

# EDITORIAL

## THE IGNORANCE OF ISOLATION

We don't know how much we don't know. This is one of the tragedies of ignorance — its victims are unaware of their plight. This problem has become more apparent in our age of specialization when our limited intellectual capabilities force us into narrow areas of inquiry where we can still make significant contributions. As we specialize, our outlook becomes narrower and we become less aware of the broad complex of reality that we are ignoring.

We need specialization but not isolation. Specialization enhances knowledge, but it tends to narrow our outlook. For instance, the deep meaning that the artist tries to convey may not be fully appreciated by the scientist or the banker, and the theologian or historian seldom understands the philosophy of science. The common curricular components of our basic education give us a casual acquaintance with various areas of information but seldom provide a good understanding of the underlying premises. As an example, many courses in science are often taught mainly as established fact instead of a search for explanations.

A more serious problem caused by the isolation resulting from specialization is that individuals and small restricted groups proceed to develop a world view of reality based on a narrow segment of information. The commonly cited errors made by theologians during the debate about the geocentric universe is an example. Likewise, the theologians or artists rightly point out that science is a narrow view and there is more to reality than is amenable to scientific analysis. Wholly naturalistic explanations seem inadequate. Man's consciousness, free will, concern, morality, vision, and sense of duty and purpose seem to be a little too much to attribute to just naturalistic explanations. Many object to the tendency of science to reduce man down to a meaningless mechanism, while scientists tend to shun the less objective aspects of reality.

Based upon these limited views, individuals or groups develop their own life philosophy. This is a biased approach. To correct this, more emphasis should be placed on a broader view of reality. While we want to reap the benefits of specialization, we must also "specialize" in breadth. There should be more emphasis on interdisciplinary endeavors. Truth is the goal, and it will be reached more readily if we try to destroy the artificial barriers that have been erected between different domains of inquiry. Specialists in different areas should combine their efforts. Multidisciplinary approaches that combine very different areas of inquiry such as history, literature, science, and religion should be encouraged. Truth is broad; so should be our efforts to reach it.

Ariel A. Roth

# REACTIONS

*Readers are invited to submit their reactions to the articles in our journal. Please address contributions to: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA.*

## **Re: Student Research Organization**

The readers of your publication might be interested to know of the formation of an inter-campus organization called “Students for Origins Research” (SOR) whose main purpose is to assist college students and instructors in studying the evolution-creation issue.

Recent debates concerning scientific views of origins held on many university campuses have prompted students to evaluate the evidence for themselves. As a result, students have been forming campus clubs at various schools. In 1974, several science students started one such group at the Santa Barbara campus of the University of California known as the “Creation Society of Santa Barbara.” Since then, other groups have been formed, such as the “Evolution Inquiry Association” which was started by a pre-med student at the Los Angeles campus of the University of California, and a Creation Research Society student chapter at the University of Texas, El Paso. We are continually receiving requests from students to help initiate similar groups at their schools. Since very little effort is being made by school administrators or professors to present a balanced view of origins, students are being motivated to take the initiative.

Among the present goals of SOR are:

- Prepare a packet of material that will help students form an origins research group on their campus.
- Help students plan lectures and debates, and provide them with information concerning scientists who are willing to speak on different theories of creation.
- Provide reference materials for students who would like to do term papers on origins-related topics and who would be interested in including the creationist viewpoint.
- Publish the newsletter, ORIGINS RESEARCH, that would:
  - report on student activities;
  - provide a means for students to have their research papers distributed;
  - provide a cost effective means to present sound scientific evidence concerning the creation model of origins to skeptical or uninformed students and professors;
  - discuss the philosophical features of the creation and evolution models of origins.

The first issue of ORIGINS RESEARCH was published in February 1978, and we hope to put it out every two months, depending on available finances and student research papers. This newsletter will be sent free of charge to all students and faculty requesting it, and will be available at a \$2.00 annual subscription rate to all other interested persons.

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**Re: Roth: Clastic Dikes (ORIGINS 4:53-55)**

Sandstone dikes in granite are anomalous in terms of current assumptions of a detrital origin of sand grains in sandstones. One would not expect layers of sandstone beneath granite; so it has been postulated that sand must have intruded granite from above by some means. In Colorado some such mechanism must have been capable of forming a vertical wall 1000 feet high and 300 feet thick in granite.

The common tendency for sandstone dikes to pinch and swell seems to indicate that the idea of sediments infilling cracks is an oversimplified or incorrect explanation. Cracks formed in a host rock ought to have parallel side-walls. The usual suggestion that sand was forcefully intruded into cracks, causing the walls to dilate, encounters several problems: 1) no adequate mechanism for intrusion of sand is known; 2) sandstone dikes occur in porous rocks, and similar structures are found even in unconsolidated material, in which the pressure needed to cause intrusion would dissipate; 3) a fluid mixture of sand and water, or whatever else is believed to have intruded the host rock, would be incapable of dilating rock walls composed of granite or of most other rocks.

Another problem with the conventional theory of sandstone dikes is the origin of the vertical stratification which sometimes occurs. Vertical laminations resembling cross stratification within a sandstone dike were reported by Peterson [Peterson, G.L. 1968. Flow structures in sandstone dikes. *Sedimentary Geology* 2(3):177-190]. He suggested, however, that this structure probably originated in a manner entirely different from normal cross stratification, generally thought to involve deposition from rapid currents. Perhaps the assumption of an exogenous origin of sand grains in dikes should be reexamined. The term "clastic dike" may be a misnomer. An alternate explanation of sandstone dikes is possible, utilizing a mechanism of rock disintegration during uplift of the continents at the end of the Noachian Deluge, as proposed by the writer [Cox, D.E. 1975. The formation of cross stratification: a new explanation.

Creation Research Society Quarterly 12(3):166-173]. Rapid uplift of continents would be accompanied by faulting. Rocks under pressure subjected to faulting could be altered in the vicinity of faults. These faults would be low pressure zones penetrating the rocks. Here, shattering and granulation could occur, forming sandstone dikes by conversion of the host rock into sandstone.

This alternate explanation for clastic dikes does not detract from the suggestions about time constraints associated with these peculiar structures pointed out by Roth.

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# ARTICLES

## THE UNITY OF THE CREATION ACCOUNT

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### WHAT THIS ARTICLE IS ABOUT

*Using the principles of biblical criticism, scholars since the past century have determined the first two chapters of the book of Genesis to be two different — even antithetical — accounts of creation, supposedly separated in source by several centuries. If indeed their assumption is correct, then the creation accounts do not necessarily represent a historically accurate record of God’s creative acts.*

*In this article, Dr. Shea examines the literary structure of Genesis 1 and 2. He concludes that the formulaic language and striking parallelism of subject matter in Genesis 1 are characteristic of poetry, although its meter is non-poetic. Genesis 2 resembles the structure of normal prose. The themes are unified, and the description of an event using the pattern of poetry/prose is common, not only in other portions of the Old Testament, but also in literature of Israel’s neighbors. Furthermore, the composition of these combinations of poetry/prose is considered to be essentially contemporaneous.*

*From the thematic unity between the two chapters in Genesis, from the many form features they share in common, and from the intricate and detailed nature of some of these formal relationships, the author concludes that Genesis 1 and 2, written by one author, are complementary halves of a unified account of God’s creative acts.*

*To further support his case for the single authorship, Dr. Shea turns his attention to the different names for the deity in the two chapters. Scholars have used the different names to prove separate authorships — centuries apart. After examining the names in both accounts, he finds that the names change only at the creation of man. He concludes that a “name” theology was involved in this distribution of names, because the author of the account wanted to say something about the personal involvement of the Creator God.*

### I. THE PROBLEM

With the rise of biblical criticism in the Age of Rationalism, the Scriptures underwent a penetrating re-analysis. One major aim of this new analysis was to determine and sort the literary sources from which the books of the Bible had been compiled. A parade example of this task comes from the first two chapters of Genesis where, it is claimed, are given two different — even antithetical — accounts of creation. Most critics separate the composition of these two sources by several centuries, attributing the Yahwist (J) account in Genesis 2 to the 10th century B.C. and the Priestly (P) account in Genesis 1 to the 6th century B.C. It follows, from this viewpoint, that if these two accounts were composed by different

authors centuries apart, one need not be surprised to find discrepancies between them when they are compared. Thus a recent commentary on Genesis 2 describes supposed differences in approach and emphasis, then concludes:

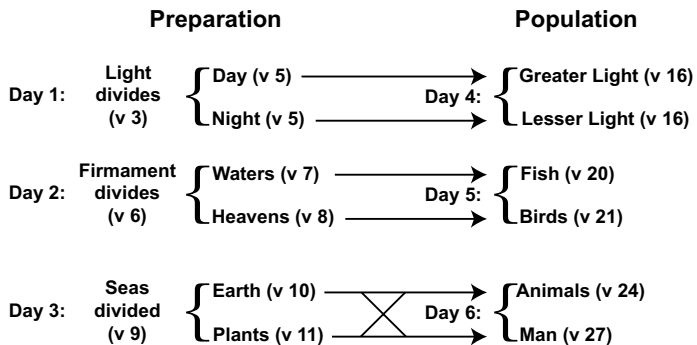
*This far-reaching divergence in basic philosophy would alone be sufficient to warn the reader that two separate sources appear to be involved, one heaven-centered and the other earth-centered.... In short, there are ample grounds for recognizing the hand of P in the preceding statement, as against that of J in the present narrative.<sup>1</sup>*

This conclusion about the first two chapters of Genesis can be investigated chiefly through examining their two main features: form (literary structure) and content (the distribution of the divine names).

## II. LITERARY ANALYSIS

### A. The Literary Structure of Genesis One

Commentators on Genesis have long noted a certain parallelism of subject matter within the account of creation contained in Genesis 1, i.e., between what occurred on the first three days of creation and what occurred on the second three days.<sup>2</sup> I concur with those interpreters who have emphasized the parallel nature of these creative acts and suggest that such parallelism may be even more far-reaching than has previously been noted. A schematic outline of this chapter demonstrates these relationships.



Not only is there a general parallelism between the first and last three days of creation, but also a parallelism within each creative day all the way through the creation week, for the activity of each day consisted of either two creative acts or one creative act which resulted in the division or identification of two essential elements in nature. The apparent exceptions to this duality of activity or objects on each creation day should be explained. Only light was created on the first day, but that light divided off day and

night, both of which were named by God at that time. On the second day the only new element identified specifically as made was the firmament, but it divided the waters above from the waters below; so the end result of this action was to arrange these two elements of nature in this way. The waters below were not named Seas until the third day when they were rearranged to make way for the emergent dry land (earth), but the really new elements that appeared on this day were the earth and plant life. Aside from the creation of land animals and man, the record of the sixth day includes the assignment of dominion over those animals to man and the designation of plant life, created on the third day, to serve as food for both man and beast.

On the whole, emphasis is placed upon two particular elements on each day of creation, and these two elements on the first three days relate to the two elements evident on each of the last three days. Thus the account contains elements of parallelism on the larger scale (between the first and last three days of creation) and on the smaller scale (with two elements per day). This smaller scale of parallelism in the creative acts of God is of some importance when this account of creation is compared with that which appears in Genesis 2.

Since the content of the record for the sixth day of creation is of particular interest to us here, its literary structure deserves examination in more detail. That structure is outlined in translation in Figure 1.

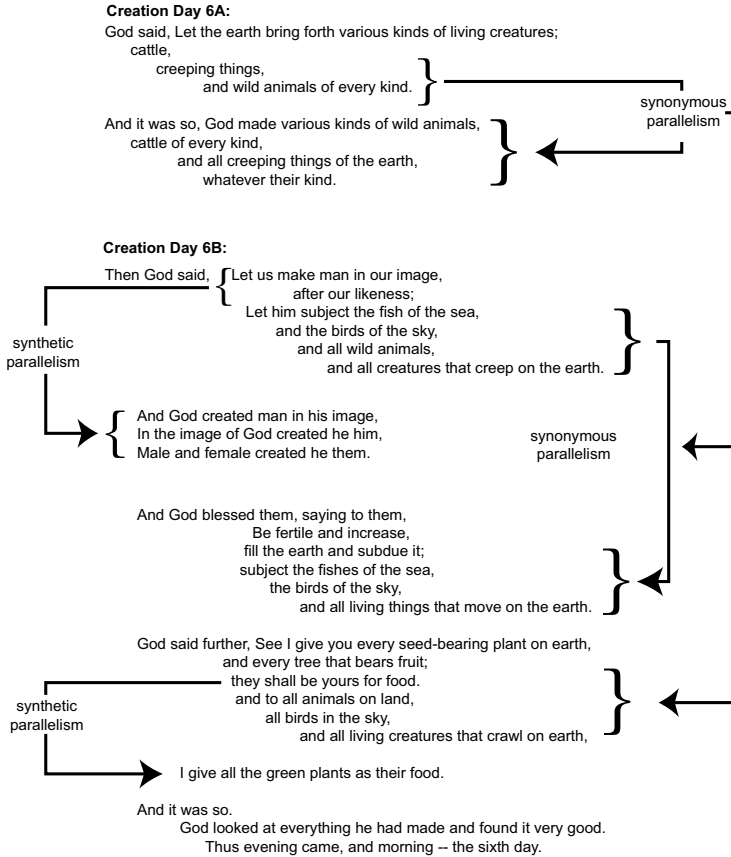
I would like to emphasize the basic parallelism of the record of the sixth day of creation. This parallelism has come about through the way in which this record and those of the other days of creation are structured.

