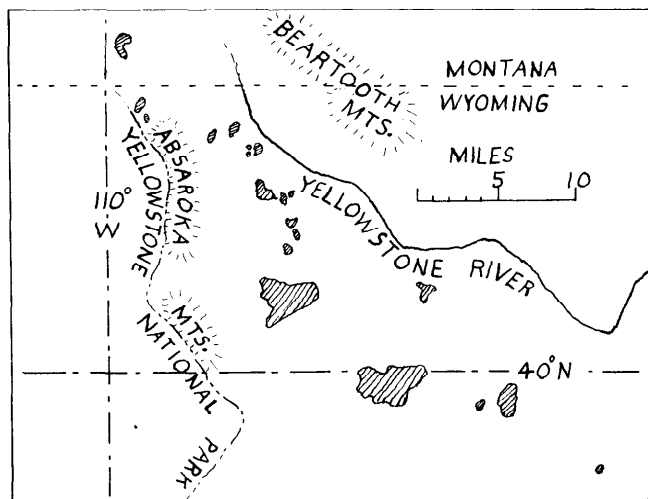


Figure 2. This is a map of the country in the vicinity of Heart Mountain. The lines marked "40°N" and "110°W" indicate latitude and longitude; the other broken lines are state boundaries, or the boundary of Yellowstone Park. The various blocks into which the alleged thrust is broken are shown cross-hatched.

most of that state the Ordovician and Silurian rock formations are missing.

This is a monument to the power of "*a priori*" reasoning; as if the evolutionary order of the fossils in the rocks were as well established as the law of gravitation.

Pierce also observed:

In most places the fault contact is concealed or poorly exposed; but where visible is clean-cut and sharp, with no brecciation of beds above or below . . . the lower contact with the Grove Creek formation is also sharp.⁶

Here also is a repetition, apparently, of the Lewis overthrust contact in Montana and Canada—where good exposures can be found they are usually sharp. Apparently these criteria meant little to the paleontologists of former years, before the impact of structural geology. Now it is recognized that such a major tectonic event as a giant overthrust should exhibit such structural or mechanical evidence as tectonic breccia, mylonite, or ground up rock, and slickensides. Along the contacts of all true overthrusts that the writer has observed, these criteria are evident.

How Could a Thrust Break Up into Blocks?

Pierce also described the Heart Mountain thrust as involving many miles of rock movement, because it is now separated into some 50 blocks of lower Paleozoic limestone scattered over a triangular area of 30 by 60 miles. See Figures 2 and 3. The Ordovician is represented by the Bighorn dolomite, and the Mississippian by the Madison limestone, measuring up to 1800 feet in thickness. In most places the thrust block rests on Tertiary rock.

Pierce seemed to think that the blocks became detached by movement. However, it seems a bit anomalous for a thrust block to move when the elements of the thrust block were separated by such great distances. For example the Heart Mountain thrust



Figure 3. This is a diagrammatic vertical section through some of the blocks and the underlying ground. This is not necessarily drawn to scale; in particular, the vertical scale has been exaggerated.

block is isolated many miles from the nearest like block on McCullough peak many miles to the east.

In places the Paleozoic thrust block is covered with what geologists call the "early basic breccia"; in other words a volcanic rock, now being eroded. Another puzzle to geologists is that no volcanic fragments have been found between the thrust block and the lower Grove Creek (Cambrian). This is strange if the volcanics had been laid down before the thrust action, which is assumed to have taken place in Eocene time.

Bucher enumerated the many problems of the so-called Heart Mountain Fault:

There are no known roots for this thrust, no known surface from which it could have been derived. Like the Juras in the Alps, a *decollement*? This fault has uncommon features not accounted for by tectonic movement accompanying low-angle faults.

As already mentioned the absence of the Bighorn, Jefferson, and Three Forks formations, which should lie between the Madison and the Grove Creek formations, seem to indicate to some stratigraphers the presence of a thrust or a glide block, as the only possible explanation for the absence of the missing formations. But this seems to be a very weak form of reasoning. Would it not be a more logical explanation to call in question the veracity of the *must* order of the fossils, that is, the assumed evolutionary order?

According to accepted reasoning, one would have to multiply many times the number of thrust or low-angle faults in the world; for there are numerous cases of missing formations or periods in the world. The Grand Canyon and the Window Rock exposures have already been mentioned.

Recent Observations at Heart Mountain

So far the task has been that of assembling geologic data compiled by other geologists, whose consensus has been that Heart Mountain is an isolated thrust plate, separated from other sections of the same overall thrust by miles. Most geologists have readily admitted the field difficulties with such a concept, but they still cling to the thrust theory on account of the fossil evidence.

Now it is urged that the time is long overdue to take into account also the structural evidence. In the case of Heart Mountain the evidence does not uphold the thrust concept, nor is there any credible support for the idea of gravitational gliding; for a sloping gliding surface is lacking.

Actually the whole area has been severly folded and deformed. Following the strata westward and to the northwest, one finds the underlying beds dipping

around 10 degrees on average to the east and southeast, dipping away from the Absaroka mountain range along the east border of the Yellowstone Park (See Figure 1).

This places the capping strata on Heart Mountain much higher stratigraphically than equivalent limestones to the west. Remember Pierce called this the Cathedral Cliffs formation and, although he placed it on top of the Madison, he believes that the formation moved along with the thrust.

Southwest of and adjacent to Heart Mountain the strata have been so severely deformed that in places they rest on edge. Due to heavy rock slides and fragmentation, the contact of the Madison on Heart Mountain with underlying beds is covered. However, I found one place, on an exposed salient at the west end of the mountain where the contact was nearly visible; except again the limestone rubble covered the actual contact.

Some geologists, I understand, have interpreted the limestone rubble as tectonic breccia, caused by thrust movement. However, this particular rubble is no different from the erosional rubble all around the steep sides of the mountain. Where the underlying sandstone was exposed it did not show brecciation or mylonite.

The so-called Madison thrust plate is more nearly horizontal than the underlying beds, indicating evidently that that formation was deposited more recently on a truncated surface of the lower beds. This is evidence against the thrust mechanism imagined.

Evidence that Heart Mountain is a Normal Fault

There is decided evidence of fault action at Heart Mountain, but it involves normal fault action rather than thrusting. Approaching Heart Mountain from the south one climbs a long limestone stratum that dips away from the mountain, toward the south; whereas the north side of the mountain has beds that dip the other way, to the north. This began to arouse suspicions that perhaps after all what is involved is not a thrust fault, but a normal fault, a fracture along the apex of an anticlinal fold, a very common occurrence. See Figure 4.

In an anticlinal fold there probably was compression throughout most of the fold, except at the top of the anticline, where in fact there would be tension, resulting in a fracture along the roof of the anticline. Before the fracture took place, however, the greatest tension would have been at the top surface of the fold. Deeper down, conversely, pressure would have compressed the plastic rock, forming a sort of a vertical, longitudinal layer of rock. (I have seen this structure in many fractured anticlines, especially in freshly extruded basalt, which cracks along the top of a lava flow. An example is in the Craters of the Moon volcanic field in Idaho.)

This fracture along the apex of the Heart Mountain fault has been filled with alluvium. I looked for tell-tale evidences of vertical dike or rock slab. I found such evidence in quantity, rather close to the nearly vertical southern escarpment of the Madison formation. This just about settled the issue with me. Here is a normal or vertical fault rather than a thrust fault.

Often with a normal or vertical fault, one side moves vertically with reference to the other side, causing the edges of the strata on one side to dip up, while the other move up. I think this is the case with the Madison cap rock or strata, on top of the Heart Mountain.

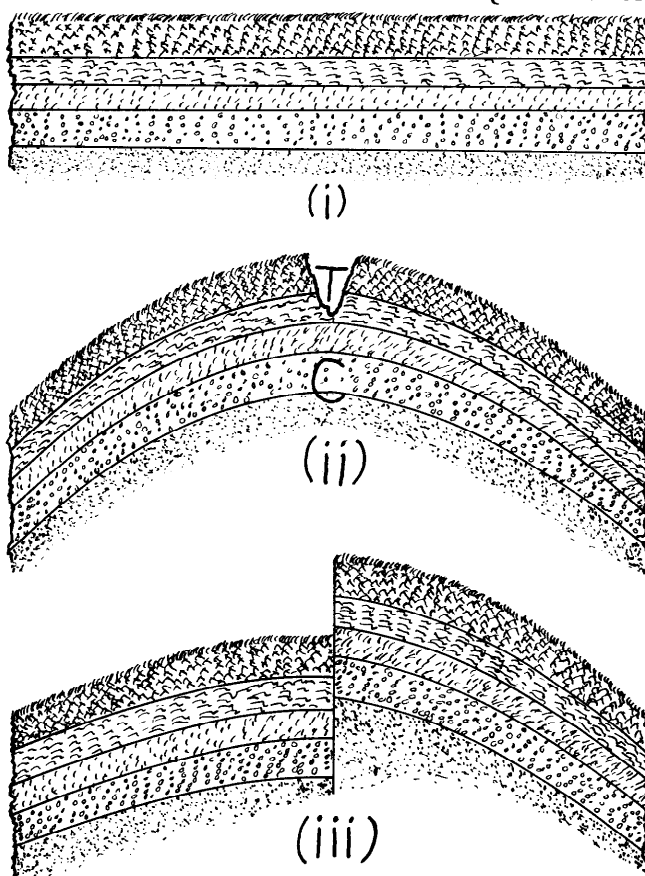


Figure 4. This shows the way in which, it is suggested, these formations actually developed. Originally level strata, as in (i), became bent into an anticline, as in (ii). The rock at the bottom, at the place marked "C", was in compression, and was likely crushed to some extent. That at the top, at the place marked "T", on the other hand, was in tension. Likely a fissure opened due to the tension, as suggested; although the fissure might later have become filled with debris. Still later, the one side slid up with respect to the other, in an ordinary fault, as shown in (iii).

The southern lip of the exposed Madison limestone dips upward at about 10 degrees, whereas the same stratum levels off to about five degrees some distance from the edge. This is more evidence of a normal fault rather than a thrust fault; although both could be admitted if the evidence warranted such a conclusion.

In conclusion I would discount the popular idea of thrust faulting at Heart Mountain, but would interpret the formation as a normal fault at the apex of an anticline.

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THE IMPORTANCE OF CREATION IN THE CHRISTIAN MESSAGE

T. ROBERT INGRAM*

In recent times the topic of creation has been stressed very little in Christian preaching, or in the Christian message generally. In early Christian preaching, on the other hand, it played a very important part. The author points out that to neglect creation is to weaken the Christian message, and that various doctrines can really be understood only when the fact of creation is taken into account.