These entries begin with a statement of divine intent followed by a statement of divine accomplishment, both of which refer to the same objects which are listed or described in essentially the same terms. The parallelism involved throughout the record of God's different creative acts is obvious.

In particular the parallelism of the sixth day can be seen first from the account of the creation of land animals. God said that the earth was to bring forth various kinds of living creatures, and then the text states that He made the various kinds of creatures involved. Both statements are elaborated with a very similar list, which shows the parallelism of this portion of the account.

The structure of the record of the creation of man is a little more complicated. It begins with the statement of divine intent, "Let us make man," and is paralleled by the record of God's accomplishment of that intent in verse 27. Yet, in between these statements of intent and accom-

**FIGURE 1**



plishment is a statement of purpose that man was to have dominion over the animals. This in turn is paralleled by another statement concerning that dominion — that it was assigned to man after he was created. Finally, this section concludes with two statements regarding food for man and food for the beasts, which again are in parallel as far as overall intent is concerned. Thus this section of the record of the sixth day of creation goes through three cycles which may be designated thematically as A:B::A:B::A:B.

- A. Man (his creation proposed)
- B. Animals (dominion over them proposed)
- A. Man (his creation accomplished)
- B. Animals (dominion over them assigned)
- A. Man (his nourishment assigned)
- B. Animals (their nourishment assigned)



Thus the basic parallelism in thought content of the record of the sixth day of creation in particular is well established, even though it is not put in precisely poetic form except for the statement concerned with the creation of man in verse 27 (see below). As has already been noted, a considerable amount of the parallelism involved in this chapter comes from the repetition of lists of things created on each of the days of creation respectively. The record of the creation of man bears a relationship to these lists in one sense that is not immediately apparent, for a list occurs in this case also, i.e., the nature of mankind is elaborated in more detail with a short list containing its two members — male and female.

## **B. Is Genesis One Prose or Poetry?**

The answer to this question is of some importance because it has been argued since the last century that the account of creation in the first chapter of Genesis was poetic and need not therefore be expected to convey historically accurate information about God's creative activity. As an artistic and aesthetic piece of literature — so this argument goes — this story was only intended to convey general truths about God and not a history of His mighty acts. With the attention currently being given by scholars to archaic or pre-Psalter poetry this argument has now become outmoded. Considerable stress has recently been placed upon endeavoring to reconstruct history from these old poems and they are now commonly considered older than the prose accounts which accompany them.<sup>3</sup> In fact, if one does consider the first chapter of Genesis to be poetry it would be extremely difficult, from a critical point of view, to assign it to so late a source as P (6th century), as some have suggested, because all the other poems in the Pentateuch (Gen 49; Exod 15; Num 23-24; Deut 32-33) are now generally considered to be pre-monarchic, i.e., from the second millennium B.C.

To answer the question of whether Genesis 1 is prose or poetry we will look first at the two lines of evidence which suggest that it might be poetry — formulaic language and parallelism — and then we will look at that line of evidence which suggests that it is not poetry — meter.

**1. Formulaic Language.** Five phrases are used repeatedly through most or all of the entries for the days of creation: 1) "And God said," 2) "Let there be X," 3) "and it was so," 4) "and God saw that it was good," and 5) the datelines. Four of these phrases occur in all six of the entries for the days of creation, the phrase "and God saw that it was good" being the exception, since it does not occur in the record for the second day. Considering the regularly repetitive use to which these phrases

were put in this account they can characteristically be considered formulaic in nature, and formulaic language (supposedly characteristic of P)<sup>4</sup> is one feature found on occasion in Hebrew poetry (e.g., see the refrains in Psa 42-43 and 107 and the formulaic phrases employed by the prophets such as are found in Amos 1-2). Thus one could suggest that the use of formulaic language here points in the direction of poetry, but it does not make interpreting this chapter as poetry mandatory without further support for that interpretation from other lines of evidence.

**2. Parallelism.** The detection of parallelism in Genesis 1 is basic to interpreting this account of creation as poetry, because parallelism was one of the basic techniques practiced by the ancient Hebrew poets. Modern scholars have analyzed the types of parallelism employed by the ancients from the grammatic and thematic points of view. The grammatic analysis of parallelism sees if the grammatic elements that occur in the first colon or line of a poem's bicolon are repeated in the second colon of that bicolon.

The parallelism is not complete unless all the same elements are present.<sup>5</sup> Thematic parallelism analyzes how the thought in the first colon of any bicolon in a poem is reflected in the second.<sup>6</sup> If the content and expression of the ideas in both cola are very similar, there is synonymous parallelism. If the cola express opposite ideas, then the parallelism is termed antithetical. Synthetic parallelism occurs when the second colon extends and complements the idea of the first colon.

All three types of thematic parallelism can be found in the account of the first day of creation:

When this type of analysis is carried through all six of the entries for the days of creation, the most impressive result is that 21 cola or lines have no parallel member in the text. This large number of unparallelled cola would be very exceptional in a poetic passage but would be more natural in a prose passage.

God said, "Let there be light." And there was light.	synonymous parallelism
God was pleased with the light that He saw, and He separated the light from the darkness.	synthetic parallelism
God called the light Day, and He called the darkness Night.	antithetic parallelism
Thus even came, and morning — the first day	no parallelism

Basically, the parallelism contained in the accounts of the different days of creation follows a similar pattern:

And God said, Let there be X.  
 And it was so. And God made X.

The phrase “and it was so” is difficult to locate correctly in any poetic analysis of the passages in which it occurs as it intervenes between two parallel members. Does it belong at the end of the first “colon,” between the two, or at the beginning of the second? These possibilities can be outlined thematically as follows:

AB - CDE - FG CDE	AB - CDE FG CDE	AB - CDE FG - CDE
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In the first and last instances these lines would comprise a bicolon, while the middle alternative presents as a tricolon. If one attempts to analyze this chapter as poetry, then the third alternative probably is preferable, but the difficulty involved in determining the correct poetic location of this phrase, and others also, illustrate the difficulties involved in treating the whole chapter as poetry. Accepting the third alternative proposed above as most likely, however, we may proceed to a specific example of this construction from this chapter, the case of the creation of plant life on the third day.

Regardless what one does with the phrase “and it was so,” it is clear that the parallelism involved here relates two very long lines to each other. Excluding the two introductory statements, these two lines contain 15 and 13 Hebrew words respectively. These 15 and 13 words are in parallel with each other as units, as the parallelism involved does not lie within

And God said, Let the earth burst forth with growth; plants that bear seed, and every kind of fruit tree on earth that bears fruit with its seed in it.	}	
And it was so. The earth produced growth: various kinds of seed-bearing plants, and trees of every kind bearing fruit with seeds in it.	}	

these units themselves. Lines of this length clearly go far beyond those commonly employed in poetry elsewhere in the Old Testament, which brings up the subject of meter. Before turning to that topic, however, the subject of parallelism might be summarized here briefly by stating that it does occur in this account in a number of instances, but in a rather rough or general way rather than in the more precise way in which it was used

in poetic passages elsewhere in the Old Testament. Thus while the initial impression conveyed by the parallelism present here is that this chapter might be poetry, upon close inspection the type of parallelism employed here lends some support instead to the idea that in reality this chapter is prose.

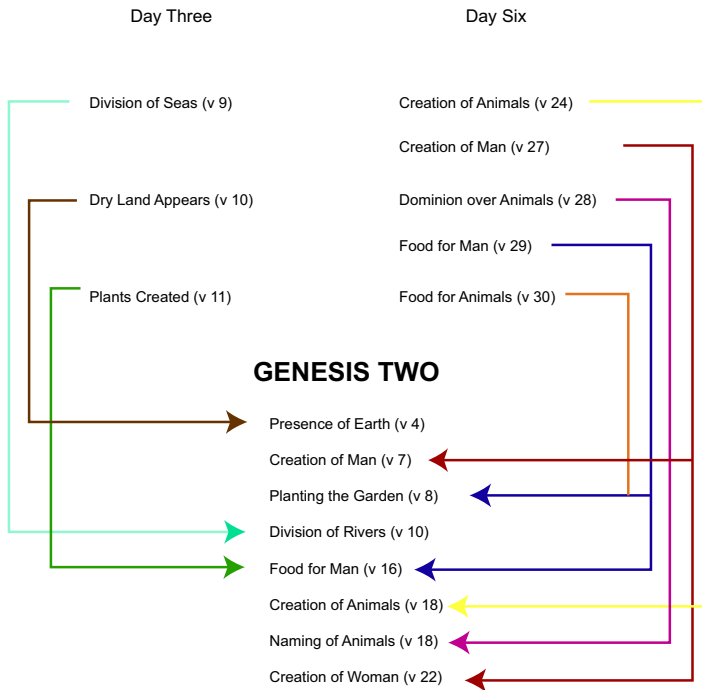
**3. Meter.** With a consideration of meter the suggestion that Genesis 1 is poetry really breaks down. Since more than one-third of the Old Testament was written in poetry, we have a rather extensive corpus of ancient Hebrew poetry with which to compare any meter suggested for this chapter. Modern scholars currently measure this meter by the length of the individual lines or cola. Colon length is determined in turn either by the number of words per colon (each word generally receiving one stress accent) or by the number of syllables per colon.<sup>7</sup> Short cola generally consist of 2 words (stress accents) or 4 to 6 syllables. Medium length cola consist of 3 words (stress accents) or 7 to 9 syllables. Long cola contain 4 to 5 words (stress accents) or 10 to 14 syllables. Cola of more than 5 words or 15 syllables are very uncommon in the Hebrew passages of biblical poetry.

In the example cited above from Genesis 1:11-12 we would have to posit two cola consisting of 19 and 17 words each in order for this passage to be considered poetry, and such cola would clearly extend far beyond the length of poetic cola found elsewhere in the Old Testament. The same holds true for other instances of parallelism that could be cited from this chapter. When judged by the standard of meter, therefore, Genesis 1 clearly is not poetry. Though not poetry in the stricter sense of the word, it does contain some poetic elements, such as the formulaic language and the general parallelisms noted above. In essence, therefore, it is prose having a poetic-like character and thus is defined accurately as poetic prose.

### **C. The Thematic Unity of Genesis One with Genesis Two**

We turn now to the relationship of Genesis 2 to Genesis 1. Is Genesis 2 a different source for the account of creation or is it part of the same source as Genesis 1? The more distinct Genesis 2 is from Genesis 1 by content, the more likely the first alternative is, and the more similar it is by content, the more likely the second alternative is. The creation account in Genesis 2 deals essentially with those objects to which the third and sixth days of creation were dedicated in Genesis 1: earth, plants, animals, and man; hence, it is with these two particular passages from the preceding chapter that this account should be compared. That comparison is outlined in Figure 2.

**FIGURE 2  
GENESIS ONE**



From this outline it can be seen that every major element present in the records of the third and sixth days of creation in Genesis 1 recurs in the account of creation in Genesis 2. Conversely, every major element in the account of creation in Genesis 2 is already present in the records of the third and sixth days of creation in Genesis 1, albeit in more abbreviated form. The close connection between these two accounts is readily apparent, therefore, when their contents are checked against each other. Thus what we have in the second chapter is not so much a new account of creation as it is a recapitulation of those elements already noted as created in the first chapter with added information about them.

These two accounts might also be differentiated into two different sources by their vocabularies, especially with regard to the verbs that predicate divine activity. This differentiation has been followed in the case of the verbs “create” and “make.” The former is identified as the theme verb of Genesis 1 while the latter is assigned that function in Genesis 2. This differentiation of verbs between these two accounts is both artificial

and inaccurate. For example, in the account of the creation of man, the verb in the statement of divine intent in Genesis 1:26 is “make,” whereas the verb in the statement of divine accomplishment in Genesis 1:27 is “create.” This is a poetic pair of verbs, as is evident from the fact that both “create” and “make” occur precisely eight times between Genesis 1:1 and 2:4a where these accounts are generally divided. From this it is clear that Genesis 1 is no more the chapter of the verb “create” than it is of the verb “make.”

It is true that the verb “create” does not occur following Genesis 2:4a, but the verb “make” only occurs twice thereafter in contrast to the eight times it occurs in the first account of creation. This is not a contrast in verbal usage between different verbs but a contrast in the frequency of usage of all of the verbs contained in both accounts. This can be demonstrated by a further comparison of the rest of the verbs in both accounts that predicate divine activity. Aside from “make” these two chapters share only two other verbs in common. The verb “to say” is used ten times of God in the first chapter while it is used with Him as the subject twice in the second chapter. The verb “to see” is used of Him six times in the first chapter and only once in the second chapter. Notice again the contrast in the frequency of the use of these two verbs between these two chapters, just as is the case with the verb “make.” Beyond these four verbs are eight others which are used for divine activity in the first chapter that do not occur in the second chapter, and a dozen verbs in the second chapter which do not appear in the first chapter.

At first glance the verbal differentiation between these two chapters might provide some support for the idea that they originally comprised two independent sources for the story of creation. However, this difference probably has more to do with the different literary characteristics of these two passages and their contents than it does with any question of sources. Genesis 1 is a skeleton sketch of the events that occurred during the seven days of the creation week and it is written in outline form using poetic prose. Considering the repetitive framework for the acts of creation recorded here it is natural that the verbs “say,” “create,” “make,” and “see” in this account should recur frequently. The second account of creation flows on in the manner of a more standard historical narrative, providing a focused view of the events of creation that occurred on one of the seven days referred to in the first account of creation. Given the different literary characteristics of these two accounts, finding a different vocabulary in them is not unexpected. The union of these two types of writing in one harmonious whole is discussed further below.

The record of creation on the sixth day in Genesis 1 states twice that man was to have dominion over the beasts of the field. The same aspect of man's creation is emphasized in the second chapter with the description of how Yahweh brought those animals to Adam for him to name. The creation of woman, a major point in the creation account of the second chapter, is anticipated in the last colon of the tricolon in the first chapter which refers to the fact that God made both the male and female of mankind at that time. The account of creation in the second chapter is basically an elaboration upon that very point.

We might summarize the matter of the thematic unity between these two chapters by emphasizing once again the point elucidated from the outline presented above: that when those portions of the first chapter having to do with the Earth, Plants, Animals, and Man are compared with the second chapter, it is evident that they share in common virtually all of their major themes relating to those particular subjects. The fact that those major themes are elaborated in greater detail in the second chapter is only a natural consequence of the progression of the Genesis narrative and, I would suggest, did not result from collecting under one cover two originally different and possibly antithetical stories of creation derived from two independent sources.

#### **D. The Formal Unity of Genesis One with Genesis Two**

**1. Related at the Juncture.** Although traditional translations have divided these two accounts between Genesis 2:3b and 2:4a, the division made by modern scholars between Genesis 2:4a and 2:4b may well be correct. Working from that premise we may note the very precise relationship of the end of the first account to the commencement of the second account. Before discussing that relationship, however, we should note the relationship of the opening statement of the first account of creation to its closing statement:

These two statements share four elements in common while two elements differ. The common elements are the preposition "in," translated "when" in the second statement, the pair of "heavens and earth" and the verb "create." "Beginning" and "God" in the first statement are missing from the second statement while "these" and "generations" in the Genesis 2:4a statement are missing from Genesis 1:1a. Given the close relationship between the contents of these two statements, a formal relationship between them can be proposed, that of an inclusion or envelope around the first account of creation. As an *inclusio* these two statements present an external chiasm since the preposition and verb occur at the beginning of the statement at the beginning of the account and at the end of the

Genesis 1:1a "In the beginning God created the heavens and the earth...."

Genesis 2:4a "These are the generations of the heavens and the earth when they were created."

statement at the end of the account, where they logically belong from a poetic point of view.

Next we may note the relationship of the concluding statement of the first account of creation to the opening statement of the second account. The syntax of Genesis 2:4a reverts back to precisely that of Genesis 1:1a. In the Hebrew text this order is:

- 1) prepositional phrase, "in the beginning/in the day,"
- 2) verb, "created /made,"
- 3) subject, "God/Yahweh God,"
- 4) objects, "the heavens and the earth/the earth and the heavens."

Since Genesis 1:1a is in chiasm with Genesis 2:4a as an *inclusio*, it follows that Genesis 2:4a is also in chiasm with Genesis 2:4b since Genesis 2:4b parallels Genesis 1:1a syntactically. The preposition and verb occur at the end of Genesis 2:4a but at the beginning of 2:4b. Heavens and earth not only occur at the end of Genesis 2:4b, in contrast to their position in 2:4a, but they have also been reversed in order here to emphasize the chiasm present. Chiasms in the Old Testament commonly occur at the center of the poems. In this case they occur at the center of the creation story, joining the two parallel accounts which go to make up the entire story. If one were to treat this juncture poetically one could say that the first creation account is tied in here with the first colon of the "bicolon." I would not press the form of Genesis 2:4 so far as to say that it is a true bicolon, but the poetic technique employed here applies regardless of whether it is found in an explicitly poetic unit or not.

A second feature found at this literary seam also ties these two accounts together and that is the relationship of the verbs present in these two statements. The poetic pair of verbs, "create" and "make," occur together at the end of Genesis 2:3 with "create" as the A-word and "make" as the B-word. This poetic verbal pair is broken up thereafter in Genesis 2:4 with "create" as the A-word in 2:4a at the end of the first account, and "make" as the B-word in 2:4b at the beginning of the second account. Thus both the clear-cut case of chiasm and the break-up of the poetic pair of verbs present emphasize the close relationship that exists between Genesis 2:4a and 2:4b according to their form. The literary features found at this juncture draw the dividing line between these two accounts and establish connecting links between them across that dividing line. On the



basis of these observations it seems fair to state that the direct ties found at the juncture between these two prose passages appear to be as strong as any similar connecting links found elsewhere in the Old Testament.

**2. Introductory Statements.** Both of these creation accounts open with preliminary statements about the state of the world before it was affected by the more direct creative acts described in them. In the first chapter this statement describes the watery state of the world before the creation of light, the event most directly connected with that first delimited day. Whether there was a gap in time between what is described as occurring in Genesis 1:1 and in Genesis 1:2 is a side issue here. What is important to note is that when God went about fitting the world for man, the account presupposes that the surface of the earth was in an essentially watery state when He went about that work.

The second account of creation begins with a similar presupposition, only in this case the presupposition is that of the presence of the dry land or earth in the more specific sense of the word (Gen 2:5). This introductory statement presupposes that a minimum of the first three days of creation in the first account preceded the events described in the second account. Thus both of these narratives begin in a similar manner, with a presupposition about the state of the earth before it was more directly affected by God's creative acts described in their respective accounts. The first account identifies that preliminary state of the earth as an aqueous one while the second account predicates the existence of dry land and plants at that point in time. The presuppositions about the state of the earth presented in these preliminary statements constitute another parallel between these two accounts of creation.

Observations on that parallel can be extended to note the form that parallel takes on here. This form can be visualized best by outlining the verse involved in translation.

Although these verses are all, as far as I can see, poetic prose, they can, nonetheless, be studied along the lines of poetic analysis. Before

Genesis 1:1-2:

In the beginning when God created the heavens and the earth,  
The earth was without form and void,  
and darkness was upon the face of the deep,  
and the Spirit of God moved over the face of the waters.

Genesis 2:4b-6:

In the day when Yahweh God made the earth and the heavens,  
No plant of the field was yet in the earth,  
and no herb of the field had yet sprung up;  
For Yahweh God had not caused it to rain upon the earth,  
and there was no man to till the ground;

But a mist went up from the earth,  
and it watered all the face of the ground.

discussing the relationship between these two passages, the internal arrangement of the second passage might be noted since it is more complicated than that of the first. If Genesis 2:4b-6 were treated as poetry it could be referred to as a title line followed by a triplet of bicola. The relations between these "bicola" can be seen in several ways. There are key words in parallel between them. The word "earth" occurs in the first line of all three. In the first instance the word "field" is linked with it and in the last two instances it alternates with "ground." God and man occur in the center of this triplet and not on either side. The emphasis at the beginning of this passage is upon the lack of plants in the field and the emphasis at the end of the passage is upon watering the ground. At the center of this passage it was Yahweh who watered the ground and man who was to till the fields which still lacked plants. But the order in the center of this triplet is Yahweh:man which is reversed so far as the elements with which they are connected are concerned, since man should precede with the fields and Yahweh should follow with the waters. This intricate pattern can be expressed as A:A::B:A::B:B.

The relationship between Genesis 1:1-2 and Genesis 2:4b-6 is best seen quantitatively. If Genesis 1:1-2 were treated as poetry it could be referred to as a title line followed by a tricolon. From the same point of view the pattern of a title line followed by a triplet of bicola has been suggested for Genesis 2:4b-6. Both of these passages commence with title lines whose similarities by content and syntax have already been noted, and they continue with a "tricolon" and a triplet of "bicola" respectively. The difference between the former and the latter form is a total of three lines, the triplet of bicola containing twice as many "cola" or lines as the tricolon. This is appropriate numerically since at this point we commence the second account of creation. For a similar numerical device in terms of the number of units present see the comparison of Genesis 1:27 with Genesis 2:23 below. If the analysis of this pattern is correct, it could hardly have come about in any other way than by the design of a single author. Note also the similarity in phraseology, especially in the concluding phrase. Genesis 1:2 ends with a reference to the "face of the waters" whereas Genesis 2:6 ends with a reference to the "face of the ground," and each of these phrases describes the state of the earth at the point in time immediately prior to the creative acts which are described thereafter.

**3. Complementary Statements.** At some points where these two accounts touch upon the same topic those topics are treated in similar or

complementary ways. The diet assigned to man, for example, is mentioned in both accounts and in both cases it is found in direct discourse from God. That being the case, these two quotations can easily be fitted together:

*And God said, "Behold, I have given you every seed-bearing plant on earth and every tree that bears fruit. They shall be yours for food (Gen 1:29a)... You may freely eat of every tree of the garden; but of the tree of knowledge of good and evil you shall not eat, for in the day that you eat of it you shall die" (Gen 2:16-17).*

In both of these passages man was instructed that he could eat from "every" (Heb. *kōl*) fruit-bearing tree, but in the second instance he was prohibited from eating of the tree of the knowledge of good and evil, a more detailed specification elaborated in the second account. In a more general sense, as discussed above, man's dominion over the animals is common to both accounts. It occurs twice in parallel statements in the record of the sixth day in the first account, initially as a statement of purpose and then as a statement of that which was accomplished. That dominion is defined even further in the second account when the animals were brought to man to be named by him, thus initiating man's suzerainty over his subjects in the animal world.

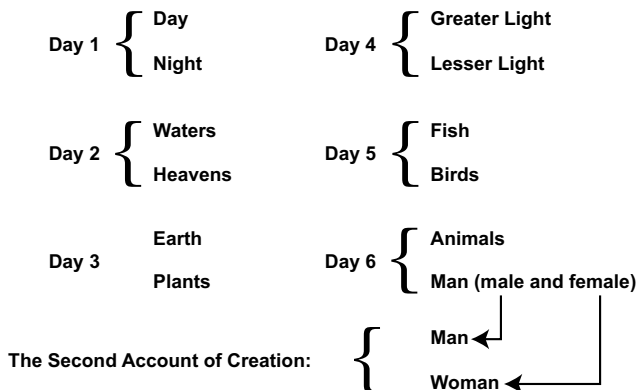
**4. Parallel Pairs.** Considerable stress was placed above upon the parallels present in the first account of creation. These parallels appear at three principal points on an ascending scale of larger and larger literary units:

- 1) within the record of each day parallel phraseology was employed for the statements of divine intent and accomplishment,
- 2) God's creative acts or the objects created or distinguished as a result of those acts appear in pairs on each of the days of creation,
- 3) there are broader parallels between the events or objects of the first three days of creation when they are compared with the last three.

Given these parallels in the first account of creation the question arises, what is in parallel in the second account? The parallelism in the case obviously stems from the pair whose creation is described here, Man and Woman. Those elements which merely constituted a list in the first account — male and female — are now brought into a picture of personhood through the more direct account of their individual creation. This pair also forms an inclusion or envelope around the second account of creation, since it begins with a description of the creation of man and closes with a description of the creation of woman. Between these two poles this account

describes the provisions made for this pair: their home, their diet, and their companions in the animal world. This parallel pair from the second account of creation, the most important pair of all, can now be outlined with those from the first account.

**The First Account of Creation:**



**5. The Assignment of Names.** The entries for the first three days of creation in Genesis 1 contain five instances in which God himself named the objects He created: day and night, heaven(s), seas, and earth. After naming these mainly inorganic aspects of His creation, God ceased to name the objects that He created in the following three days. Basically, God ceased to assign names, with the exception of man, after He began making organic or living forms.

This distinction in the text raises the question of why God ceased to name the objects after the first three days. Genesis 2 tells us that God specifically reserved the task of giving names to that part of His creation for man. That intention, implicit in Genesis 1, is spelled out in detail in Genesis 2. This reciprocal relationship between that aspect of these two narratives applies down to almost the same number of things that were named by God and the number of things left by God for man to name, as the following outline demonstrates:

<p>Objects named by God, mainly from the first three days:</p> <p>(Gen 1:5) Day -1-</p> <p>(Gen 1:5) Night -2-</p> <p>(Gen 1:8) Heavens -3-</p> <p>(Gen 1:10) Seas -4-</p> <p>(Gen 1:10) Earth -5-</p> <p>(Gen 1:27) Man -6-</p>	<p>Objects left to be named by Man, mainly from the last three days:</p> <p>The Greater Light (Gen 1:16)</p> <p>The Lesser Light (Gen 1:16)</p> <p>Birds (Gen 2:19)</p> <p>Fish (Gen 1:20)</p> <p>Animals (Gen 2:19)</p> <p>Woman (Gen 2:23)</p>
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It appears to me that the relatively even distribution of the names assigned by God and man to the objects created in these two accounts could only have come about by design, i.e., the original design of the Creator and secondarily by the design of one author who recorded both of these accounts of creation together as complementary to each other. So specifically complementary is this aspect of these two narratives that it seems unlikely in the extreme that such a distribution of this kind of activity could have come about by chance through the preservation and collection of two separate, distinct, and originally independent stories of creation. This design even transcends the extent of literary activity that one could normally attribute to an editor. Thus the distribution of the names assigned to the objects of creation stands as a strong argument for the unity of these two accounts on the basis of form.

**6. Prose and Poetry.** Although Genesis 1 is not poetry *per se*, it contains one small piece of poetry towards the end of the chapter, the tricolon in verse 27 which refers to the creation of man.

And God created man in his image;  
In the divine image created he him,  
Male and female created he them.