Despite the fervor shown on both sides whenever the question of creation as opposed to evolution is raised, the subject seems to be almost totally neglected in the modern pulpit. This may fairly be stated in spite of the peril of broad generalizations and without the necessity to make a case.

That preachers should fail to espouse evolution in sermons is understandable enough: even those who zealously believe evolution to be true cannot escape what practitioners of modern slang very aptly call a "gut feeling" that it wouldn't do at all to preach it.

Others might incline toward creation but be unequipped to deal intellectually with the issues involved. The attempt to "baptize" evolution by trying to reconcile Genesis with the geological column, besides being a failure, would be dull in any event and would afford small grist for the pulpit mill.

But those who are convinced of the truth, the historical and scientific truth, of creation ought also thereby to understand that it is a doctrine both exciting to hearers generally and absolutely essential to the Gospel.

Neglect of Creation Mutilates the Christian Message

The Gospel cannot stand either on the sentimentalism of the revivalist or the intellectual *tour de force* of those European heroes of the 1920's, such as Karl Barth and Oscar Cullman, who undertook to erect an orthodox theology without reference to creation.

In spite of the intense interest on both sides of the Atlantic, and almost breathless expectation, Continental theology, like ancient Israel, "brought forth wind." The leading minds among Christians were not long in ferreting out the errors and failures of Neo-orthodoxy, but it is surprising how few if any hit on the root error, which was at the same time the central claim to fame. It remained for a Swedish theologian to point out the fatal flaw in trying to build a theology on the single article of faith, namely, the confession that "Jesus is Lord."

Gustaf Wingren, in his book *Creation and Law*, takes the position that preaching Jesus Christ without first recognizing that the God whose Son He is is the Creator results in a totally man-centered view. Wingren makes an impressive and weighty case, despite his emphasis on the controversial doctrine that every soul is created at the beginning of human life, and a lack of clarity on the controlling fact of "the beginning" as it applies to all things.

Nevertheless he speaks directly to the point, and particularly as it applies to the preaching of the Gospel. He

notes, as have others, that in preaching to the pagan world the early Church not only presupposed that God is the Creator, but often, as in the case of St. Paul both in Lycaonia and in Athens, began their sermons with the declaration of God the Creator.

Creation in Early Christian Preaching

"Forgiveness and the summons to conversion in the missionary preaching of the Church to the Gentiles presupposes that there is a work of God in Creation which has already been discerned and experienced before the preaching of the Gospel," says Wingren in a footnote.

Certainly the two sermons of Paul referred to here are cases in point, in Acts 14:15, and 17:24.

In Lycaonia, where the mob called Barnabas, Jupiter, and Paul, Mercury, after the miraculous healing of one crippled from birth, the Apostles restrained the crowd, running in among the people and crying out, "Sirs, why do ye these things? We are also men of like passions with you, and preach unto you that ye should turn from these vanities unto the living God, *which made heaven and earth, and the sea, and all things that are therein.*" (Emphasis added)

And at Athens, addressing the intellectual establishment, he began by declaring unto them, "God that made the world and all things therein."

These two instances are conclusive evidence that not only did the Church from the beginning approach the pagan world with an explicit and prior declaration of God as the Creator, but further that they could take it for granted the pagan world knew what they were talking about.

These two facts find open and determined hostility from two widely different quarters, and this may account for some at least of the reticence of preachers today to preach Creation.

Why Creation is Often Ignored

The amazingly thorough and stubborn mind-set of evolutionists in the nineteenth century could not tolerate the possibility of a common knowledge of the Creator simply because it didn't fit into their time table of religious evolution. Paganism was firmly believed to represent an evolutionary stage which had not yet progressed to the understanding of one God.

At the same time, there is an overly pious notion among some Evangelicals that man can have no knowledge of God at all outside of Biblical revelation. Hand in hand, these two otherwise repugnant positions undoubtedly have discouraged a great deal of understanding about the value and rightness of preaching creation generally.

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Knowledge of Creation is Ancient

Both of these positions are unsupportable. There is overwhelming evidence not only that the pagan world at the time of Christ had knowledge of creation and of the Creator, but also that knowledge was common to the whole race from the beginning.

Adam, Enoch and Noah certainly had a knowledge of God beyond that of most men today and knew Him as Creator, and this knowledge must have been handed on generally. While explicit doctrinal statements that God created *ex nihilo* are lacking in these ancient documents, it is inconceivable that anything less was understood. Job was familiar with creation, and it would seem likely that Abimelech, King of Gerar, to whom God spoke in a dream, must have known God's identity.

That the pagan world did not worship the Creator is another thing. It should be abundantly clear from our own times that to know that God created all things in heaven and earth does not necessarily result in worshipping Him. It has always been the case that the idea of creation is childish in the good sense: it is so simple and obvious that it does not seem to appeal like the contortions of evolutionary thinking to a strong mind. That is, creation is such a reasonable idea that it is often rejected precisely for that reason in favor of something more esoteric.

All Men Know Something of Creation

The Bible declares firmly, without any room for equivocation, that the whole human race has an intuitive knowledge of the Creator. This agrees with reasonable evidence from incidental history contained in the Bible about the pagan world and with the writings of the pagan philosophers. Thus it is seen that by scripture, by reason and by documentary evidence, one concludes beyond a reasonable doubt that man naturally knows that God created all things. The case for evolution of religion, as well as that against a natural knowledge of creation apart from Biblical revelation, is overthrown by the facts.

"The invisible things of him from the creation of the world are clearly seen, being understood by the things that are made, even his eternal power and Godhead; so that they are without excuse," Paul wrote in the first chapter of Romans.

In other words, the natural powers of human reason are held accountable by God to discerning (1) that all things were made; (2) that therefore there was the Maker; (3) that the Maker must be eternal; (4) that no higher power can be imagined; and (5) that the Maker is therefore God and to be worshipped as God.

Any other explanation is not mere ignorance common to man, but blamable contumacy.

Their fault, says the Apostle, is that, "When they knew God, they glorified him not as God, neither were thankful."

Such is the Biblical position. There is knowledge of the Creator naturally discerned by man, and man has already had this knowledge.

As for evidence from pagan writings of the knowledge of creation, it should be sufficient to accept the testimony of Augustine of Hippo in the early fifth century, who was himself quite a student of pagan philosophy

before he became a Christian. On top of that, at the time he wrote there were plenty of pagan scholars around to correct him.

He said not only that Plato knew about creation, but that he had gone so far as to offer an explanation as to why that which God had made was good: "This was given by Plato as the most valid reason for the creation of the world—that good works should be effected by a good God." Then Augustine added:

Plato may have read this passage of Scripture (Genesis 1:31) or have learnt of it from those who had read it; or it may be that with the intuition of genius he observed 'the invisible realities of God' presented to the mind by means of his creation, or learned about them from those who had thus observed them. (City, Bk. XI, Ch. 21).

In any event, Plato knew. And as for pagan philosophers generally, Augustine wrote:

There are some who admit that the world is created by God, but refuse to allow it a beginning in time, not allowing it a beginning in the sense of its being created, so that creation becomes an eternal process. (City, Bk. XI, Ch. 4).

Attempts to Replace Creation by an Eternal Process

The notion of creation as an eternal process is not unfamiliar to theologians today. It is inherent in evolutionary thinking and has been the false refuge for many a Christian who has tried to keep one foot in faith and the other in evolution. Obviously time is not the refiner of man's thinking about God: faulty reason is present in every time.

The difficulty so many have with creation, now as in Pagan times, would seem to be not only a matter of a perverse will ("when they knew God, they glorified him not as God") but also of ignorance—ignorance not of the historical fact, but of the vast implications which become clear only after intensive instruction grounded on faith and cultivated by much meditation. It is one thing to say the doctrine of creation is childish: it is something else indeed to believe that all there is to it is the credal affirmation, "I believe in God, the Father Almighty, Maker of Heaven and Earth."

The Importance of Creation in Preaching

Here is where preaching comes in. It is not only for missionary preaching, but for solid instruction and discipline of the faithful.

It is not preaching creation simply to declare, with however much heat, "God made all things, visible and invisible." Where preaching comes in is to show what difference it makes. The implications seem to be unlimited, for some very important and universal principles of life are rooted here, and if creation is not a fact of history, there is no Gospel.

If everything was not created, there is no Creator; neither is there law, nor is there human guilt to be expiated and forgiven.

I think many preachers would blush to be confronted with the real vapid nature of such sermons as declare salvation requires a personal knowledge of Jesus Christ without any hint as to who this Saviour is.

O yes, there is the Jesus of Nazareth who walked on earth. But any real knowledge of Him brings us at once into the presence of God the Father; and, who is He? He is the Creator. Except for calling him "Father", all that is said about God in the creeds is this, that He is the Maker of all things in heaven and on earth. One can have a personal and present knowledge of this Jesus only as He is alive in Heaven at the right hand of the Father.

Aside from some sentimental mystique, some esoteric experience that may or may not have any validity, knowledge of any person, or of God Himself, is to be had only through his works—what he does.

Each one, therefore, comes to know Jesus Christ by what He does, by His works. And what are they? He is the Maker of all things. This is said of Him as expressly His work as the Second Person of the Blessed Trinity, the Word of God: "All things were made by him; and without him was not anything made that was made." (John 1:3)

But, someone will say, the Gospel is concerned with Him as Redeemer. Ah, yes. But how fitting it is that all things should be Redeemed by Him who made them.

"What—or rather Who was it that was needed for such grace and such recall as we (fallen man) required?" asks Athanasius (On the Incarnation of the Word of God, Chapter 7). "Who, save the Word of God Himself, Who also in the beginning had made all things out of nothing? His part it was, and His alone."

Some excellent preaching could go into an explanation of why it was his part, and his alone. And this requires some preaching on creation.

Another will say, salvation needs to be preached only in terms of justification by faith. Ah, yes. And there are hours of fruitless dissertation on the meaning of faith with not a word about what it means to be justified; or, for that matter, about Paul's penetrating discussion of faith in Hebrews 11, especially verse 3, "Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear."

Moreover, justification is a legal action. It has meaning only in matters of law.

But even with his strained emphasis on the creation of every soul as sufficient for a doctrine of creation, Wengren has shown admirably that except God be understood as the Creator, there is no foundation for law at all. If there is no law, there is no guilt, no forgiveness and no redemption.

Still another will say, preach on the Providence of God. But God's Providence can be understood only as it is understood that, as Augustine says, "God rules all things consummately by law."

The very notion of authority, which the Centurion understood so clearly and Jesus accounted it to him for faith, hangs on the truth of creation and an understanding of it. God's own authority, his right to command, arises from the fact that He Created, and man's unqualified duty of obedience arises from his relationship to God as creature.