The poetic character of this verse is clearly evident from its meter, which is 4:4:4 in terms of words or stress accents in the Hebrew text (or 12:10:10 by syllable count). The parallelism between the first two cola of this tricolon is complete and chiasitic. The parallelism between the second and third cola of this tricolon is incomplete, the word for female in the latter having replaced the word for God in the former. All three cola of this tricolon employ the same verb for “create,” and they all end with pronouns. This brief piece of poetry is preceded by a long prose passage and it is followed by a short prose passage. Thus the overall literary structure of Genesis 1 can be outlined as prose:poetry:prose, or A:B:A.

The literary structure followed in the second account of creation is the same A:B:A form. This is evident from the fact that Adam’s response in Genesis 2:23 to the creation of Woman is recorded, as recognized by the RSV for example, in poetry:

This one now at last,  
is bone of my bones,  
and flesh of my flesh.  
This one shall be called Woman,  
for from Man was this one taken.

In terms of the larger poetic units, this verse consists of a couplet which contains a short-line tricolon followed by a long-line bicolon. The

cola in the opening tricolon of this couplet contain two words each in the Hebrew text, which yields a meter of 2:2:2 in terms of stress accents or 4:6:7 in terms of their syllable counts. The second and third cola of this tricolon are of particular interest since they contain partitive cognates, meaning that both of the words in each of these cola, bone of my bone and flesh of my flesh, come from the same noun, an obvious poetic device. Taken together bone and flesh are in synthetic parallel with each other as they refer to different parts of the body. The letter *M* is used in Hebrew for the prefixed preposition “from”; consequently, this letter provides a recurrent or alliterative sound in this tricolon. It occurs once in the opening colon, once in the closing colon, and three times in the central colon of this tricolon.

The parallelism present in the long-line bicolon with which this couplet concludes relates the Woman in the first colon to the Man in the second colon, two words which consist of very similar sounds in Hebrew as they do in English. A chiasm is present in this bicolon since its first colon opens with the word for “this” and the second colon closes with the same word. In addition, Woman occurs at the end of the first colon while Man occurs at the beginning of the second. Thus this bicolon can be outlined thematically as A:B:C:B:C:A, a good example of chiasmus. The word “this” also links the opening tricolon to the closing bicolon since it is also the first word in the opening colon of the tricolon. The meter of the closing bicolon of this couplet is 3:3 as it stands in the Hebrew text with the last two words of the second colon joined by a *maqquph*, a marker which joins these two words like a hyphen in English writing. The syllable count of this bicolon is 7:8.

With the poetic character of this verse established, we can now compare it with the tricolon found in the first account of creation. The results of the comparison can be outlined as follows:

Genesis One				Genesis Two				
Outline Poetic Prose				-A-	Historical Narrative Prose			
The Song of the Creation of Man				-B-	The Song of the Creation of Woman			
form	stress	accents	syllables	form	stress	accents	syllables	
tricolon	4:4:4		12:10:10	tricolon	2:2:2		4:6:7	
				bicolon	3:3		7:8	
total	12		32		12		32	
Concluding long prose statement				-A-	Concluding short prose statement			

To emphasize further the relationship between these two brief poetic pieces, it may be noted that when they are compared directly with each

other their chiasms occur in chiasmic order. Thus the order of this particular element between these two poetic pieces is chiasm:non-chiasm::non-chiasm:chiasm, or A:B::B:A, which is a chiasmic construction in itself.

At this point I would like to refer back to the discussion of the features of the juncture between these two accounts located in Genesis 2:4. In the discussion of that juncture it was noted that another chiasm can be seen when Genesis 2:4a and 2:4b, the last line of the first creation account and the first line of the second, are compared with each other. Although Genesis 2:4 probably is not poetry in the more precise sense of the word as Genesis 1:27 and 2:23 are, it can be included in the outline that follows with these other two verses since the same literary technique is demonstrated in it.

It seems very unlikely to me that the A:B:A forms followed in both of these chapters and the exact metrical correspondence between the more

Genesis 1:27	- Tricolon	$\left\{ \begin{array}{l} \text{colon 1} \\ \text{colon 2} \\ \text{colon 3} \end{array} \right\}$	- chiasmic - non-chiasmic
(Genesis 2:4	- "Bicolon"	"bicolon"	- chiasmic)
Genesis 2:23	- Couplet	$\left\{ \begin{array}{l} \text{tricolon} \\ \text{bicolon} \end{array} \right\}$	- non-chiasmic - chiasmic

precise poetic pieces present in both of them could have come about in any other way than by direct intent or design. Once again, the intricate nature of this design, especially as concerns the directly poetic elements, goes beyond that which one could conceivably attribute to an editor and must be traced back to the original author of both of these narratives. The strong implication of these correspondences is that both of these accounts of creation were originally written down by the same author without much of a time lag between the occasions when they were composed, not by different authors separated by several centuries.

**7. Parallelism of Larger Literary Units.** We have already concluded that Genesis 1 was poetic prose, i.e., prose written in a quasi-poetic style. With the exception of verses 4b-6 (poetic prose) and verse 23 (poetry), however, Genesis 2 was written in more normal narrative prose. For the purposes of this discussion the poetic aspect of Genesis 1 is emphasized in contrast to the prose of Genesis 2, even though Genesis 1 is not poetry in the stricter sense of the term. One might wonder if there are any parallels to such a relationship elsewhere in the Bible or outside of the Bible in terms of more lengthy literary units like these two chapters. That question can be answered in the affirmative from both sources.

Other sections of the Pentateuch reveal similar poetry/prose patterns. The poem found in Genesis 49, the Testament of Jacob, is both preceded

and followed by prose passages that provide a context for it. The pattern of prose and poetry involved in this case takes on the A:B:A configuration to which we have referred previously.

The prose account of the deliverance of the Israelites from Pharaoh's host is found in Exodus 14 while the poem celebrating that deliverance appears in Exodus 15. The pattern in this case is thus simply A:B. The Oracles of Balaam in Numbers 23-24 have a more elaborate arrangement. Instead of one large block of poetry set beside one or two blocks of related prose, smaller blocks of poetry are interspersed in a prose narrative. Four different poems from Balaam occur in this narrative and the whole episode ends with the last of those poems so that the pattern is A:B::A:B::A:B::A:B. It would be difficult to separate these poems of Balaam from the prose narrative in which they are found and still make good sense out of them, which shows the intimate relationship between prose and poetry.

The famous covenant lawsuit poem of Deuteronomy 32 conveys the blessings or curses predicated of Israel contingent upon its obedience or disobedience. The same blessings and curses already appear, however, in prose passages beginning with Deuteronomy 28, making a pattern of A:B. The Testament of Moses found in Deuteronomy 33 is followed by the prose passage in chapter 34 which tells of the circumstances of his death, making a pattern of B:A. Thus the two great poems at the end of Deuteronomy were located back-to-back with their related prose passages on either side of them.

The first of the old poems encountered following the Pentateuch is the Song of Deborah in the book of Judges. The story of the battle and the circumstances leading up to it is found in prose in Judges 4 while it is commemorated in poetry in chapter 5. The pattern here is thus A:B, the same as that found in Exodus 14-15 which also celebrates a victory over the enemies of God's people. Some scholars have tried to separate these two sources rather widely from each other in time and point of view. I would suggest, however, that a clear picture of the topography and strategy involved in the battle described in these two passages can only be derived from a combination of the historical data available in both of these sources. To the extent to which that suggestion is correct it would show the complementary nature of these two sources and, therefore, their close literary relationship.

The message of the Song of Hannah in 1 Samuel 2 is explained in the preceding chapter of prose and is also related less directly to the fate of Samuel as a child that is described in what follows. An understanding of David's Lament in 2 Samuel 1 is dependent upon a knowledge of the



events described in the prose of 1 Samuel 31. The Songs of David in 2 Samuel 22-23 appear to be the only pre-Psalter poems that stand in a rather isolated position from the prose context surrounding them. On a larger scale one might cite the example of the book of Job in which the classic A:B:A pattern spans the entire book, with the frame story in prose serving as an envelope around the dialogues in poetry.

To summarize our findings from this review of the relationship between prose and poetry in pre-Psalter sources we may note that in 9 out of 11 cases studied the poetry involved related rather directly to the prose passages connected with them, the exceptions being 2 Samuel 22 and 23. In four of these cases that relationship may be expressed as A:B (Exod 15, Judg 5, Deut 31, and 2 Sam 1). In three cases the relationship present is A:B:A (Gen 49, 1 Sam 2, and Job). One case presents the pattern of B:A (Deut 33), while another was written in the more complex pattern of A:B::A:B::A:B::A:B (Num 23-24). It may be said, therefore, that there are a number of biblical parallels for pairing larger literary units of prose with poetry as we have suggested for Genesis 1 and 2 in a more general sense.

Critical scholars who dispute the prose/poetry relationship employ the *a priori* assumption that the prose account must have been composed later, frequently much later, than the poems involved. The question here is, were the prose accounts in these cases written down much later than these poems or were they both written down relatively contemporaneously?

One way in which this subject can be investigated is to look for prose/poetry combinations in the literature of Israel's neighbors in the ancient world. If such pairs are found, then there is no particular reason why we should deny the possibility that the Israelites were capable of creating the same type of literary constructions at the same time or later than their neighbors were. From a very brief survey of this subject which was far from exhaustive it appears to me that this type of writing was employed in Egypt in particular, in contrast to Mesopotamia where examples of it are rare. This Egyptian context for this type of writing is of some interest since half of the old poems considered above come from the Pentateuch and accepting a Mosaic authorship for that section of the Scriptures would indicate that the author or recorder of these poems with their related prose passages was educated at the court in the land where this type of writing was done.

The use of the prose-poetry type of literary construction goes back at least as early as the time of the sixth Egyptian dynasty late in the third millennium B.C. A description of military expeditions into Palestine begins with a long prose passage, then shifts to a poetic passage consisting of

seven bicola with refrains, and concludes with another shorter passage of prose.<sup>8</sup> The identification of the poem in this inscription as a victory poem puts it in the same class of texts as that to which the Song of the Sea (Exod 15) and the Song of Deborah (Judg 5) belong.

A victory hymn of Thutmose III (1504-1450 B.C.), the general period during which Moses lived in Egypt, employs the same type of literary construction as described above.<sup>9</sup> A more complicated pattern of A:B::A:B::A:B::A:B::A:B::A:B<sup>10</sup> appears in Merneptah's Victory Stela (ca. 1225 B.C.) which contains the first reference to Israel outside of the Bible.

Some literary pieces from the First Intermediate Period just before 2000 B.C. reflect the political chaos of the time. One text, "A Dispute over Suicide," describes the argument of a man with his soul about whether to commit suicide. At the end of the dispute he agrees to remain with man. The text begins with a long prose introduction, continues with a poem consisting of 32 tricola employing 4 refrains, and ends with a shorter prose conclusion<sup>11</sup> or, A:B:A.

The second text from this period for consideration here records the story of a peasant whose nine eloquent speeches at the king's court convinced his hearers to execute justice on his behalf. The literary frame for this story opens with a long prose introduction and ends with a shorter prose conclusion. Since the central cycle of this piece alternates 9 times, its structure is A:B(×9):A,<sup>12</sup> and the form of his work has been compared with that of the book of Job.

Other Egyptian pieces show similar structures. A building inscription of Amenhotep III (1413-1377 B.C.) has the simple structure A:B.<sup>13</sup> The 125th chapter of the Book of the Dead which was in use in the latter half of the second millennium and the first half of the first millennium gives an A:B:A:B:A structure.<sup>14</sup> The Instructions of Amenomopet, resembling biblical proverbs in some respects, begins with a lengthy prose prologue which is followed by 30 short chapters of instructions in written poetry.<sup>15</sup>

One of the better examples of this type of literary construction from Mesopotamia is found in the Code of Hammurabi. This inscription begins with a poetic prologue which is followed by 282 stipulations written in legal prose and then concludes with a poetic epilogue.<sup>16</sup> The structure here is the reverse of that seen more commonly, B:A:B. The legal prose in this inscription probably has a longer tradition behind it than the poetry present in the prologue and epilogue, since these laws are considered to represent the cumulation of common practice rather than *de novo* legislation or decrees issued by Hammurabi.<sup>17</sup> From the very late (Seleucid) period of Babylonian history come four texts which describe temple rituals.<sup>18</sup>

The rituals to be performed are outlined in prose but the prayers to be recited during those rituals were written in poetry; so these texts have structures of A:B, A:B:A, A:B(×6), and A:B(×7):A respectively.

With the possible exceptions of the Book of the Dead and the Seleucid temple rituals, it would be difficult to argue in any of the above cases that the prose passages present in these cases were first recorded in written form at a time much later than the poems present with them in the surviving copies of these texts. To my knowledge, no Egyptologist (or Assyriologist) has expressed himself in favor of such a viewpoint on the composition of these texts. Thus there is a basic dichotomy between biblical studies and ancient Near Eastern studies when it comes to the way in which texts that contain these combinations of prose and poetry are treated. Biblical scholars say the prose passages were always written down later than the poems found with them, while specialists in ancient Near Eastern studies generally consider such combinations in texts with which they deal to be essentially contemporaneous.

Since these texts came from the world in which the Israelites of the Bible did their writing, it seems appropriate to take into consideration the form in which contemporary compositions were written in the world around them. Examination of such compositions indicates that poetry was written with prose in the same pieces at the same time, hence it seems rather arbitrary of the critic of biblical literature to deny that such could have taken place in Israelite circles. It is also evident from these considerations that there was a long-standing tradition of such combined compositions both in the pre-Psalter portions of Scripture and in extra-biblical texts from the same period. The combination of “poetry” and prose in Genesis 1 and 2 adds another example to the list of such parallels on the larger literary scale.

## **E. Summary**

Parallelism is found in Genesis 1 on three levels: 1) within the record of each day parallel phraseology was employed for the statements of divine intent and accomplishment, 2) God’s creative acts or the objects created or distinguished as a result of those acts appear in pairs on each of the days of creation, and 3) there are broader parallels between the events or objects of the first three days of creation when compared with the last three. Along with the formulaic language used in this chapter, these parallels might at first convey the impression that this chapter was written in poetry. It soon becomes evident that this initial impression is incorrect, however, when the matter of meter is taken into account. The exceptionally long lines one would have to posit here to interpret this chapter as poetry

clearly indicate that it is prose instead, but prose which was written in a quasi-poetic style. Although Genesis 1 was written in prose, it contains one clear-cut example of poetry, the tricolon in verse 27 which I have entitled, “The Song of the Creation of Man.” It is more evident that Genesis 2 was written in prose, but it too contains one clear-cut example of poetry, the couplet in verse 23 which I have entitled “The Song of the Creation of Woman.”

The unity present between these two accounts of creation can be demonstrated through two main avenues, by theme and by form. As far as theme is concerned, it is evident from our examination of these two narratives above that every major theme found in Genesis 2 is already present in Genesis 1, albeit in miniature, especially in the records of the third and sixth days of creation. The formal unity of Genesis 1 with Genesis 2 can be demonstrated in a number of ways:

1. They are related at the juncture between Genesis 2:4a and 2:4b by the chiasm which occurs across this juncture and by the break-up of the poetic pair of verbs which occurs here.
2. They are related by the nature of the introductory statements found at the beginning of both of the accounts of creation which present a presupposition about the state of the earth, whether covered with water or consisting of dry land to some extent, prior to the creative acts described in what follows these introductory statements.
3. In some cases statements referring to the same created objects in these two accounts are given in rather similar and thus complementary terms.
4. Genesis 1 presents precisely six parallel pairs of creative acts or created objects, one pair for each of the six days. Genesis 2 fills out this list of parallel pairs with the final and most important pair, Man and Woman. This pair was already referred to in Genesis 1 with the list elaborating the creation of Man into male and female, just as the other objects described there as created — such as the plants, fish, and animals — are elaborated upon with comprehensive lists.
5. When it came to the task of assigning names to the objects He created, God named those things which He made on the first three days, but He left those things which He made on the next three days for man to name. Man’s participation in this naming process is described in Genesis 2.

6. Both of these chapters contain one brief piece of poetry, verse 27 in the first and verse 23 in the second. Both of these brief pieces of poetry are preceded by longer passages of prose and followed by shorter passages of prose, giving them both an A:B:A structure. These two pieces of poetry contain exactly the same number of stress accents and syllables and they treat a parallel theme, the creation of Man and the creation of Woman. Genesis 1:27 contains a tricolon while Genesis 2:23 consists of a couplet containing a short tricolon followed by a long bicolon. In this case the poetic piece with two units appears in the second, which again is numerically appropriate as it is in the case of the two introductory statements. Genesis 1:27 begins with a chiasm while Genesis 2:23 concludes with a chiasm, which fits a pattern that is elaborated further with the chiasm that occurs at the juncture between Genesis 2:4a and 2:4b, where these two accounts of creation divide and are joined.
7. If one interprets Genesis 1 more generally as a poetic type of writing, even though it is not poetry in the technical sense of the word, then it can be coupled with Genesis 2 as a pair of “poetry” and prose. Nine biblical, eight Egyptian, and five Babylonian examples of writing which couples prose together with poetry have been cited as parallels for such a construction in the first two chapters of Genesis.

From the unity that exists between two chapters by theme, from the length of this list of the features they share in common by form, and from the intricate and detailed nature of some of these formal relationships, it seems to me that the logical conclusion to draw is that these two chapters of Genesis present an account of creation unified by intentional design. That design extends far beyond the details an editor could have touched up to join two originally independent accounts of creation. Accordingly, the composition of these two chapters containing the account(s) of creation should be attributed to a common author.

If these two accounts were written by one author, as is proposed here, the dates of their composition obviously cannot be separated by more time than the span of his literary career, and more probably they were composed around the same time in that career. If the conclusion drawn here from the features of these two accounts discussed above is correct, they cannot be attributed to J writing in the 10th century and P writing some four centuries later. In my opinion, literary critics, such as the one quoted at the beginning of this study, have come to this incorrect

conclusion about these two chapters, because they have approached the text with a methodological presupposition rather than a methodology derived from the text itself. Some of the features which these critics have sorted out of these two chapters do not support the conclusions associated with them, and other details which have been overlooked contradict these conclusions.

### III. THE REASON FOR THE USE OF DIFFERENT NAMES FOR GOD IN GENESIS ONE AND GENESIS TWO

With the rise of biblical criticism one criterion cited to aid in the project of sorting out the sources underlying the books of the Bible, especially of the Pentateuch and more particularly Genesis, was the different names used for the Deity. This criterion came into use more than two centuries ago, as the commentator quoted at the beginning of this study noted:

*A significant milestone in the literary criticism of Genesis was the observation published in 1753 by the French physician Jean Astruc that, when referring to the Deity, some narratives in this book use the personal name Yahweh ("Jehovah"), while other and apparently parallel accounts employ Elohim, the generic Hebrew term for 'divine being.' It would thus seem to follow, Astruc argued, that Genesis was made up of two originally independent sources<sup>19</sup>*

A common example cited for employing this criterion to sort out such sources comes from the first two chapters of Genesis where it has often been noted that the names used for God in these two chapters, attributed to P and J respectively, are different. In the first chapter *Elohim* is used exclusively and occurs there almost thirty times. Starting with the fourth verse of the second chapter, on the other hand, *Yahweh Elohim* is the only name used for God and it occurs there eleven times. This difference in reference to the Deity is used as further evidence against the Mosaic authorship of Genesis 1 and 2.<sup>20</sup> Logic limits to three the interpretations available for solving the problem posed by this difference in divine names.

1. This difference in divine names should be attributed to the different sources from which these two accounts originated.
2. Different divine names are used in these two passages because of a mere random or chance selection of them on the part of the writer of the entire creation account.
3. The names for God in these two passages differ because the writer of the creation account had a specific theological reason in mind.

The first of these theories is the standard interpretation adopted by a majority of literary critics over the last century. It achieved acceptance to

some extent because it provided a relatively reasonable explanation for the data available from the text, and because no better explanation for such data was forthcoming. The second interpretation might appear to hold some appeal for a conservative commentator on Genesis, but in the end it must be rejected because it does not fit the facts of the case. If our statistical sample were small then one might argue that only a random difference was involved here, but in view of the relatively frequent occurrence of the names for God in these two passages (28:11) this explanation is unsatisfactory. The distinction is too sharp and too well attested to be attributable to chance. The third interpretation listed above is the one proposed here.

The statement in Genesis 1:26 of God's intent to make man provides a convenient point of departure in the study of this subject, since it differs in nature from the other statements of intent in Genesis 1 and it introduces the more detailed description of the creation of man in Genesis 2 where the longer name for God is introduced in the creation story. The subjects of the verbs in the initial statements of the records for the first five and one-half days of the creation week are always the objects created or the substance from which the created object issued. In the statement "Let there be light," for example, light is the subject of the verb to be. In the statement "Let the earth cause plants to spring forth," the earth is the subject of the verb to (cause to) spring forth. Not so with the record of the creation of man. If it had followed that pattern this record would have read, "Let there be man," or, "Let the earth give forth man." Instead, for the first time in these initial statements, God is the subject of the verb present, "Let us make man."

The uniqueness of this statement in contrast to its fellows in the records of the previous days of creation emphasizes the distinction intended by the author here. More than any other aspect of His creation, God was intimately involved in the creation of man. While He could speak those other aspects of creation into existence, creating man required more personal attention so that man became not only the product of His lips but also of His hands and thus of His heart. Thus this much-discussed phrase in Genesis 1:26 introduces God's direct and personal attention to and intimate involvement in the creation of man described more fully in Genesis 2. The first person plural form of the verb in Genesis 1:26 may indicate either an aspect of mutuality within the Godhead, or a plural of "fullness."<sup>21</sup>

In the Genesis 2 account of the creation of man we are not really dealing with a different name for God, but with a more specified name for God: Yahweh Elohim, in contrast to Elohim alone. The association of

Elohim in Genesis 2 with the divine name Yahweh is something of an embarrassment to the literary critical theory. To make the contrast between a presumed Elohist source (P) and a presumed Yahwist source (J) more distinct in these chapters, the critic is obliged to suggest that the name originally present in Genesis 2 was Yahweh, and that Elohim was added to it later.<sup>22</sup> Not only is there no textual evidence for such a theory, but the fact that Yahweh Elohim is used only in Genesis 2 and 3 and nowhere else in the Pentateuch, with the sporadic exception of Exodus 9:30,<sup>23</sup> argues strongly against a later insertion of Elohim in Genesis 2. If Elohim was a later addition one would expect to see such a combination more widely spread throughout Genesis and the rest of the Pentateuch. Thus we are not dealing with the distinction between Elohim and Yahweh, as the literary critic would have it, but with the development of an increasing specification from Elohim to Yahweh Elohim.

The question then is, why does the divine name take on this increasing specification in Genesis 2? It is clear that the forms El/Elim/Elohim refer to god in the generic sense and could be used for the true God or a false god, one god or many gods (in singular or plural), the Israelite God or Canaanite god(s). Thus in a certain sense Elohim is a more “impersonal” name for God, and this name is used for God when He set up an impersonal cosmos in Genesis 1. The equation for the divine name used in Genesis 1 is, therefore — creation of an impersonal cosmos: created by an impersonal God, Elohim.

When we come to the creation of man in Genesis 2, however, the picture changes. With this change the name of Yahweh is introduced for God. As far as etymology is concerned, the best current suggestion probably is that Yahweh may derive from a causitive form of the verb to be. But the etymology of the name Yahweh is a side issue in Genesis 2. The really important aspect of Yahweh from the viewpoint of the author of the creation account is that this is God’s personal name. The generic word for god, El/Elohim, is not nearly so specific. The name of Yahweh, however, could apply to one God only from the biblical point of view — the one true God whom the Israelites worshipped. At this point in the record, therefore, the personal God Yahweh bends down to “fashion” the personal man, Adam, from the dust of the earth. The anthropomorphism involved here is obvious but is nonetheless beautiful as it expresses God’s tender and loving concern for this part of His creation more than any other part of it. Thus the equation for the divine name used in Genesis 2 is — creation of a personal man, Adam, and a personal woman, Eve: created by a personal God, Yahweh. Hence this personal God is known by His personal name. We may now put these two parts of the equation together:



Genesis One —

creation of an impersonal cosmos: created by an impersonal God, Elohim

Genesis Two —

creation of a personal man, Adam: created by a personal God, Yahweh

The situation presented here differs from the Mesopotamian polytheistic scheme in which the god(s) who created man and the personal god of the individual generally were different members of the pantheon. In Genesis 1 and 2 the great Creator God and the personal God of Adam and Eve were one and the same, as is indicated by the connection between these two narratives, both by content and by the divine names used in them. We might also note in conclusion that when man's face-to-face fellowship with his Creator began at his creation the name Yahweh Elohim first appears in the Genesis record (chapter 2) and when this face-to-face fellowship finally ended with man's fall (chapter 3) the compound name of Yahweh Elohim disappears for the rest of the biblical record. In other words, this particular form of the divine name was used for that particular period in man's history when the persons of the first man and woman held open converse with their personal God and Creator; and when that relationship was broken, the particular formulation for the divine name disappears from the record.

In summary, there is a distinct "name" theology involved in the distribution of the different names used for God in Genesis 1 and 2. The author who composed these two narratives as parts of a larger whole, as discussed above, wished to say something specific about God by using these names in this way. Just as something more is said about man and his creation in Genesis 2, so also something more is said about God in this narrative — not only about what He did, but also about His personal relationship with His creation. Thus the process of naming recorded in Genesis 1 and 2, and its significance, applies not only to the objects created, but also to God Himself.

#### IV. EPILOGUE

As the writing of this study was drawing to a close, there came to my attention Jerome T. Walsh's article, "Genesis 2:4b-3:24: A Synchronic Approach,"<sup>24</sup> in which he points out a number of features that Genesis 2 and 3 share in common, thus indicating that they were composed as an entire unit, as we have suggested above for Genesis 1 and 2. Assuming that Walsh's view of the unity of Genesis 2 and 3 is correct, and assuming that the analysis presented above on the composition of Genesis 1 and 2 as a unit is also correct, then the composition of Genesis 1-3 as an entire unit should be attributed to one author on one occasion or very close to that point in time.