Another, a revivalist, will say one need only preach so as to convict his hearers of sin. But man is a sinner only because of his creaturely relationship to God. More-

over, there is far more saving grace to be had from sermons on man's nature as a dependent being rather than as a sinful being. For even if man were not a sinner (and in Christ he is no longer held accountable) he still, being dependent, owes perfect obedience. No man can live unto himself, either without God or without his fellow men.

These are some of the areas of preaching where we must admit there is a "thunderous silence" today: Authority, law, providence, faith in Creation, creaturely dependence.

Arguments to Prove God's Existence

Then there is the deadly silence about reasonable arguments for the existence of God.

Not demonstrable by reason, snaps one.

No, but without reason there is no understanding, any more than without faith. And the understanding of God is the goal of human life—to see Him face to face, to see him as he is. (1 Cor. 13:12, 1 John 3:2).

There is no understanding of scripture without the application of reason in its highest sense. The knowledge of God, Theology, is the most exacting and demanding of all sciences, and it is the preacher's job to open the understanding of his flock even as the Risen Christ opened the understanding of the Apostles (Luke 24:45).

One of the great works of Christendom, Paley's *Natural Theology*, is chiefly a discourse on only one of the five traditional lines of argument to show the existence of God, in this case, the argument from design. The pulpit is the place to exercise the reason of the faithful in showing them how reasonable it is to believe God made all things.

The other traditional arguments are equally broad and instructive: the argument from cause and effect, from the nature of man (also a subject for many a good sermon), from the nature of knowledge (that man can conceive only of what exists but all men conceive of God), and finally, the argument already hinted at from the record of Jesus Christ.

Creation and God's Attributes

Finally, there are the attributes of God.

Granting that to see God as He is is perfect bliss, mustn't the eyes of the mind be trained to see first at least His attributes?

But these all derive from the fact that He is the Creator.

His very eternity and immutability are inseparable from His being Creator.

Then there is the relationship between goodness and existence: it is good to be. And God, the great I AM, who is sheer Being, is also sheer goodness. But His being in this sense becomes meaningful chiefly as He is the author of all being.

There is a temptation to go on and on at this point, suggesting subjects for preaching that are rarely if ever used today, yet which become understandable only in terms of God the Creator, and a full understanding of what is involved in Creation *ex nihilo*.

Finally, there is the insulting and senseless retreat of the ungodly into some acknowledgement of a "supreme being."

The atheists of the French Revolution were quite pleased to acknowledge a Supreme Being. In fact, I

would think no man can retain his sanity who does not in some way assume a Supreme Being; there can be no order, no universe, no thought or reason without one.

The great question is, who is He?

There is only one answer: The Creator.

PHYLOGENETIC DEVELOPMENT OF ADIPOSE TISSUE IN ANIMALS

DAVID A. KAUFMANN*

A review of the supposed phylogenetic development of adipose tissue in invertebrates and vertebrates is presented. In invertebrates, lipid-storage tissue is absent in the sponges and coelenterates. There is some evidence of such tissue in Echinoderms, a speculated possibility in Annelids, Mollusks, Crustaceans and Arachnids, and well-developed tissue in Myriapods and insects, but no distinct adipose tissue in Cephalochords.

In vertebrates, the poikilotherms have only traces of adipose tissue, the liver performing a lipid-storing function. Fishes, amphibians, and reptiles have little or no highly developed white adipose tissue. Carnivores have very little white adipose tissue, while hibernating mammals have large amounts of lower-developed brown adipose tissue.

These observations do not correlate with the prediction of the mega-evolution model of a graded increase in quantity and quality of tissues with advancement up the so-called evolutionary ladder of life.

Adipose Tissue Generally

The occurrence of cells filled with lipid material varies greatly among the various branches of the animal kingdom.

Among invertebrates only arthropods have a distinct, individualize adipose tissue. The record shows that some primitive types of fat storage are found in few other invertebrate species.¹ This observation does not correlate with the prediction of the mega-evolutionary model that cells and tissues would develop from the very most primitive forms of animals to the very most complex forms culminating in the highest presumed product of mega-evolution, man.

If mega-evolution were the true explanation of the origin and diversity of life, this development of cells and tissues would be irreversible. Thus there would be some degree of uniform increase in complexity directly related to various grades of development of each animal group in the animal kingdom.

Any gaps of histological development or regression away from development would be counter to predictions of the mega-evolutionary model. But such gaps would correlate with the prediction of the creation model that the Creator created different animal groups for different purposes, and hence there would be distinct differences in their cellular makeup and function along with nonuniform increase in complexity.

The lack of a significant amount of observations of adipose tissue development among vertebrates certainly does not strengthen the case for credibility of the doctrine of mega-evolution.

Among vertebrates a well-developed subcutaneous lipid-storage tissue occurs only in homoiothermic animals.² The fact that there is no significant development of adipose tissue in cold-blooded vertebrates is never explained by mega-evolutionary scientists.

One would think that if mega-evolution were true, there would be a gradual upward development of adipose tissue among cold-blooded vertebrates starting with the agnatha and progressing upward through the placoderms, osteichthyes, amphibia and ending with the reptiles. Furthermore, there would be an accelerated but unique development of adipose tissue in both the warm-blooded classes of birds and mammals.

The stages of development of adipose tissue that occur in both invertebrates and vertebrates may be reviewed as follows:

I. Invertebrates

A. Sponges—no evidence of any lipid storage cells.³

B. Coelenterates (Cnidariae and Ctenariae)—no evidence of even a rudimentary form of adipose tissue. They even lack mesoderm *in toto*.⁴

C. Echinoderms—only starfish which have lipid-storage sites in their gastric caeca and sea-urchins which have epithelial cells with lipid-storage abilities show any resemblances to an adipose-tissue.

D. Annelids—The only indication of lipid-storing function in Annelids is contributed by Van Gansen,⁵ who speculates that choloragogenic cells of the coelomic wall perform this function.

E. Mollusks—According to Fontaine and Callamand⁶ mollusks have only faint traces of adipose tissue.

F. Arthropods—As stated above, the arthropods are the only invertebrates that show a definite, individualized form of adipose tissue. Crustaceans and Arachnids have a hepatopancreatic system with only traces of adipose tissue. However, Myriapods and insects which lack a liver are the first invertebrates to demonstrate a significantly developed type of adipose tissue.⁷

G. Cephalochords (Amphioxus)—In this group there is no distinct type of adipose tissue. For invertebrates this appears to be a regression downward, from the complex development of adipose tissue of arthropods to the non-development of adipose tissue in Cephalochords.

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In summary, the development of lipid-storage tissue in invertebrates starts with absence in the Sponges and Coelenterates, some evidence in Echinoderms, a speculated possibility in Annelids, Mollusks, Crustaceans and Arachnids, well-developed adipose tissue in Myriapods and insects and undeveloped adipose tissue in Cephalochords. This is, in reality, a sudden jump from nothing and faint traces to a well-developed, distinct kind of tissue followed by a regression downward in Cephalochords.

This certainly isn't the slow, upward development in quantity and quality that one would expect if the processes that are attributed to mega-evolution were in effect.

II. Vertebrates

A. Fishes:

1. **Selachians**—There is evidence that the liver is the main organ of lipid storage. Hadjioloff⁸ was unable to discover any adipose cells either under the skin or in the peritoneal cavity in dogfishes.

2. **Teleosts**—Fontaine and Callamand⁹ found low lipid storage in Cod and fat storage in both the liver, muscles and subcutaneous connective tissues in eel. However, although adipose tissue does exist in Teleosts, in all instances, it contains very small quantities of lipid substance.

B. Amphibians:

1. **Urodele**—There is no evidence of subcutaneous adipose tissue in salamanders.¹⁰

2. **Anurans**—In frogs, adipose tissue is distributed in subcutaneous tissue, the chest and abdomen and bone marrow.¹¹

C. **Reptiles**—The quantity and quality of adipose tissue in reptiles is essentially the same as in Amphibians.¹²

D. **Birds**—With the appearance of homiothermy in birds and mammals, adipose tissue reaches its highest level of development. In birds the visible hepatic lipid stores vanish. Great amounts of subcutaneous white adipose tissue are found in penguins, albatrosses, ducks and chickens.

In the migratory birds, premigratory metabolic adjustments result in the facilitation of lipid stores in adipose tissue. Hence, these birds can undergo marked changes in body composition and weight depending on the time of year.

E. **Mammals**—Adipose tissue of mammals is found in three basic anatomical areas: under the skin, deep into the body and in the bone marrow.

1. **Pinnipedia and Cetaceans**—According to Owen¹³ there is no intra-abdominal fat tissue but some lipid storage in areolar tissue among seals, sperm whales and true whales.

2. **Ruminants**—Certain of these animals store lipid material in specific localities for use during prolonged deprivation of food, e.g., the withers of some bovids such as the zebu, yak, the dorsal hump of camels and dromedaries and the fatty rump or tail of certain Asiatic or African sheep. These adipose reserves increase during the rainy season, decrease during the dry season, and during long excursions disappear more rapidly than other adipose stores.

3. **Carnivores**—Most carnivores have little adipose tissue under normal conditions.¹⁴

4. **Rodents**—Some rodents, such as the hare, have few or no fat-storage cells, but lipid material does accumulate in some cells of the domestic rabbit. According to Owen,¹⁵ numerous rodents have their adipose tissue located primarily in the abdominal cavity.

5. **Hibernating Mammals**—In these animals some subcutaneous fat tissue persists, but much is stored in the abdomen. Fat may disappear, however, by the time of the spring awakening. Although there is some evidence of brown adipose tissue in insect-eaters, bats, rodents and some carnivores, this special type of adipose tissue reaches a high level of development in the hibernating mammals.

Brown adipose tissue is characterized by nuclei being centrally located with the lack of fusion of fat globules. There is more than normal amount of cytoplasm which gives a vacuolated appearance.¹⁶ It is not as highly developed as white adipose tissue which looks like a signet ring with one large globule of lipid material surrounded by a thin margin of cytoplasm. The nucleus is squeezed to an edge of the white adipose cell by the bulging lipid globule in its center.

The type of fat cells in brown adipose tissue appear to be less developed in their lipid-storage ability, and hence may be called lower-developed cells. It is interesting to note that in the human embryo, brown adipose tissue appears at a very early stage (11 mm), later develops into white adipose tissue, but is totally absent in the newborn.

This pattern of development of white adipose tissue to brown adipose tissue to white adipose tissue in animals alleged to be advancing up the "tree of life" of the evolutionary model of origins certainly does not correlate with its prediction of simple tissues to complex tissues. In fact, this observation correlates rather nicely with the prediction of the creation model that different animal groups would have diverse quantities and qualities of certain tissue in order to serve totally different purposes intended by their Creator.