## ENDNOTES

1. Speiser EA. 1964. Genesis. Anchor Bible, vol. 1. Garden City, NY: Doubleday, p 18-19. I have utilized Speiser's translation freely in the quotations from Genesis that follow below.
2. See, for example: Cassuto U. 1961. A commentary on the book of Genesis, vol. 1. Abrahms I, translator. Jerusalem: Hebrew University, p 17.
3. For a discussion of this point see: Albright WF. 1968. Yahweh and the gods of Canaan. Garden City, NY: Doubleday, p 42-52.
4. For formulaic language in some of the earliest writing of mankind see: Alster B. 1975. Studies in Sumerian proverbs. Copenhagen: Akademisk Forlag, p 17-31. Just why the Israelite author of Genesis 1 should have had to wait until the exile, according to literary critical theory, to write in this fashion is unclear.
5. This type of analysis of Hebrew poetry was developed especially by G.B. Gray (1915) in his major work on this subject, The forms of Hebrew poetry. London: Hodder and Stoughton.
6. This type of analysis of Hebrew poetry goes all the way back to Bishop Lowth's landmark study on this subject published in 1753, De Sacra Poesi Hebraeorum, and it is still followed by scholars working in this field today.
7. Analyzing Hebrew poetry by counting syllables has been proposed recently by D.N. Freedman, and an introduction to his thought on this approach can be found in the prolegomenon to the reprint of G.B. Gray's (1972) The forms of Hebrew poetry. KTAV, NY.
8. Pritchard JB, editor. 1955. Ancient Near Eastern texts relating to the Old Testament. NJ: Princeton University Press, p 228.
9. Ibid., p 374-375.
10. Ibid., p 376-378.
11. Ibid., p 405-407.
12. Ibid., p 407-410.
13. Ibid., p 375-376.
14. Ibid., p 34-36.
15. Ibid., p 421-424.
16. Ibid., p 164-180.
17. On this point see: Mendenhall GE. 1970. Ancient oriental and biblical law. The Biblical Archaeologist Reader, vol. 3. Garden City, NY: Doubleday, p 10-12.
18. Pritchard, Ancient Near Eastern texts, p 331-342.
19. Speiser, Genesis, p XXII.
20. Ibid., p 19.
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22. Speiser, Genesis, p 15.
23. Ibid.
24. Journal of Biblical Literature 96(2):161-177 (June, 1977).

# ARTICLES

## MEGABRECCIAS: EVIDENCE FOR CATASTROPHISM

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### WHAT THIS ARTICLE IS ABOUT

*Megabreccias are transported rock deposits in which some of the angular fragments exceed one meter in diameter. The forces needed to move such rock masses are extraordinary and imply catastrophic conditions. Dr. Chadwick considers three different conditions which may produce these megabreccias. 1) Turbidity currents which are rapidly deposited underwater mud flows; 2) debris flows which result in the transport of large blocks in a mud and clay matrix; and 3) slides and slumps when masses of loosened material move down a slope. Rock fragments and blocks several meters to several kilometers in size have been moved several hundred kilometers from their source. The data suggest that rapid depositional processes were involved in the formation of these megabreccias.*

Many geologic phenomena of the past do not appear to be adequately accounted for in terms of the processes now occurring on the earth's surface. In some cases it is difficult to conceive of any mechanism capable of explaining them. Among these problem areas in geology the explanation of the origin, transportation and deposition of megabreccias has long rated a prominent place. An increasing number of geologists (the so-called "neocatastrophists") have recognized the need to consider forces of enormous magnitude not now operating to explain observations of the geologic record. One of these individuals, Derek Ager, has considered the catastrophic implications of megabreccias in his book *The Nature of the Stratigraphical Record*.<sup>1</sup> In this report we will take a more comprehensive view of megabreccias and attempt to bring the insights they provide to bear on the larger problem of understanding the past history of the earth.

Megabreccias are sedimentary deposits in which angular fragments of rock in excess of one meter in diameter occur as conspicuous components (Figure 1). Such a deposit may include many other clasts smaller than one meter, which may or may not be angular. This definition, modified from Cook et al.,<sup>2</sup> is purely descriptive and thus includes both subaerial (land) and subaqueous (underwater) deposits that have the above characteristics.

Subaerial events are generally more localized than similar processes occurring underwater. Both the size of clasts transported and the distances traversed are limited by the great difference in density between air and rock. In contrast to the more recent record, very few pre-Pleistocene megabreccias can be regarded as strictly subaerial.



FIGURE 1. Giant rip-up associated with megabreccia flow in basal Cambrian Tapeats Sandstone at Ninetyone Mile Canyon in the Grand Canyon of the Colorado. Weathered Precambrian Vishnu Schist is found below the Tapeats (lower part of the cliff). The Tapeats includes the massive sandstone found above.

By far the majority of megabreccias is considered to have a subaqueous origin. A rock equivalent to one cubic meter in volume may weigh three metric tons, and most megabreccia clasts are larger than this. Consequently, transportation of megabreccias to the site of deposition becomes a formidable consideration. Buoyancy supplied by clear water can reduce the weight by  $\frac{1}{3}$  or more and can significantly decrease friction as well. As we shall see, under appropriate conditions buoyancy and other factors can be greatly modified by changes in the transporting medium so that rocks of truly enormous dimensions can be moved.

Three categories of subaqueous depositional processes that give rise to megabreccias will be considered: turbidity currents, debris flows, and slides and slumps. The latter two categories are not clearly differentiated from each other. In each case we will define the process, describe its operation, outline the extent of such deposits, and discuss their significance.

**Turbidity currents.** Turbidity currents occur when unconsolidated sediment becomes resuspended in water, forming a fluid of high density. Flow of such a suspension introduces turbulence which prevents the suspended material from settling out, thus perpetuating the density difference and prolonging the movement of the turbidity current. Such a current can flow downhill, on the level, or even uphill, if it has sufficient momentum. As the velocity is decreased in the region behind the moving front, material in suspension is deposited, beginning with the coarsest

particles. The resulting deposit commonly exhibits normal grading with larger grains at the base and finer material at the top.

Turbidity currents of easily imaginable dimensions are capable of moving enormous clasts. Kuenen<sup>3</sup> has estimated that rocks weighing up to 100 metric tons can be moved in such flows. The initiation of a turbidity current flow probably occurs most commonly as the result of earthquakes, but other mechanisms are also involved.<sup>4,5,6</sup> Sediment capable of maintaining suspension of rock fragments of all dimensions generated in the original disturbance can be transported for great distances across minimal slopes.<sup>3,4,7</sup>

Turbidites, the deposits left by turbidity currents, occasionally are reported to contain megabreccias. Clasts exceeding a meter in diameter are known from beds in Nevada,<sup>8</sup> Arabia,<sup>9</sup> New Hebrides,<sup>10</sup> and elsewhere.<sup>7</sup> Casshyap & Qidwai<sup>11</sup> report clasts exceeding four meters in a “diamictite” in India. The authors postulate glacial origin, but turbidity currents appear to be at least as likely a source. Rigby<sup>12</sup> reports clasts up to five meters in diameter in breccia beds interpreted as being deposited by turbidity currents.

There can be little question that turbidity currents capable of transporting large clasts represent catastrophic events. Earthquakes can trigger turbidity currents of large dimensions,<sup>5</sup> but it is more difficult to envision a process capable of simultaneously producing and transporting the brecciated clasts. We shall see in the following section that these problems become more complex as the clast sizes increase.

**Debris flows.** Debris flow is a term used by Cook et al.<sup>2</sup> to describe megabreccia deposits consisting of very large clasts that have been transported by a mass flow process, usually over a considerable distance. Debris flows, like turbidity currents, do not require a steep slope for movement, but unlike turbidity currents, debris flows are less fluid and flow more slowly. There does not appear to be any limit to the size of clasts that can be moved. The clasts are commonly exotic (blocks derived from a source different from that of the matrix) and are generally supported in a matrix of mud or clay.

For example, in Peru exotic blocks of up to 5000 metric tons (10-15 m in diameter) occur in Eocene strata far from the site of origin.<sup>13</sup> In Texas, slabs of exotic rock over 30 m long are found in Paleozoic mudstones, apparently derived from a source many kilometers distant.<sup>14,15,16</sup> In the Klamath Mountains of California clasts over 100 m in length occur at least 5 km from their source area.<sup>17</sup> Exotic boulders in Pennsylvanian strata of eastern Oklahoma exceed 100 m in length.<sup>18,19, 20</sup> Among these clasts are gigantic blocks of shale of similar length and possibly 20 m or more thick.<sup>21</sup> These rocks have been transported over 30 km. In early Tertiary strata of Venezuela exotic “boulders” of Mesozoic rocks over 100 m long and 30 m thick, which must have moved at least 40 km from a source area, occur in a submarine deposit. One slab of Cretaceous limestone in these strata is more than 1 km long and over 100 m thick.<sup>22</sup>

Newell<sup>23</sup> reports exotic blocks of reefoid limestone over 100 m long and perhaps 20 m thick in Mexico. Ordovician rocks in Newfoundland contain exotic clasts several hundred meters long.<sup>24</sup> In Miocene deposits on the island of Timor exotic blocks of Paleozoic and Mesozoic sediment up to 800 m in diameter are reported to have been transported tens of kilometers from the proposed source area.<sup>25</sup> Rigby<sup>12</sup> cites examples of clasts 300 m long and many other large blocks which have been transported several kilometers across very shallow slopes. In the Tertiary strata of Switzerland exotic blocks and “cliffs” up to 500 m long, some overturned, are known. A move of tens of kilometers is postulated for these blocks.<sup>26</sup> Mountjoy et al.<sup>27</sup> chronicle numerous other examples including clasts with dimensions of up to 1 km being moved for tens of kilometers.

Other examples could be added, but perhaps one more will suffice. Wilson<sup>9</sup> reports exotic blocks of Jurassic limestone in Cretaceous radiolarites in Arabia. The largest such block covers an area of 1600 km<sup>2</sup> and is 1000 m thick. This and other similar mountainous clasts are postulated to have moved a distance of many tens of kilometers to their present position!

Attempts have been made to develop a non-catastrophic explanation for the presence of exotic blocks in megabreccias. Some authorities have posited glacial transport. Others have concluded that the rocks slid to their present position from distant highlands.<sup>19</sup> Such attempts have generally failed to satisfy those who have carefully investigated the circumstances. For example, the “glacial” boulders are located in strata which otherwise represent a warm temperate climate;<sup>19</sup> the rocks which are presumed to have slid to their present positions give no indications of having done so. As far as I can ascertain, there is no recorded instance of a tailing disturbance such as would have been left in the wake of a rock moving across an unconsolidated surface. On the contrary, the only disturbed strata occur immediately below the clast,<sup>12</sup> indicating compaction below the clast following its movement (Figure 2). Since continuous, rapid movement would be required to prevent the clasts from settling during transit, these clasts must have been transported by some mechanism of mass flow. As Mountjoy et al.<sup>27</sup> have emphasized, no contemporary model for such a process exists. It is not only difficult to come up with a transport mechanism, but it is also difficult to imagine forces operative which would have produced clasts of this size.

The process of generation and deposition of these megabreccias represents catastrophes of extraordinary dimensions, as substantiated by both the clast size and by the requirement for rapid movement across gently dipping or flat terrain for many kilometers. Wilson,<sup>9</sup> assessing the magnitude of the problem, has called for consideration of “major disturbances originating outside the planetary system” which may have affected the speed of revolution of the earth and the earth’s revolution about the sun. All things considered, such a statement may not be too far from truth!





**FIGURE 2.** Exotic quartzite boulder compressing sand laminae in basal Bright Angel Shale overlying Tapeats Sandstone at Ninetyone Mile Canyon in the Grand Canyon of the Colorado.

**Slides and slump deposits.** If a mass of sediment is deposited on a sloping surface or is uplifted unevenly so that a slope is formed, the sediment will tend to move downslope. This tendency is counteracted by internal friction which is much greater in cemented or compacted sediment. Once movement is initiated, either by external or internal forces, the sediment will move downslope more or less as a body, forming a slide or slump deposit. Unconsolidated sediments will tend to form folds,<sup>28,29,30</sup> but when sediments differ in competence (resistance to flow or internal shear), the more competent members will tend to fragment and form a megabreccia within a matrix of the less competent members.

Slide deposits of immense dimensions with associated megabreccias are encountered in many parts of the world. The Tertiary strata of the Apennines in Italy contain megaclasts ranging up to many cubic kilometers. These blocks have in some cases traveled up to 100 kilometers from their source area. One slab of limestone, reported to be inverted, covers an area of over 200 km<sup>2</sup>.<sup>31,32</sup> Nearby in Greece are similar late Tertiary sediments containing blocks ranging from several hundred meters to several kilometers in length; again, many are overturned. These sediments are believed to have traveled 100 to perhaps 500 km from their sources to the point of deposition.<sup>33</sup> Farther east in Turkey late Cretaceous sediments

contain blocks ranging up to “hill-sized” outcrops which presumably were derived from many kilometers to the north.<sup>24</sup> In the Appalachians of the eastern United States mountainous masses moved by “gravitational stresses” slid for up to 80 kilometers on a very gentle or flat surface.<sup>35</sup> Numerous other examples of gravity-induced slides and slumps are reported by other authors.<sup>36,37</sup>

A catastrophic interpretation for these deposits depends somewhat upon the time frame in which they are cast. If the movement of a mountainous clast over 100 kilometers occurs at the rate of a millimeter a year, it can hardly be considered a catastrophic event. If the clast moves the same distance in a matter of hours or days, it represents a catastrophe of earthshaking dimensions. How fast do slides move? The authors of most papers either do not directly confront this question, or merely assume very slow rates of movement.

The rate at which slides move depends in some degree upon the slope of the underlying surface. A number of authors have cited a figure of about 3° for the slope over which slide deposits traveled.<sup>36,38</sup> This figure is chosen because a lower slope probably would not support movement and a steeper slope would require that a source area many kilometers distant be several kilometers high. While one cannot be certain about the prevalent slope at the time of movement, it is safe to suggest that 3° is a minimal figure.

Several reports of recent offshore slumps and slides are available for comparison with the Tertiary deposits. One of these, the Grand Banks slump of 1929, is historical. In two examples the authors cite favorable comparisons between the recent slides and those from Tertiary strata mentioned above.<sup>6,38</sup> In each case the slides moved across slopes of approximately 3° for several kilometers, and the movement is either known<sup>5</sup> or inferred<sup>6,38</sup> to have been catastrophic. While we cannot be certain that this was the case in the fossil examples, under similar circumstances it is difficult to conceive of such movement as having been slow.

## CONCLUSIONS

The presence of various kinds of megabreccias in the geologic column, showing in some cases the transport of extremely large clasts, indicates energy levels on a scale that staggers our imagination. Their common occurrence in major portions of the geologic column of some localities indicates significant catastrophic activity in the past not readily explainable in terms of contemporary processes.

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# NEWS AND COMMENTS

## CREATION AND THE LAW

Attempts to implement a two-model approach to the teaching of origins in the public school science curriculum have been blocked by those who have branded the inclusion of creation in the classrooms as an establishment of religion. Struggles over the teaching of creation, especially in connection with the use of a textbook, *Biology: A Search for Order in Complexity*, prepared by the Creation Research Society (CRS), have taken place with school boards and textbook commissions in the states of Tennessee, California, and Texas.

Last year in Indiana, the textbook battle was taken to the courtroom. Hopes of seeing a favorable decision for the two-model approach died when a Marion County Superior Court judge ruled the required use of the CRS book to be a violation of the constitutional provisions of separation of church and state.

As in many other religion-related legal suits, the underlying problem centers on the interpretation of the opening clauses of the First Amendment to the U.S. Constitution which states: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof...."

The ambiguity of the wording that has plagued both plaintiffs and defendants seems to revolve around the definition of "religion" and "religious." Once, "religion" was confined solely to theistic connotations, implying a definite belief in the deity. But the definition was changed in 1961 when the U.S. Supreme Court indicated that non-theistic religions are also protected under the First Amendment's provision of "free exercise." This broader interpretation and definition of "religion" includes non-theistic concepts such as "Ethical Culture" and "Secular Humanism."

When in 1963 the Supreme Court ruled state-required prayer and Bible reading in the public schools to be establishments of religion, it seemed that God was banned from the classrooms. In explaining the ruling, Justice Tom C. Clark stated that its intent was merely to correct abuses or coercion and preference by the state. In other words, the state must remain neutral, not opposed, to religion.

In an article entitled "Has the Court *Really* Outlawed Religion in Schools?" (Worldwide Challenge, November 1977, p 9-13), John W. Whitehead argues that in actual practice, however, the state has sanctioned the religion of secular humanism over other religions. He proposes that the state has a duty to balance this trend by allowing a place for the teaching of theistic religion objectively.

Carrying this proposal one step further, Wendell R. Bird applies this idea to the teaching of creation in the science classrooms. In “Freedom of Religion and Science Instruction in Public Schools,” an article which appeared in the January 1978 issue of the *Yale Law Review* (p 515-570), Mr. Bird questions the validity of the Indiana textbook ruling. He examines the current practice of teaching only the general theory of evolution (naturalistic evolution from simple organisms to man) and concludes that the state is violating the free exercise of religion by its refusal to present alternative views. He proposes that this abridgement be neutralized by the incorporation of creation into the teaching of origins, and maintains that a non-religious approach to creation should be followed. Even though some aspects of creation are related to religious beliefs, the entire theory cannot be banned from the classroom solely because of religious reasons, for creation can be taught objectively, based on scientific evidence.

It is probably not easy to practice the distinction between presenting information *about* religion and indoctrinating the students in those beliefs. But the distinction is allowed by the First Amendment. Justice Clark has stated that religion may be taught within public schools if it is taught objectively. Even if creation ideas are ruled to be religious by the courts, they should still be allowed in the classroom.

Katherine Ching

## LITERATURE REVIEWS

*Readers are invited to submit reviews of current literature relating to origins. Mailing address: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA. The Institute does not distribute the publications reviewed; please contact the publisher directly.*

### A GOD OF THE GAPS?

PUNCTUATED EQUILIBRIA: THE TEMPO AND MODE OF EVOLUTION RECONSIDERED. Stephen Jay Gould and Niles Eldredge. 1977. *Paleobiology* 3(2)115-151.

*Reviewed by Edward N. Lugenbeal  
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Creationists have long argued that the fossil record offered scant support for the theory of evolution because it was characterized by many “missing links” and large gaps between major “kinds” of plants and animals.

Although dutifully deployed by virtually every creationist author, the “gap critique” has failed to dent the momentum of evolutionary theory. With the confidence befitting a juggernaut, Darwinian evolution has rolled on, content in its belief that the gaps in the fossil record were not real.

Yet, in one of those surprising shifts in perspective that occasionally turn a discipline inside out, leading paleontologists are now accepting the validity of some of creationists’ most trenchant criticisms, including the gap critique.

Paleontology combines the disciplines of biology and geology, both of which have long looked at the natural world through uniformitarian glasses inherited from Charles Lyell. It was Lyell who sold the nascent science of geology on the importance of an uncompromising uniformitarian view of earth history.<sup>1</sup> According to Lyell, present “tempos” as well as “modes” were the key to the earth’s past — and geology’s future as a science. Darwin’s view of life was similar to Lyell’s view of the rocks — uncompromising in its uniformitarianism. For Darwin the key to the history of life also lay in present tempos and modes. Central to Darwin was the conviction that microevolutionary changes observable in the present could be expanded infinitely to account for the origin of all species.<sup>2</sup>

Now there are signs that geologists and biologists are becoming uncomfortable with their Lyellian glasses. Some are daring to give expression to their malaise, pointing to blind spots and distortions in the overly restrictive view of nature they have inherited from Lyell. In the field of sedimentary geology, for example, the concept of catastrophism has been resurrected,

the dust of 100 years of neglect brushed off, and catastrophic explanations offered for many (but not all) features of the earth's crust. The most notable advocate of "neocatastrophism" in geology is Derek Ager. He vividly captures the new catastrophic point of view in geology in these words: "The history of any one part of the earth, like the life of a soldier, consists of long periods of boredom and short periods of terror."<sup>3</sup>

So it should not be surprising that a similar view of reality is now emerging in paleontology. The paleontological challenge to Darwinian uniformitarianism is also a return to a more catastrophic view of reality. Any revival of catastrophic views of nature is naturally of keen interest to creationists, whose reaction to the recent developments could justifiably be — "At last!"

One of the best articles for understanding the new developments in paleontology is found in a lively and stimulating professional journal called *Paleobiology*. The article is entitled "Punctuated Equilibria: The Tempo and Mode of Evolution Reconsidered," and is written by Stephen Jay Gould of Harvard University and Niles Eldredge of the American Museum of Natural History. Here, Gould and Eldredge vigorously restate their theory, defend it against its critics, and summarize the status of the debate it has inspired.

Have Gould and Eldredge really accepted the creationist critique? Probably not consciously, but listen to the assertions they make about the fossil record and evolution:

1. *Paleontologists have dealt with the fossil record in a seriously biased manner.* ("Paleontologists have worn blinders that permit them to accumulate cases in one category only: they have sought evidence of slow, steady and gradual change.... other classes of information were explained away or simply ignored....") (p 116).
2. *Stability is more fundamental than change.* ("...most species ...either do not change in any appreciable way, or else they fluctuate mildly in morphology, with no apparent direction.") (p 115).
3. *The gaps in the fossil record are real and will not go away with more collecting.* ("The punctuations that mark the fossil record do not smooth out as stratigraphic resolution improves.") (p 118).
4. *The processes that produce small-scale changes in living organisms are inadequate to explain the origin of the tremendous variety of living forms.* ("Genetic substitution within populations cannot be simply extrapolated to encompass all events in the history of life.") (p 139).
5. *Rates of change are far too slow to account for macroevolution.* ("The characteristic rates of supposed gradualistic events... are

too slow to account...for adaptive radiations and the origin of new morphological designs.”) (p 133).

All of these points have been raised by creationists, though, sad to say, rarely as cogently or with comparable sophistication.

Although these new developments will be (and should be) viewed by creationists as a sort of vindication, it is quite unlikely that creationist views will now achieve greater acceptance in paleontology. After all, the title of Gould and Eldredge’s article is *not*: “Punctuated Equilibria: Evolution Reconsidered!”

Most scientists who come to accept the Punctuated Equilibria model will follow Gould and Eldredge’s lead in assuming that macroevolution must be true (primarily because no other alternative exists within the framework of natural law) and direct their energies towards the task of explaining why intermediate forms should nevertheless not be expected in the fossil record.

To nonevolutionists this procedure may seem to smack of making the best of a bad situation — an ad hoc attempt to explain contradictory data. And the argument does come full circle: “Why don’t we find missing links?” Gould and Eldredge’s answer to the question is still the traditional one: “Because the fossil record is biased.” New is only the degree of emphasis placed on viewing the record as *hopelessly* biased. It is not that samples are currently inadequate, but that the nature of speciation and macroevolution makes the fossil record forever inadequate for the purpose of documenting the historical continuity that *must* have linked all forms of life.

Vindicated or not, creationists should steel themselves for the possibility that the new models in paleontology will make the creationist position less influential in the world of paleontological science. One of the most successful techniques a society can employ in meeting its radical critics is simply to co-opt much of the critique. In a sense the Punctuated Equilibria model co-opts the creationist critique. Therefore a real danger exists that paleontologists may be even more disposed to conclude that the creationist critique is irrelevant (partially true, but unimportant), and will swallow with relief any previous uneasiness over the absence of evidence for intermediate forms.

Ironically, creationists may find themselves holding a rooting interest in the success of the critics of Punctuated Equilibria! The strongest pressure for taking creationist models of the fossil record seriously may flow from a combination of compelling evidence for gradual evolution at lower taxonomic levels coupled with persuasive evidence against it at higher taxonomic levels.

A sometimes unnoticed aspect of the current discussion is that the Punctuated Equilibria model carries the emphasis on discontinuity beyond the range of the traditional creationist critique, extending it even to the species level. This has to be viewed as a mixed blessing by creationists,

because few wish to argue that the origin of many species necessarily involves direct special creation. Thus, if the Punctuated Equilibria model applies even to species, then species can and do evolve into new species without leaving connecting links in the fossil record. This tends to minimize the significance of gaps in the record — the lynchpin of the creationist critique.

Nevertheless, creationists can continue to insist upon the differences between the gaps that exist between lower taxa-like species and those that separate *different basic morphological designs*. If discontinuity is fundamental in the record all the way down to the level of species and “species selection” is the essence of evolution above the subspecies level (as Gould and Eldredge claim), why is not the degree of discontinuity characteristic of the species level characteristic of the entire fossil record?

In short, even if Gould and Eldredge’s view of speciation is correct and their explanation of the mechanisms of evolutionary change above the subspecies level is true, the problem of the “macro-gaps” between major morphological designs remains just that — an unsolved problem. Gould and Eldredge still do not have a tested mechanism to explain these gaps. The best they can presently offer is “changes in regulatory genes” — the genes that presumably control the growth and development of an animal from its conception until maturity.

Gould and Eldredge admit the gaps between basic morphological designs are enormous:

*Smooth intermediates between Baupläne [basic morphological designs] are almost impossible to construct, even in thought experiments; there is certainly no evidence for them in the fossil record (curious mosaics like Archaeopteryx do not count) (p 147, emphasis supplied).*

We might liken the Punctuated Equilibria view of speciation to one of these ubiquitous institutional electric wall clocks. The kind whose minute hand jerks in a noisy, almost spastic, spasm from one minute marker to the next, instead of flowing smoothly like the accompanying second hand. If Gould and Eldredge are correct, speciation proceeds by “jerks” because it occurs with geologic suddenness in small geographically isolated portions of a species that are under intense selective pressure. In these “peripheral isolates” one stable genetic system rapidly collapses and is replaced by another. Perhaps all this, although still far from adequately tested, is a more accurate description of the usual process of speciation and accounts for low level evolutionary change, whereas the observable processes of microevolution account predominantly for changes *within* species. But what mechanism is there to explain the prodigious leaps to new basic morphological designs (new “kinds” of animals)? Can a few random changes in regulatory genes produce workable new basic designs?

Or are we still stuck with “hopeful monsters,”<sup>4</sup> “quantum evolution,”<sup>5</sup> “inadaptive phases”<sup>6</sup> and the other empty terminological ghosts of past confrontations with the stubborn fact of the systematic discontinuities in



the fossil record? Do Gould and Eldredge, like others before them, offer us only another set of terms (“species selection,” for example) but no real explanation of how new designs could arise with such apparent abruptness?

Their solution may not be satisfactory, but in their diagnosis of paleontology’s problems Gould and Eldredge are surely right on target. The extreme uniformitarian visions of reality characteristic of the historical natural sciences have never been based on an objective assessment of the actual nature of the record. They have been imposed on reality as western science has looked at the past wearing some very special cultural blinders (p 145-147).

The factors in our culture that have led to this view of reality are changing. The intellectual by-products of these changes are spilling over into many scholarly disciplines, including paleontology. But paleontologists still shrink from the possibility that the gaps in the fossil record can be the final word about the origin and history of life. Understandably they turn back, perhaps in fear of giving up too soon the attempt to develop natural explanations. But is it good science to exclude any possibility? Even the intellectually uncomfortable (for natural scientists) possibility that in a paleontological sense there is a God of the gaps?