6. **Primates**—In this order of mammals, subcutaneous adipose tissue is atrophied, and in man develops side-by-side with the diminution of body hair. It appears that the less hair (fur) a mammal has, the more subcutaneous fat the organism accumulates.

In man, adipose tissue tends to accumulate more in the lower trunk (lower abdomen, sacrum and hips) than in the upper trunk. Fat distribution over the surface of the body follows familial and genetic patterns. The predisposition to become more or less android or gynoid is also determined by heredity. The fat cells in human adipose tissue are entirely of the white type which is the highest developed in its structure and function.

Summary: Adipose Tissue in Vertebrates

In summary, vertebrates demonstrate a unique array of states of adipose tissue development. In poikilotherms, adipose tissue is scanty with the liver performing a lipid-storing function. The liver is dense with fat cells and largest when adipose tissue is least developed. Fishes, amphibians and reptiles have little or no highly-developed, white adipose tissue. In birds,

there is a big jump in the amount and quality of white fat cells.

In mammals, pinnipedia, cetaceans, and rodents have small amounts of fat tissue, ruminants and hibernating animals have abundant amounts of fat tissue, and primates a large amount of well-developed white adipose tissue.

Two observations are worth noting: 1) carnivores have very little white adipose tissue, and 2) hibernating mammals develop a large amount of less-developed brown adipose tissue. Both these facts do not correlate with the prediction of the mega-evolution model of increase in quantity and quality of tissues with advancement up the so-called evolutionary ladder of life.

Conclusion

The above review of the developmental stages of adipose tissues in both invertebrates and vertebrates indicates that there is not a smooth upward development in quantity and quality of fat cells. There appears to be some general upward development, but it is broken with faint traces from highly developed to lowly developed levels. These differences in development appear abruptly and out of order of supposed progression.

It is suggested that if other scholars would examine more data in the disciplines of cytology, histology, and biochemistry, these data would be found to agree more

with the predictions of the creation model of origin of matter and life, and to run counter to the mega-evolutionary model.

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PANORAMA OF SCIENCE

When Does the Foetus Become a Human Being?

Two recent articles in the *Quarterly* had to do with the question just asked.^{1,2} The conclusion was that there is no stage of development at which there is any reason to say that the foetus is not already a human being. The present purpose is to investigate the question a little more.

Aristotle and other philosophers have defined "man", i.e. "human being", as "rational animal". So rationality, either actual or potential, seems to be the point on which the answer depends. Since rationality is connected with the soul, the question may be turned into: "When does the foetus acquire a rational soul?"

It may be noted that Christian philosophers, such as St. Thomas Aquinas, identified "rational soul" with "immortal soul", at least as far as corporeal beings are concerned. So it may likewise be asked when the foetus acquires an immortal soul.

Aristotle, followed by the mediaeval philosophers, distinguished three kinds, or grades, of soul;³ the term "soul" being understood in its widest sense, as "principle of life". There is the *vegetable soul*, which has to do with nourishment and growth. The *animal soul* adds to this the power of sensation. And the *rational soul* has moreover the power of reason.

The human being has all of these powers. But it does not follow that he has three souls. For the higher soul, the rational, has, as well as its own peculiar powers, the powers of the lower grades of soul.

It is necessary to distinguish also actuality and potentiality. A rational being is not necessarily always reasoning. At times the rational powers are only potential, i.e., available when called upon.⁴ A writer has pointed out that every night, when we sleep, we lapse into potentiality.⁵

Again, a new-born infant has the rational faculty, for the most part, as a potentiality. But nobody denies that a new-born infant is a human being. So the foetus cannot be denied humanity because its rationality is still largely potential.

It is maintained, then, that the foetus acquires an immortal soul at the moment of conception. And the moment of conception is indeed a moment in time; it is the moment when the sperm cell and the egg cell unite to begin a new being. (See Reference 2)

The mediaeval philosophers, it is suggested, were hampered by insufficient information about the physiology of reproduction. St. Thomas, for instance, supposed that the semen somehow becomes the foetus; and did not know that there is a clear-cut point in time at which there is a new being. So he supposed that likely at first there is only a vegetable soul; then, as the foetus develops more, an animal soul; and still later a rational soul.⁶

I have heard it said that Aquinas suggested a certain time in the development at which the foetus first acquires an immortal soul; but I have not yet found such a statement in his writings. In any event, the

Roman Church, which followed him in so many things, has not taken advantage of any such view, but has remained uncompromisingly opposed to abortion at any stage.

The question, when the foetus acquires a rational soul, may be helped by considering "whence". Either, presumably, it is from the parents, in some way; or else, as many, including St. Thomas, have held, God intervenes directly to give the soul.⁶

If the rational soul comes from the parents, presumably it will be held that the father contributes something. In that case, the rational soul must be given at the moment of conception; for the father may have no opportunity to contribute later.

Many Christians have held, however, that the production of an immortal soul, being an act of creation, is beyond the power of anyone except God Himself. In that case, He must intervene to produce the soul. The question is: "when?"

It still seems likely that it is at the moment of conception. For that is the only unique moment, at which a unique act would be appropriate. Later, the foetus develops gradually and continually; there would be no reason to say that one moment was more appropriate than another for the giving of an immortal soul. But it must be given at a particular moment; for the foetus either has an immortal soul or it has not.

It may be remarked that it is granted that the moment of birth might be considered another unique moment. But that is nothing to the point; for nobody maintains that the foetus has not a rational soul until birth.

The belief that God intervenes directly to give an immortal soul would seem to fit in with what was done when Adam was created. For the breathing into his nostrils the breath of life was surely equivalent to giving a soul. Likely something similar was done when Eve was created.

The suggestion, which is sometimes heard, that the foetus could not have an immortal soul until it had reached a certain stage of physical development, seems unfounded. For many believe that between death and resurrection the soul can exist without a body at all. Surely, then, it could exist for a few weeks with a rudimentary body.

It is maintained, then, that all of the evidence shows that the foetus is a human being from the moment of conception.

Are Absolutes Returning to Favor?

Many readers were no doubt surprised, a few months ago, to see in *The New Scientist* an advertisement⁷ (apparently) about an International Conference on Space-Time Absoluteness, to be held at Golden Sand, Varna, Bulgaria, 5-15 May, 1977. The organizer is Stefan Marinov, Laboratory for Fundamental Physical Problems, ul. Elin Pelin 22, Sofia 1421, Bulgaria.

Apparently the subject is to be the question of absolute vs. relative, which is discussed so much in the introductions to treatises on relativity. It seems to be maintained that the position now taken by most physicists is not entirely satisfactory, and that a number of questions, commonly believed to have been closed some time ago, should be re-opened.

Also, there are suggestions, similar to those which Dingle has made, that, if there are flaws in physical theory as it is commonly accepted, there may be unrecognized hazards in such activities as nuclear experiments.

Some experimental work is mentioned; it would seem to say that something like an improved Michelson's experiment has given some positive results.

It is interesting to note the classification of physicists, in terms of their stand on this matter, as: "absolute absolutists", "relative absolutists", "absolute relativists", and "relative relativists".

Whatever may be the outcome of all of this, it is a healthy sign in science when notions which have been accepted as dogma for perhaps too long are once again subjected to investigation. Perhaps in a similar way many scientists, even if not moved by religious convictions, will come to question the evolution dogma. Indeed, some have done so; there is room for many more.

— Contributed by Harold L. Armstrong

More Doubts About a Former Reducing Atmosphere

While many evolutionists have maintained that formerly the earth had a reducing atmosphere, and that in it life arose spontaneously, they seem to present little real evidence to show that such a state of affairs ever existed. Sometimes, it would appear, they say that it was thus merely because they wish to have it thus.

Now more doubts have been cast upon this notion. The argument is rather technical. But the main points are that because of strong eddy diffusion in the upper atmosphere, and the process of photodissociation, the supposed reducing atmosphere, if it existed at one time, would have disappeared relatively quickly, very likely too soon for the steps proposed for the spontaneous origin of life to have happened.⁸

However, the spontaneous origin of life is not abandoned in the article. Rather, it is proposed that it might have happened in a non-reducing atmosphere, which, however, contained no oxygen.

Needless to say, there is no real evidence for a non-reducing atmosphere either. Really, if one did not know better, he might think, upon reading some articles about supposed spontaneous origin of life, that they were intended as science fiction, not as sober science.

More Studies on Cross Stratification

The phenomenon of cross stratification in sedimentary rocks continues to attract interest. Where it is found in some sandstone formations in Western Europe, an investigator has ascribed it to strong fluctuating currents, which, it is suggested, were caused by tides.⁹ One reason for this is that there are often inclined strata, the directions of inclination alternating in successive sets.

It is conceded, however, that such strata would likely not be produced under present conditions. So once again the present is not the key to the past.

An alternate explanation has already been proposed:¹⁰ that the cross stratification arose through a

process of disintegration. In that case naturally the present is not the key to the past; for the disintegration presumably came about under catastrophic conditions, which are not duplicated anywhere today.

— Contributed by Douglas E. Cox

Remarkable Confirmation of Genesis Record

In the science section of *Time magazine*, October 18, 1976 the story of the discovery of a new "Third World" is told.¹¹ A pair of Italian scientists have uncovered a treasure trove of clay tablets at Ebla in northern Syria which prove the existence of the Eblan kingdom, existing between 2400 and 2250 B.C. It may well provide the best evidence to date that various Old Testament people actually existed.

The ruins were located about 30 miles south of modern Aleppo. In 1964 Paola Matthiae, 36, and Giovanni Pettinato, 41, of the University of Rome began excavating a 50 foot high mound of dry, dusty dirt. Over 1000 tablets inscribed in both Sumerian and an "Eblaite" dialect were found. A powerful Semitic civilization stretching from the Red Sea to Turkey, and east to Mesopotamia, existed.

Biblical connections are numerous. Accounts of the creation and the flood strikingly similar to those in both the Old Testament and Babylonian literature occur. Reference is made to Urusalima, clearly Ebla's name for Jerusalem. Frequent mention is made of Ebrum or Eber who is identified in the Book of Genesis as the great, great, great, grandfather of the patriarch Abraham. "We always thought of ancestors like Eber as

symbolic," says Freedman. "Nobody ever regarded them as historic—at least not until these tablets were found. Fundamentalists could have a field day with this one."

Actually only a portion of their discovery has been publicized. Only a few of the 140 acres that were once Ebla, have been excavated. But Biblical scholars have heard enough to become really excited, and heard more from Matthiae and Pettinato when they arrived in the United States for their speaking tour in November, 1976.

— Contributed by Walter E. Lammerts

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BOOK REVIEWS

Farming in Prehistory by Barbara Bender. 1975. John Baker, London. 225 pages. Paperback, price £ 5.50.

Reviewed by Walter E. Lammerts*

Barbara Bender asks, "Was it fortuitous that food production began about the same time in widely dispersed parts of the world—in Southwest Asia, Meso-America, Peru, and Southeast Asia?" Also if human occupation in Southwest Asia goes back to about 300,000 years ago, "Why did it take so long for food production to begin?"

Contrary to general belief the hunter gatherer who lived toward the end of the last ice age was not a miserable half starved creature. And early farmers were not a stable leisure society. Farming did however, allow for increased population.

The C₁₄ dates for incipient cultures are far too great by creationist standards.¹⁻³ Even so, the dates for the actual beginning of farming are surprisingly recent. Thus the first clear evidence of cultivated grain is found in the clumsily named Pre-Pottery Neolithic A and B

cultures. Dates of the A culture Es-Sultan site (Jericho) range from 8350 ± 200 down to 6945 ± 150 B.C.

However, only two grains of emmer wheat, and six grains of very primitive hulled two row barley were found. The dates of the Beidha site (Jordan) range from 6990 ± 160 down to 6690 ± 160 B.C. Much of the grain found was barley. Emmer wheat was less important. In addition pistachio nuts, field peas, two kinds of lentils, and vetch were collected.

The town at the Es Sultan site was quite large with a population of 2000-3000 people. The town even had massive fortifications with a huge circular tower 8.5 m. high.

The B cultures at Es Sultan and Beidha began around 7000 B.C. A large number of settlements appeared rather suddenly in Turkey, Iran, Lebanon, and the Jordan areas. (Fig. 19, pg. 134) Many authorities favor the view that this was an intrusive culture from the north.

Readers will be surprised to know that the modern cow is much smaller than the wild aurochs from which it presumably came. Also the original wild sheep were hairy, so were kept for meat or milk. The selection for wooly sheep takes time since changes in two skin follicles are involved. It is difficult to see how this was accomplished in the brief time from the first appearance of the wild sheep about 9000 B.C.

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Regarding plants both the small grained einkorn wheat (*Triticum monococcum*), and the larger tetraploid emmer (*T. dicoccum*) showed up early; then a little later the *T. aestivum* L. or hexaploid (modern) wheat appeared. One explanation is that modern wheat resulted from crossing emmer wheat with goat grass, *Aegilops squarrosa*. But actually this cross results in a grain resembling *T. spelta*.

As regards the New World, no wild form of maize exists; so it was either swamped out or the ancestor was a grass called teosinte. Hybrid corn does not show up until about 1500 B.C. In 5000 B.C. corn had tiny cobs only 20 millimeters long with eight rows of kernels each partly enclosed in glumes. The boost in size and variability occurred very suddenly in 1500 B.C.

It was not until about 5000 B.C. that cultivated plants became at all important in the economy, and a viable food producing economy did not emerge until about 1500 B.C. Even by 3000 B.C. cultivated foodstuffs accounted for only about 9% of the diet. This was in the Tamaulipas area of north east Mexico. But even in the Tehuacan valley (Puebla, Mexico) during the Coxcoatl phase from 5000 to 3400 B.C. cultigens represent no more than 14% of the total food supply.

As Bender states in the preface, the book is mainly a synthesis of a tremendous amount of information from all available sources. Accordingly only a small portion of the vast amount of information presented can be mentioned in a review.

Creationists would be inclined to believe that wild barley, wheat, and oats degenerated from originally

created cultivated species. Evidence for this belief is found in the data presented in this book such as the discussion of the origin of barley on pages 54 and 55. Research on the concept that modern hexaploid wheat actually originated from the crossing of emmer wheat with *Aegilops squarrosa* is needed. It is difficult to believe that such a cross occurred naturally, or that the relatively primitive people of the Pre-Pottery Neolithic A and B cultures made it. Similarly the origin of corn involves considerable that is rather mysterious as P. C. Mangelsdorf observed in his article on the mystery of corn in *Scientific American*, July, 1950.

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- Also there have been other articles in the *Creation Research Society Quarterly* on this topic; and some have been reprinted in other anthologies under the title, *Symposium on Creation*, published by Baker Book House over several years.

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Unformed and Unfilled by Weston W. Fields. 1976. Presbyterian and Reformed Publishing Company, Nutley, New Jersey, 245 pages. Paperback, \$4.95.

Reviewed by Robert D. Bell*

In a 1971 C. R. S. *Quarterly* review, John Whitcomb and Charles Smith recognized the book *Without Form and Void* by Arthur Custance as the modern definitive defense for the view of creation which has become known as the Gap Theory. Now one of their students, Weston W. Fields, has expanded his master's thesis into a definitive critique of the Gap Theory, concentrating his efforts primarily on refuting the positions and arguments of Arthur Custance. Those who are still interested in detailed material with which to refute the Gap Theory will, of course, welcome this book.

The bulk of the book (pp. 51-130) treats the arguments involving the language and grammar of the Genesis creation account.

The first chapter effectively demonstrates "that no fully-developed, ruin-restoration exegetical interpretation of Genesis 1:1, 2 appeared until the late eighteenth and early nineteenth centuries" (p. 44). In his book Custance had marshalled a list of writers who down through history from the early Jewish interpreters and Church fathers had supported the Gap Theory. Care-

fully examining each quotation, Fields has shown that Custance has grossly overstated his case.

After treating briefly some other arguments for the Gap Theory (chapter six), Fields turns his attention to some other theories of creation such as the age-day theory and the view that Genesis 1:1 should be translated, "When God began to create . . ."

The final two chapters discuss scientific arguments which indicate a young earth: the decay of the earth's magnetic field and radiocarbon dating.

Although in his linguistic arguments Fields is generally correct in arguing that Genesis 1:1-2 does not indicate a gap, he has nevertheless overstated his case. He is emphatic that the Gap Theory has done "very great violence" to the language (p. 76); in his mind "there can be no doubt . . . that Gen. 1:2a is a noun clause" (p. 78). In short, for Fields, the Gap Theory is "grammatically impossible!" (p. 86).

These overstatements depend too heavily on arguments about the nature of Hebrew sentences and Hebrew verb tenses, both areas in which there has long been a debate among various experts in Hebrew language. This does not mean that there is much hope that the correct translation should be "and the earth became without form . . ."

The most natural translation of the first clause of verse two is "and the earth was unformed . . .," but, according to the present knowledge of Hebrew grammar, it cannot be said *absolutely* that no time or events inter-

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vened between creation and this condition. Of course the Gap Theory is "out on a limb" grammatically with the translation "became," but we must not in our enthusiasm overstate our case.

A key theme in this book is that Bible believers must not accommodate their interpretation of Scripture to the fickle "facts" of so-called science. Fields emphasizes that Christians in the past have often "*imposed* upon the Bible the fallible science of their own time," and he warns that "*science is changing and the Bible is not!*" (p. 46). He speaks of "an unnecessary intimidation of science" (p. 70), "accommodating motives" (p. 160), being "bullied by science" (p. 166), and ridding "ourselves of harmonizations with science which are based on its intimidating power" (p. 222).

Fields is convinced that Exodus 20:11 is so clear, contrary to the Gap Theory, that "only intimidation by contemporary scientism can drive one to persist in

rejecting the plain teaching of Scripture" (p. 74). From a practical standpoint, however, it is not really fair to caricature modern proponents of the Gap Theory as those who are eager to accommodate the Bible to modern science.

Those persons holding to the Gap Theory whom I have known have demonstrated that they were anything but eager to adjust their interpretation of the Bible for the sake of keeping in step with *any* modern view. I have no quarrel with the general position of Fields, but his presentation may serve to alienate some brethren who are most interested in joining creationists in combating modern scientism.

In any argument overstatement and caricature tend to polarize the parties involved, and an argument over a point of interpretation must not be allowed to distract attention from the real enemy in the discussion of Genesis one, scientism and evolution.

REPLY BY DR. FIELDS

I am grateful for the positive comments of Dr. Bell about *Unformed and Unfilled*, but he does not specifically mention four chapters out of 12, merely alludes to five more, and inadequately represents arguments.

I am aware of the ambiguities peculiar to Hebrew. But it should at least be brought to the reader's attention that each of my arguments about a chronological gap in Genesis 1 was substantiated by recognized grammars, in most cases Gesenius'.

I find it singularly curious that he mentions the fact that Gen. 1:2 is a noun clause (less than two pages of discussion in the book), but does not mention what I consider to be the far more important, as well as more completely discussed arguments about the disjunctive character of the *waw* and the circumstantial nature of the first clause of 1:2. It is these three considerations, when taken *together*, which indicate that 1:2 cannot be a chronologically sequential development of 1:1. One wonders how arguments based entirely upon and in no way advancing beyond recognized grammars can be labeled "overstatement."

My arguments do not stand or fall with the fact that Genesis 1:2 is a circumstantial noun clause, but I do not understand his reticence to so identify it. If there are such things as noun clauses, and grammars identify the first clause of 1:2 as such, and I report this fact to my readers, how is that overstatement?

I really doubt that the "arguments about the nature of Hebrew sentences and Hebrew verb tenses" to which he alludes preclude the identification of this as a circumstantial noun clause, or in any way mitigate the disjunctive force of the *waw*, which in turn means that it is highly improbable that Moses had in mind by his use of *hayetha* what is conveyed to the English mind by the translation "became." It should be noticed, furthermore, that Dr. Bell does not even mention that most of my argument on this word dealt with the pluperfect (had become), which is defended by Custance.

As to my statements about why people have defended and still defend the Gap Theory as the proper exegetical

interpretation of the lexical and linguistic features of the Hebrew text, it goes without saying that my conclusions were based on what gap theorists have said in print, and upon conversations with gap theorists I have known. I do not think that Dr. Bell can fairly fault me for not being cognizant of those *he* has known personally who allegedly are "anything but eager to adjust their interpretation of the Bible for the sake of keeping in step with *any* modern view."

I would assume, therefore, that such gap theorists would have no problem with making the Gap period five years or one year or two weeks. But when one reads the literature written by gap theorists over the past 150 years, he immediately discovers that the theory was invented, has been propagated, and is still held largely to account for the *long* spans of time called for by modern geological systems. It is still my opinion that if a person has accepted the validity of the grammatical facts of Genesis 1:1, 2, he will remain a gap theorist only as long as he feels he must find time for geology somewhere.

It is my observation, for instance, that once one accepts the flood as the explanation for the geological features of the earth, he immediately abandons the Gap Theory, whether he knows anything about Hebrew grammar or not. If there are such people who believe in a Gap, but would be willing to shorten the gap to two or three weeks instead of vast periods of time (as required by geology), I am sure that even Dr. Bell would have to admit that they are decidedly the exception. I hardly think it is a "caricature" of the theory to contend that modern proponents of the Gap Theory have been eager to accommodate the Bible to geological science.

While it is true, however, that the main purpose of the theory was to find time for geology, and geology provides the vast ages needed for biological evolution, it does not follow that gap theorists are evolutionists. This was made clear enough in the book.

All gap theorists are creationists, for this is the essence of their theory: they believe in two creations. But I question how many of these people my discussion will

alienate from the creationist movement in the United States. The creationist movement is almost entirely a recent creation movement, led by people who reject the gap, and who believe that all the events and phenomena associated with Noah's flood account for the geological features of the earth.

The Gap Theory and recent creation are mutually exclusive by definition, and that is why most gap theorists with whom I am acquainted show little interest in the Creation Research Society and its various projects. Is Dr. Bell suggesting that we de-emphasize recent creation so that our gap theorist brothers will not be offended? Are those who believe in a local flood also alienated from the creationist movement because most of its leaders are flood-geologists? Should we then de-emphasize flood geology?

I agree with Dr. Bell that the real enemies in the discussion of Genesis 1 are scientism and its evolution. The point of my book is that it is exegetically impossible, theologically unnecessary, and philosophically unwise to posit a chronological gap between Genesis 1:1 and 1:2; and until the Gap Theory has been totally abandoned by Christian creationists I think the book will meet a very desperate need.

☆ ☆ ☆

Isaac Newton, the True Story of His Life as Inventor, Scientist, Teacher by John Tiner, 1975. Mott Media, Milford, Michigan 48042. Price \$5.95.†

Reviewed by Bolton Davidheiser*

When I received this book I could not put it down and read it in an evening. Later I read it again, with as much enjoyment as the first time. It is well written, easy to read, and a sensitive account of the life of a great man.

The French mathematician Lagrange said: "Newton was the greatest genius that ever lived". Of himself, Newton said:

I do not know what I may appear to the world, but to myself I seem only to have been like a boy playing on the seashore and diverting myself now and then finding a smoother pebble or a prettier shell than ordinary, while the great ocean of truth lay all undiscovered before me.

Newton spent untold hours studying the Bible and wrote the equivalent of 30 books about it. The Bible was part of his life; and this book about him refers to the Bible very frequently.

Isaac Newton was born on Christmas, 1642, and there was doubt that he would live through the night. His father was already deceased, and his mother could not cope with the large farm. When Isaac was three years old a rather elderly and well-to-do gentleman proposed marriage to his mother, and upon the approval of her brother she accepted. But one of the conditions was that little Isaac be left on the farm with his grandmother, while his mother moved to a new residence not far away.

Other accounts imply that Isaac grew up a rather abnormal eccentric who never married. This book tells of his love for Catherine Story from the time of their childhood and of his engagement to her. When it became evident that he was not suited to managing the farm it was expected that he would become a country clergyman; but to his surprise he was offered a teaching position at Trinity College, Cambridge. But Trinity professors were not allowed to marry. The engagement had to be broken. According to the narrator, Catherine had expected this for some time, realizing that Isaac was meant to be a scholar.

But seven years later, according to a rule of the school, in order to remain on the faculty Newton would have had to become a clergyman of the Church of England. This he could not do, because he was not in agreement with some of the tenets of that church. The only way to have an exception made was by a direct appeal to the king. Even this involved a long trial, for which he had to go to London. But in the end he was allowed to remain at Trinity.

Newton could not tolerate wrangling over material which is factual. But wrangling there was a plenty. As a result, he neglected publishing important discoveries so as to avoid arguments. When the idea came up about celestial bodies attracting one another with a force varying inversely as the square of the distance between them, nobody could prove it. Newton, however, had already proved it, but he had lost the papers. So he did the work over again.

When he was urged to write about his discoveries, Newton at first refused, on the grounds that it would interfere with his study of the Bible. But finally he did write, neglecting food and rest while he was engaged at the job. The result was the *Principia*.

Robert Hooke, with whom Newton was associated in some of his work, appears in this book as a bad-tempered, jealous, disagreeable, vain and dishonest man. To satisfy Hooke, Newton, to whom the credit really belonged, gave him credit for the inverse-square law in the *Principia*. One reason why Hooke is remembered today is for his discovery of cells. He observed the empty dead cells in cork.

Newton worked so hard—sometimes 18 hours a day for long periods, and that without stopping to eat—that for a while his health broke down and his mind was affected. But he regained his health; and as for his mind after this, upon one occasion he solved in one evening a problem which others had not been able to solve in six months.

For some time he held a position with the mint. In that capacity he solved the problem of England's worn-out coinage. Also, becoming a detective, he discovered and successfully prosecuted the leader of a band of counterfeiters of the new coinage.

I recommend this book particularly as a gift to a young person who is interested in things of a scientific nature. It has a healthy Biblical emphasis. Numerous sepia wash drawings add to the interest.

Controversial matters are not mentioned, which is probably the best policy for a book of this sort. It may be noted, however, that one of Newton's principal interests in the Bible was in the book of Daniel.

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†This review first appeared in *News and Notes*, published by Bolton Davidheiser, and is used here, with slight adaptations, by permission.

It may be mentioned also that Newton's discovery of the law of gravitation has, since his time, sometimes been used in support of the heresy of deism—the notion that God established the natural laws, started the world going, and then left it to run by itself. Much about the way in which these notions developed can be found in Berkeley's writings, especially the *Analyst*, and the correspondence to which it led. But Newton himself, so far as can be determined, never held any such opinion.

☆ ☆ ☆

Variation and Fixity in Nature by Frank L. Marsh, Ph.D. 1976. the Pacific Press Publishing Association, Mountain View, California. 150 pages.

Reviewed by H. L. Armstrong*

In the world of living things, there are two complementary aspects: *continuity*, in that, for instance, within one kind of animal, such as dogs, many varieties are to be found; and *separation*, in that there is a gap, which anyone can recognize, between dogs and cats. Indeed, much the same could be said of dead things; the evolutionist makes much of the alleged continuity of the fossil record; but for all of that the gaps are still there to his perpetual embarrassment.

The same dichotomy exists as things are followed through time. There is variation: many breeds of horse have been developed. But there is also fixity: no breed of horse has ever looked like cows.

The author investigates these complementary aspects of living beings. Subjects considered include the physical basis of heredity, which could be called the basis of heredity, which could be called the basis of stability or fixity; and the causes of variation, since variation within limits from generation to generation undoubtedly occurs. But the key words are: "within limits". There is no evidence for limitless variation.

As for the fossil record, Marsh shows that it is evidence, not for continuous change, but rather for great stability (as is shown especially by the persistence of the so-called living fossils) along with limited variability.

The author has been well known for his investigations into the nature and extent of the Genesis kinds. So it is not surprising to find some space devoted to the question: "What were the original created kinds?" Scripture rarely deals with such details. The conclusion is that, for the most part, the kinds are recognized by "the true instinct of mankind", as Aristotle wrote.

Experiments in breeding may throw light onto doubtful cases. If different animals, such as the bison and the cow, can cross, they belong to the same original kind. But if not, that does not prove that they belong to different kinds. For there are varieties of *Drosophila* which are mutually sterile.

Incidentally, it is shown that hybridization, and related phenomena, could not have anything to do with alleged macro-evolution. For such processes are merely a re-shuffling of existing characteristics; and result in nothing really new. As a matter of fact, many reports of unlikely crosses have to be received with great caution.

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For the whole matter is full of hoaxes and errors. As for mankind, all of the evidence goes to show that man never has crossed and cannot cross with any other creature.

The book concludes with a chapter, "Thoughts to Ponder", in which the author summarizes the conclusions reached. Marsh concludes that the doctrine of limited variability inside of created kinds, which is the scriptural one, is in best accord with the facts. There is also a very useful glossary. Many references to the literature are given.

In summary, this book gives a very readable account of the scriptural doctrine of creation according to kinds, and shows the doctrine to be a reasonable one.

☆ ☆ ☆

The Lives of a Cell by Lewis Thomas. 1974. The Viking Press, New York, 153 pages. Price \$6.95.

Reviewed by Paul G. Culley*

The president of Sloan-Kettering Cancer Center presented these essays in 29 issues of *The New England Journal of Medicine* through 1971-1973. The reading is a delight, and should be shared repeatedly. The chapters are packed with myriad bits of information from all branches of biology.

If God were recognized in it, this encyclopedic story of natural phenomena would be a thrilling experience for any lover of nature and the Bible. One is tremendously let down by the frequent intrusions of evolutionary philosophy, but the glory of God shines through in spite of concessions to evolution.

My favorite chapter, "The Music of This Sphere", is so full of evidence of the Creator, and indicating ways in which all His creatures have been prepared to give praise to our God.

In summary, while this book is not written from a creationistic viewpoint, a creationist will find it an excellent source of useful information.

☆ ☆ ☆

Planet Earth's Last Hope, by Alan Hayward. 1975. Marshall, Morgan and Scott, Ltd., London. 128 pages. Price 50 pence.

Reviewed by A. F. Penner**

Many contemporary futurists, both secular and religious, see planet earth on a collision course.

Willis W. Harman, director of Educational Policy Research Center, Stanford Research Institute, in an address given to the White House Conference on the Industrial World Ahead: A Look at Business in 1990, left little doubt in his hearer's minds that apart from a reversal of man's value systems that would result in less "self-interest-directed microdecisions"; there is little hope for the future of man on this earth.

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Dr. E. F. Schumacker, another secular futurist, Founder-Chairman of the Intermediate Technology Development Group in London, England and Director of the Scott-Baker Institute, in his book, *Small Is Beautiful*, paints an equally depressing picture of the modern world.

Dr. Alan Hayward, in his book *Planet Earth's Last Hope*, also develops a convincing case for the brevity of hope for this earth and its present inhabitants. In the first one-third of the book he documents the unprecedented world environmental crisis we find ourselves in due to pollution, over-population, dwindling natural resources, and the mismanagement of our resources. Dr. Hayward does not develop the root problems of his gloomy predictions until he begins to deal with the solution from chapter four to the conclusion of the book.

The solution is ridiculously simple, says Dr. Hayward. It lies in a good central world government. But who could possess the needed qualities to rule such a massive world empire with multiple problems? There can only be one Person to guide such a mass of humanity and to restore to this world a society with values that will not be centered on selfish materialistic microdecisions, but where everyone's interest will be for the good of the other.

The author offers no hope for this earth's environmental crisis apart from the return of Jesus Christ to this planet. The latter half of the book is a study of the prophetic scriptures pointing to the second coming of Christ.

Dr. Hayward feels that of all the prophecies in the Bible, the ones that speak to the restoration of Israel as a nation are the most unmistakably precise. The return of the Jews to their homeland cannot be confused with any other event in history. "It is the sign that God has given His people—the unique, unmistakable, undeniable, sign—that the Lord Jesus Christ will return to this earth in our time".

In the sixth and seventh chapters Dr. Hayward deals with devastations that are already striking this earth in the forms of wars, plagues, immorality, and the deification of the knowledge of man. These will increase into a period of time known as the tribulation. The author refuses to identify himself with any given theology regarding the length or the sequence of the events during this period, reasoning that the prophecies regarding the order of events during the tribulation are highly symbolic and therefore it is wise to avoid holding dogmatic views about details.

However, he touches on most of the events commonly spoken of by pre-tribulationists, with the exception of

trying to argue for the rapture of the Christians out of this great time of distress and trouble which ends in the great battle of the ages, where the atheistic nations of this world, led by the beast, wage an all-out attack on true religion. This brief campaign against the beast and his armies really will be a "war to end wars". The beast will be defeated and Christ will set up his temporary Kingdom for 1000 years.

In the eighth chapter readers are introduced to the world government at last. For a period of 1000 years after Christ's return His immortal followers will help to set up the world aright. There will be new values, a new environment, and a happier state. The author sees imperfections in the subjects of this kingdom, but the Rule will be perfect. At the end of this period there will again be a separation of the "faithful" from the "unfaithful". Those that are immortal, with the "faithful", will be ushered into the eternal state—heaven.

In the last chapter Dr. Hayward makes practical applications that grow out of a very simple logical Biblical look at the return of Jesus Christ to planet earth. It seems that the author's true burden is exposed in his application where he calls for faith in the living Son of God, and for commitment to the full message of the Bible on the part of believing Christians. Christians have a present responsibility to this earth's environment, to their neighbor, and to themselves. While Christians wait for the personal return of their Lord and Saviour Jesus Christ, Who is the only hope for planet earth, "the New Testament calls us to faith, faithfulness, prayerfulness, and Bible-mindedness".

In evaluating *Planet Earth's Last Hope*, I see its chief worth as a tool for evangelism. It develops the crisis we are in, then offers a simple solution through the person of Jesus Christ. It is a convincing solution because the author uses Biblical prophecy to validate the reality of the deity of Christ and His mission to the people of this earth.

The book does not seek to offer alternate solutions to the environmental crisis, and therefore may not have an appeal to many people who have studied other source materials. I asked a Christian science student who has read considerably on the topic of earth's future to comment on Dr. Hayward's book. His response was lukewarm, because he felt Dr. Hayward neglected to recognize the power of God on earth today through His Word and His Spirit in His people. God has in times past reformed individuals, social orders, and values, to such an extent that society was renewed, and so was the land. Could God not do this again when Christians truly become "light" and "salt" on planet earth?

LETTERS TO THE EDITOR

Further Critique of Velikovsky's Views

As a Christian astronomer I was most intrigued by the appearance of Dr. Keister's article proposing that it would be an improvement of the orthodox Velikovskian view to assume that Mars, instead of Venus, sprang from Jupiter.¹ Although I agree with Dr. Keister that his proposal is an improvement, I do question the soundness of Velikovsky's thesis. If you would bear with me I would like to offer several comments.

For one thing, the assumption that the planets came within each other's Roche limits can be checked empirically. By definition, the Roche limit is that point at which an approaching planetary body would break up because of tidal stress. If, then, such a passage has occurred, especially within the last few millenia, evidence of such passage should remain in the form of a ring of rock and dust around the planets. Since no such ring exists around any of the planets in question, this further aggravates the energy constraints on Velikovsky's thesis.

Another consideration, perhaps, the most difficult of all from Velikovsky's perspective is the observation that all four planets involved: Venus, Earth, Mars and Jupiter, settled into near-circular orbits. Collisions with asteroids cannot account for the resulting orbits.

First of all, all the asteroids left could only minimally influence the orbits of any of the relevant planets at all; and, second, even if this were not the case Mars would have to be hit by a large number of asteroids from a highly specific direction. Collision by just one large asteroid could not work as it would shatter the planet.

As far as traces of asteroid collisions on Mars are concerned, the predominantly cratered hemisphere is the southern one. If bombardment caused the craters, it was from a direction perpendicular to the direction of motion. The case for Venus is even more difficult.

Attention to Jovian Comets

One can also examine the orbits of a family of comets which parallel the paths which the ex-Jovian planet was supposed to have taken. These are called Jupiter's family of comets, or the Jovian comets. Let it be noted that these do not indicate any preference for the supposed seven year orbit, preferring instead, a six year orbit which is half the present period of Jupiter.

The difference between their periods and Jupiter's period results from their highly eccentric orbits. At perihelion these comets average about one astronomical unit (sun-earth distance) from the sun while at aphelion they average slightly further out than the orbit of Jupiter.

Since 1500 B.C. these comets have crossed earth's orbit some 5,000 to 10,000 times and have crossed Mars' orbit some 14,000 times or more (there are over two dozen such comets known and each would cross earth or Mars orbit twice per revolution). Despite this, not one of them could be remotely described as being in a planetary-like orbit, even though they are more readily perturbed than the planets.

In all fairness it should be noted that there is one comet which is known to have a planet-like, near-circular orbit. That comet is the famous "flare" comet,

Schwassmann-Wachmann I (1925 II), which has a period of 16 years and lies 1.16 astronomical units beyond Jupiter. This amounts to a distance of 174 million km., at which distance Jupiter's gravitational influence is far less than the sun's. The orbit of this comet cannot be explained by perturbation theory as derivable from any likely cometary orbit. Indeed, this comet in itself is one piece of evidence for a young solar system.

Why, then, would eminent scientists seriously consider Velikovsky's hypothesis? The uniformitarian scientist is in the least favorable position to answer this question and the Christian is in the most favorable position.

The answer is apparent if we ask a basic theological question, namely, given the irrefutable scientific evidence for recent catastrophes, both in the geologic record and in folklore and literature, where would one turn to if he did not want to accept the responsibility of one's actions implicit in the Scriptures before the God of Abraham, Isaac and Jacob?

Of all the modes of thought in existence at present only Velikovsky's view meets these requirements. That is also one of the reasons why it is becoming acceptable again in the predominant scientific communities to reject the uniformitarian hypothesis, or to even acknowledge openly that it is a hypothesis.² In the above evaluation of Velikovskites I am assuming that 2 Peter 3:5 is as strictly true for them as it was at one time for me.

"Fundamentalist Astrology"?

The Christian reader should bear this in mind when reviewing the work of a Velikovskite, for what he basically seems to propose, once all the trimming is cut away is what, for want of a better word, I consider to be a form of "fundamentalist astrology". I say this because he considers astrological forecasts and observations of conjunctions as literal space-time planetary history; and, furthermore, as indicative of underlying philosophical and psychological truths.³

Once catastrophism becomes respectable again in the predominant scientific community one may expect two developments. First, members of the scientific community will start to invoke Velikovsky-like ideas in their theories. Second, there will arise a division between those holding Velikovsky's or similar views and fundamentalist Christians of the type we now have between Special Creationists and evolutionary Creationists.

The basic difference will center around the question: Is it right to look for or to accept naturalistic explanations for events in the scriptures which are clearly designated as one-time, special event miracles? I refer specifically to the plagues on Egypt, Joshua's command of the sun and moon over the Ajalon Valley, and similar happenings including Hezekiah's sign.

References

- ¹Keister, J. C. 1976. A critique and modification of Velikovsky's catastrophic theory of the Solar System. *Creation Research Society Quarterly* 13(1):6-12.

²Evidence of such a movement can be found in recent literature. An example is Frazier, K. 1976. When the Sun went strangely quiet. *Science News* 109:154-156. Frazier was quoting J. A. Eddy, who said: "We've finally broken a block that has held us back—uniformitarianism. It was an assumption we took as fact." (p. 156).

³See, for example, Wolfe, I. 1975 and 1976. The catastrophic substructure of Shakespeare's *Antony and Cleopatra* (in two parts) *Kronos* 1(3 & 4):31-45 and 37-54.

Respectfully yours in Christ,
Gerardus D. Bouw
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About the Evolution Protest Movement

It may be of interest to newer members of the Creation Research Society to know a little about the Evolution Protest Movement (EPM). EPM is mentioned occasionally in the *Quarterly*, to which, indeed, some members of EPM have contributed.

EPM was the pioneer of systematic scientific opposition to the theory of evolution in England. The founder was Captain Bernard Acworth, D.S.O., R.N. He published articles, critical of evolution, in *The Spectator*, *The National Review*, and *Discovery*, subsequently incorporating them into his book, *This Bondage*, published by John Murray, London, in 1929. A national newspaper, *The Daily News*, bravely welcomed the book "in an age when much so-called science is simply mumbo-jumbo".

On being invited to lecture to the Victoria Institute, or Philosophical Society of Great Britain, Acworth, with others, launched the Evolution Protest Movement. One of his chief supporters was Douglas Dewar, B.A., F.Z.S., a noted amateur ornithologist, who was also a barrister, and former Auditor-General of India.

Other distinguished men, including Dr. Basil F. C. Atkinson, Under-Librarian of Cambridge University, were associated with the cause. Sir Ambrose Fleming, F.R.S., Professor of Electrical Engineering at University College, London, and inventor of the thermionic wireless valve, an ardent opponent of evolution, was the first President of EPM.

These pioneers lectured, debated, wrote in newspapers and magazines, and produced pamphlets, to demonstrate the scientific, social, and spiritual ill-effects of evolutionary indoctrination. Douglas Dewar, a keen debater and a well-informed and able author, became a key figure in EPM as first Secretary, and later President. William E. Filmer, B.A., F.Z.S., succeeded him as Secretary, and wrote a number of pamphlets. He was followed by Albert G. Tilney, B.A., who became a prolific author.

Over 40 pamphlets and booklets were produced during Dewar's term as Secretary. The total number has increased to over 200 now. Incidentally, about 100 pamphlets had been published by 1963, the year of the founding of the Creation Research Society.

Mr. Tilney has just retired, after 21 years as Secretary. He has been succeeded by Alan Radcliffe-Smith, B.Sc., a research botanist at Kew Herbarium. His address is 13 Argyle Ave., Hounslow, Middlesex, TW3 2LE, U.K.

Branches were formed early, and continue to function in Australia, New Zealand, South Africa, and North

America; and there are members in various countries of Europe and elsewhere. The autonomous revived North American branch is known as the North American Creation Movement, Box 5083, Station B, Victoria, British Columbia, Canada. The Secretary is W. Dennis Burrowes, M.A. (Oxon.). This branch issues a quarterly newsletter.

The original EPM *News Letter* has been replaced by a half-yearly journal *Creation*, consisting of eight pages and two four-page pamphlet supplements to each issue.

EPM is controlled by a council of evangelical Christians, including some younger qualified scientists, and is described as "educational, religious, non-sectarian, non-political, and non-profit-making" (at \$1 minimum subscription!). EPM is not committed exclusively to any one of the different views of Creation, such as the long age-day, the gap, or the young earth; but it is strongly opposed to theistic or atheistic theories of evolution, and supports the Biblical account of creation.

Members of the Creation Research Society may recall reprints of E. P. M. pamphlets in the *Quarterly*, such as "Bacterium *E. coli*", "Beginnings", "Teleology and Trace Elements", and "Evolutionary Contradictions and Geological Facts". Examples of other E. P. M. pamphlets are: "The Coelacanth", "Scientific Method", "Horse Evolution", "*Pithecanthropus*", "*Archaeopteryx*", "Viruses", "Theistic Evolution", "Diatoms", "Fossils", "*Cetacae* (Whales)", "Blood", "The Cell", "Uniformitarianism", "The Skin", "The Flood", "Methods of Dating", "Instincts", "Bats", "*Ophidia* (Snakes)", "*Cnidaria* (Jellyfish)", and "Dinosaurs".

In addition, there have been critical reviews of the life and work of evolutionists such as Charles Lyell, Charles Darwin, T. H. Huxley, and Erasmus Darwin. The Biblical aspects of the contest have always been included. This work in defense of, and for the propagation of, the truth of creation continues, with renewed encouragement from developments across the Atlantic.

With warm greetings in Christ to
all members of the Creation
Research Society,
C. E. Allan Turner,
M.Sc., Ph.D. (London) Chairman,
Evolution Protest Movement

Contents of Pothole at Flume Falls, N.Y.

A boulder occurs inside a pothole at Flume Falls, in Adirondack Park, New York, that provides evidence against the erosional origin of potholes. The pothole is bottle-necked in shape, and the boulder inside is oriented in such a way that its deposition from outside appears improbable.

Flume Falls of the West Branch Ausable River occur below the bridge of highway 86, two miles southwest of Wilmington. The pothole is in a rock outcrop which divides the river at the falls. Top of the outcrop is about 30 feet above the water. Many other potholes occur in the vicinity, some partial ones in the gorge having diameters of 10 feet.

The pothole containing the boulder is partial for the top 5 feet, and complete in the lower portion. Complete depth is not known. Maximum diameter in the top sec-

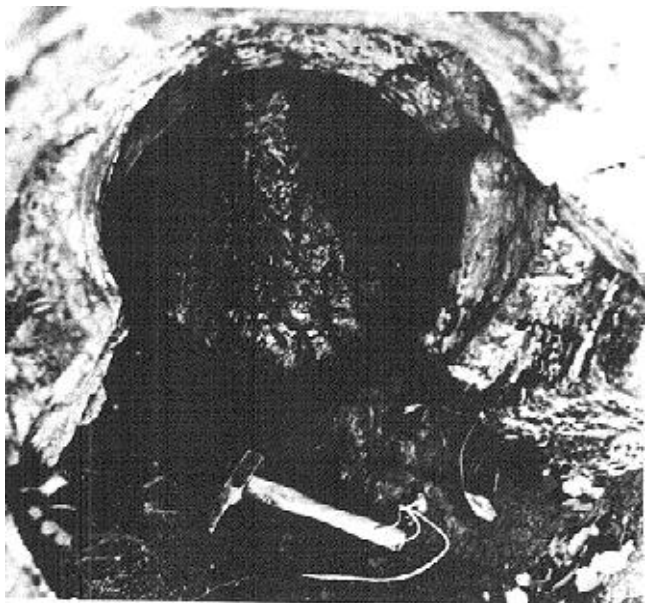


Figure 1. A photograph of the pothole, taken looking down on it.

tion is 27 inches. Diameter at the depth of 5 feet is 20 inches, and the pothole widens lower down. Figure 1 is a photograph of the top of the pothole, looking down.

The boulder was discovered as I removed some of the sand that filled the lower section of the pothole. About two inches of fine sand covered the boulder, and coarse sand was present lower down. Several rounded cobbles were also removed. After extracting the material around the boulder, I found that the boulder vibrated slightly, but could not be pulled out without first removing the gravel underneath. This would allow rotation of the boulder. Figure 2 shows what the pothole was like inside.

In order for the boulder to have been deposited inside the pothole, this process would have to be reversed. That is, the boulder would have to be introduced before the material underneath it! What appears improbable in terms of the erosional hypothesis of pothole formation, is not that the boulder could have fallen into the pothole, but that it could have obtained its present orientation through any depositional process.

Evidence has been presented in the *Quarterly*¹ that potholes were not formed by processes connected with stream erosion, although streams aid in exposing potholes and removing loose material from inside. Boring deep holes into hard rock is quite beyond the capacity of flowing water.

An alternative explanation of potholes is that rocks have disintegrated during a release of pressure on the continents, sometimes resulting in holes that are filled up with the disintegration product.^{2,3} If the Flood waters covered the continents to a considerable depth, such a release of pressure would occur during the elevation of the continents afterwards.

Only about 14 inches of the lower part of the pothole was excavated, and the boulder was left intact. One end of the boulder is tight against the wall of the pothole, and the other end obscured underneath the pothole rim. The rocks and gravel below the boulder are still in the original state. I believe the material inside this pothole is the product of disintegration, resulting from a rapid release of pressure.

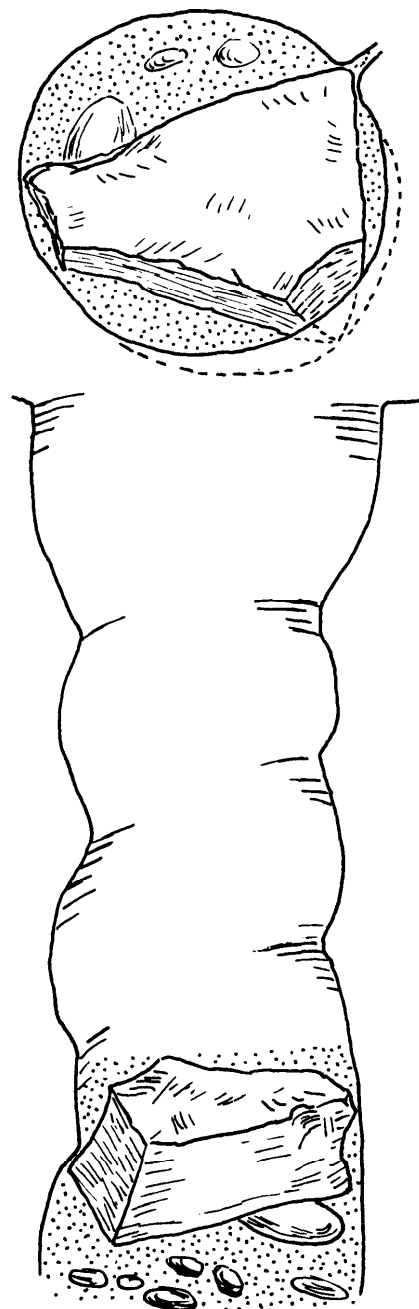


Figure 2. A sketch of the pothole, in two views. The upper view is looking down into the pothole with the boulder represented in position. The lower view is as it would look from the side. The significance of the letters is as follows: A. excavation began at about this depth; B. fine sand; C. coarse sand; D. coarse sand and gravel; and E. maximum depth excavated, about 18 inches.

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- ²Cox, D. E. 1975. The formation of cross stratification: a new explanation, *Creation Research Society Quarterly* 12(3):166-173.
- ³Cox, D. E. 1976. Cave formation by rock disintegration, *Creation Research Society Quarterly* 13(3):155-161.

Sincerely,
Douglas E. Cox
P. O. Box 18,
Petersburg, Ontario,
Canada

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On Tall Tales

The *Kingston Whig-Standard* for 7 October 1976, on page 24, had a brief account, from Jonesboro, Tennessee, of the U.S. National Storytelling Festival held there. One particular tall story was as follows:

The storyteller, as a boy, while fishing one day caught a catfish; but he threw it back. The following day he caught it again. This time he kept it out of the water for a little longer, and then threw it back. And so it continued all summer; the fish staying out of the water for longer and longer periods, until it became accustomed to living on land.

At the end of the summer, as the boy was walking to school, the fish jumped out of the water and began following him like a dog. All went well until they started across an old bridge with a plank missing. The catfish, alas, fell through the hole in the bridge into the water below, and drowned.

Can it be that some gathering similar to the one mentioned here is the source of evolutionary tall tales?

— Editor

Reversals in the Fossil Record

(continued from page 190)

Reports should include full and complete documentation from the original sources. Send any reports to: Marvin L. Lubenow, First Baptist Church, 901 East Lake Street, Fort Collins, Colorado 80521.

References

- ¹Ammonites indicate reversal, *Nature* 225 (5238):1101-1102. 21 March 1970.
- ²This very extensive quotation is taken from the tape recording of Professor Smith's lecture as recorded, with Professor Smith's permission, by the writer of this paper. Because it is an exact transcription of a portion of a somewhat extemporaneous lecture, the language is not as polished as one would expect to find if one were quoting a written document. Those desiring a more extensive treatment of the Lake Idaho fossils should consult: *Fishes of the Pliocene Glens Ferry Formation, Southwest Idaho*, by Gerald R. Smith (Papers on Paleontology, No. 14; 1975) obtainable from The Museum of Paleontology, The University of Michigan, Ann Arbor, Michigan 48104. The price is \$4.16.
- ³See Reference 1.
- ⁴Stokes, William Lee 1973. *Essentials of earth history*. Third Edition. Prentice-Hall, Englewood Cliffs, New Jersey, p. 319.
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- ⁸Kurten, Bjorn 1963. Return of a lost structure in the evolution of the felid dentition, *Societas Scientiarum Fennica, Commentationes Biologicae, Helsinki XXVI* (4):3.
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- ¹⁰*Ibid.*, pp. 10 and 11.
- ¹¹Byers, George W. 1969. Evolution of wing reduction in crane flies (Diptera: Tipulidae), *Evolution* 23(2):346.
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- ¹⁶See Evolution of the Elephantidae, *Transactions of the American Philosophical Society* 63(3):71-77. 1973.
- ¹⁷Keith and McCown. 1939. The stone age of Mount Carmel, Volume II. Clarendon Press. Oxford, p. 11.
- ¹⁸*Ibid.*, p. 373.
- ¹⁹Eiseley, Loren C. 1948. Antiquity of modern man, *Scientific American* 179(1):16-19.
- ²⁰Laughlin, William S. 1963. Eskimos and Aleuts: their origins and evolution, *Science* 142(3593):633-645.

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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