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# GENERAL SCIENCE NOTES

## INTRONS: NEW COMPLEXITY IN THE SYNTHESIS OF HIGHER ORGANISM RNA

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In studies with lower organisms such as bacteria and their viruses, it has been found that when an RNA molecule is made (transcription) it is copied directly from the DNA template (the genetic information source) on a basic unit basis, nucleotide for nucleotide. The final product has the same continuous sequence of bases as the complementary strand of DNA from which it was copied. Within the last year new and unexpected information about gene organization has been obtained in studies with plants, animals, and animal viruses.

The first of these results came from an analysis of the rabbit beta-globin (BG) system<sup>1</sup> (BG is a portion of hemoglobin). BG-DNA was obtained in two different ways. One, the BG-messenger RNA was purified and copied with an enzyme which makes DNA using RNA as its template. Two, BG-DNA was isolated from rabbit DNA using the techniques of recombinant DNA analysis in which restriction enzyme fragments of rabbit DNA were grown in bacterial cells. Those bacteria containing the BG genes were selected and replicated further to yield large amounts of BG-DNA. When the sequence of these BG-DNAs was compared it was found that the BG-DNA derived from DNA had approximately 600 nucleotides in the middle of the sequence that were not present in the BG-DNA derived from messenger RNA.

Further study has demonstrated that DNA insertions (introns) within genes may be the rule rather than the exception. They have been detected in the messages for mouse BG,<sup>2</sup> chick ovalbumin,<sup>3</sup> immunoglobulin<sup>4</sup> and in SV40 and polyoma animal viruses. Genes which yield structural RNAs with no known protein product, such as yeast transfer RNA and *Drosophila* ribosomal RNA,<sup>5</sup> have been shown to be synthesized from DNAs containing large or small internal regions which are absent from the final RNA molecule. In those cases which have been examined the

primary RNA transcript contains the intronic sequence. Subsequently, the RNA is processed to cut out the unused portion(s) and the ends rejoined.

Synthesis of these spliced RNAs seems to involve copying the whole DNA sequence followed by cutting out the unused portion(s) and joining the ends back together again. Very little is known about this type of RNA processing. The 5200 nucleotides of the SV40 virus DNA may be used to make 30-50 different messenger RNAs of several hundred nucleotides each by using different combinations of cuttings and splicings. A single messenger RNA may contain as many as three gaps when its sequence is compared with the original viral DNA. In the case of SV40, with its very tiny genome, perhaps RNA splicing provides a mechanism of compact storage of genetic information. In animal cells, however, there is more DNA than can be functionally accounted for so that compactness of information storage would not seem to be necessary. The intronic sequences may be involved in the structural organization of the RNA molecule that occurs as the molecule loops and folds during synthesis. This secondary structure may help determine the RNA half-life or the RNA ribosomal binding constant. Thus it may be an important regulatory aspect of protein synthesis. The problems of how the introns are recognized, how they are cut, and how the ends of the preserved molecules are rejoined are just being studied.

As usual, there are those who find in this new complexity of cell regulation a mechanism for increased evolutionary efficiency.<sup>6,7</sup> Errors in the splicing process, they suggest, could provide new proteins for test by natural selection. Actually, arguments of this type are less than compelling. They are based upon the questionable premise that random changes in a complex system can improve it. In fact, the more complex a system, the more profound are the effects of such changes in the system and the greater the difficulty of finding changes which improve it and are accommodated by all levels of the system in a coordinate and functional manner. In a designed system, on the other hand, the problem of complex controls is one of designer ingenuity, because the system is required to function only in its final form and not in a gradual series of simpler subsets going back in time to no system at all.

The creation hypothesis includes a designer of infinite capability. As we have penetrated His design at the molecular level we have found that which also exists at higher levels of organization — a union of

elegant simplicity with prodigious complexity and variety; a biological universe that still holds many surprises for its investigators.

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# EDITORIAL

## CLOSED MINDS AND ACADEMIC FREEDOM

Education has been described as the process of driving a set of prejudices down one's throat. Unfortunately, there is some basis for this comment. The frequency with which ideas that have been considered true are revised is too great to permit an unqualified negation of this allegation. This matter has also been of importance in the recent controversy about origins — the controversy between creation and evolution. Concern is for what is true versus what is taught.

The present practice in many educational programs is to teach the general theory of evolution as the only valid concept of origins. While this is being done, dissenting creationists point out that their ideas, which they feel are no less speculative than evolutionary ones, are suppressed. This suppression is considered a breach of academic freedom. The reverse situation has also occurred. In 1925 the state of Tennessee passed a law forbidding the teaching of non-biblical views of the origin of man in public schools. Arguments from the standpoint of academic freedom were presented against the statute at the famous "Monkey Trial." Clarence Darrow, the renowned trial lawyer for the defense, pointed out: "Here we find today as brazen and as bold an attempt to destroy learning as was ever made in the Middle Ages." When the statute was eventually repealed over 40 years later, evolutionists again presented a strong argument from the standpoint of academic freedom. In a press release the National Science Teachers Association expressed the opinion that: "Society cannot tolerate any obstruction of the process of academic inquiry and the dissemination of information and ideas." Now that evolution is almost exclusively taught, evolutionists are saying practically nothing about academic freedom but are appealing to the principle of separation of church and state to keep creation out of public schools. Conversely creationists are now making a strong appeal to academic freedom. It would have been commendable if the evolutionists who had been promoting academic freedom so as to teach evolution would have continued this good trend by promoting academic freedom to teach creation concepts also.

Academic freedom is necessary for the evaluation and incorporation of information into one's truth system. It is a commodity that, at least in principle, is jealously guarded by the academic community. On this basis unacceptable influences and biases are often rejected. The principle does not mean simply freedom to promote one's particular views regardless of how biased they may be — this can actually result in academic restriction. It especially entails openness and the responsibility to recognize as much

valid information as possible. Actually, the principle works better in speeches than in the research laboratory, where the practicalities of inquiry often force one to work under the influence of a proposed or accepted hypothesis or paradigm. Nevertheless it is a principle that must be encouraged if one is going to be open to new information and views. To oppose it encourages a closed intellectual system that cannot claim to be as good as one that is open and free to follow wherever truth may lead.

Regarding the issue of origins, both evolutionists and creationists have accused the other of operating under a closed system which is not academically free. Evolutionists state that creationists start with their conclusions, i.e., the concept of creation as given in the book of Genesis, while creationists accuse evolutionists of allowing only a simple naturalistic system which excludes the less tangible aspects of reality. The recent reaction against the National Science Foundation sponsored MACOS (Man: A Course of Study) program is an example of the problem induced by such a purely naturalistic system. Here, educational materials about man prepared for elementary schools were rejected by parents because of their purely humanistic approach. Speaking on behalf of the parents, Congressman John B. Conlan objected to the “morally sick content” that such a narrow view encourages.

In view of the foregoing I would like to propose that in the study of origins academic freedom should be strongly encouraged so that new data can readily be assimilated into the truth-evaluating process, regardless of where it leads.

This ideal does not mean that because one encourages an open system of investigation, one cannot draw conclusions and therefore one must forever make tentativeness his goal. There is some truth to the dictum that many an open mind has revealed a vacant lot. The goal of intellectual pursuits is truth and not academic freedom, which is only a tool to reach that goal. One should draw the best conclusions possible — and act on that basis. However, one should make his conclusions revisable; otherwise he has moved into a closed system that cannot claim the truth-gathering value of an open process of investigation. The person who feels that his conclusions are unrevisable denies academic freedom and will not be as useful in arriving at truth as someone with a more open mind. Truth does not fear the investigation of new ideas — they might be true.

Ariel A. Roth

# REACTIONS

*Readers are invited to submit their reactions to the articles in our journal. Please address contributions to: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA.*

## THE EDITOR'S TURN

To the readers:

In the absence of substantial discussion letters for this issue of ORIGINS I shall take this opportunity to communicate to the readers in a less formal way than editorials allow.

We receive many compliments, and some complaints, about ORIGINS. Most compliments are about the high standards of scholarship we try to maintain, a good format, significant articles, and the balance of presentation. Criticisms are about the lack of balance of presentation and most frequently about the difficulty and technicality of some of the writing. A number would desire a more frequent publication.

We have tried to alleviate the problem of the technicality of the articles by introducing the section "IN A FEW WORDS" which gives a simplified summary at the beginning of the main presentations. We would urge the reader to make use of this section. We feel that it is important to maintain high scholarship standards which unfortunately entails complexity because we are often dealing with complex and controversial areas that deserve very careful study. The issue of origins has profound significance for man. His concepts of truth, his future and destiny are often based on what he can glean about his origin. Hence the importance of the question.

We are dedicated to an outstanding publication, but we need your help. Our greatest need is for good manuscripts in the form of articles, reviews of the literature, letters, general science notes, news, etc. It does take time to study out a question carefully, but the importance of the issue at stake is great enough to deserve it — and you will find your contribution rewarding. We also might be able to publish more frequently if we had more manuscripts.

Yours for a better ORIGINS,

Ariel A. Roth

# ARTICLES

## FOOTPRINTS IN THE GRAND CANYON

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### WHAT THIS ARTICLE IS ABOUT

*One of the questions the student of earth science often faces is regarding the nature of the agents which deposit the sediments found on the surface of the earth. This question is all the more intriguing in the context of folklore flood legends and the description of the Noachian flood as given in Genesis. Most sediments are transported and deposited by water, but wind and ice can also do the same thing. The Coconino Sandstone of the southwestern United States, which is well exposed in the Grand Canyon of the Colorado, has traditionally been interpreted as a wind-deposited sedimentary unit and not the usual aqueous type of deposit.*

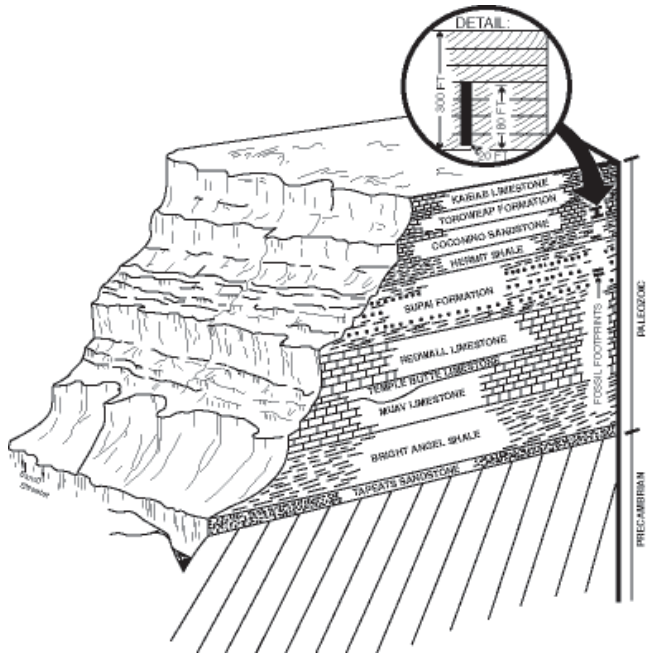
*In this article Dr. Brand explores the nature of some fossil animal footprints in the Coconino Sandstone. These serve as a clue to the conditions under which sediments in which they are found were deposited. The data indicate that the Coconino Sandstone was deposited under wet conditions, not the dry sand dune conditions usually described.*

*To discover the conditions under which the tracks were formed, animals were used to produce trackways in the laboratory on 1) dry sand, 2) moist sand, 3) wet sand, 4) underwater sand. These results were then compared to the tracks found in the Coconino Sandstone. The tracks that were produced in the laboratory under water most closely fit those found in the field, bringing into very serious question the concept of a wind-deposited Coconino Sandstone.*

The Grand Canyon of the Colorado River is not only a spectacular slice of scenery, but it also poses many intriguing questions for the student of earth history. One of those questions concerns the way in which the Coconino Sandstone, a prominent rock formation in the Grand Canyon area, was deposited.

We will begin our discussion with a brief summary of the geologic history of the Grand Canyon, especially the Paleozoic rocks that form the majority of the canyon wall. At one time northern Arizona was a basin where layers of sediments were being deposited by wind and/or water. The floor of the basin was formed of the tilted and planed-off layers of Precambrian sediments. Many layers of sand, mud, and other sediment were deposited in the basin (Figure 1), with most of them being brought in by water. Some of these layers contained animals and plants. As other layers were being deposited, animals walked on them and left footprints which were preserved by the next layers. The sediments became cemented into rock, and the organisms and footprints became fossils. Then the Grand Canyon area was uplifted to form a plateau, and the canyon was





**FIGURE 1.** Cross section through the wall of the Grand Canyon, showing the distribution of vertebrate fossil footprints in the sediments.

carved into the layers of sediment by water. The cutting of the canyon exposed the sediments, making it possible to attempt to reconstruct the detailed depositional history of this area, by examining the characteristics of the sediments and their fossils.

Most of the Paleozoic sediments in the Grand Canyon are considered by geologists to have been deposited primarily by water (McKee 1966). An exception to this is the Coconino Sandstone. McKee (1933) studied the Coconino Sandstone and concluded that the sand forming the Coconino's slanted layers were deposited by wind, in the form of layer after layer of desert sand dunes. This theory would mean that a layer of water-deposited mud (the Hermit Shale) was followed by a layer of wind-deposited desert sand, and then the area was again covered by water and the Kaibab limestone was deposited.

The Coconino Sandstone is a homogeneous deposit of fine-grained, primarily quartz sand. It extends over much of northern Arizona, from the Mogollon Rim, northward to the Utah border. It is up to 1000 feet thick at its southern edge and thins to a few feet at its northern limits. It is a crossbedded deposit, with individual horizontal units (Figure 1) composed

of many fine layers sloping at 20°-30°. The sloping layers of laminae are often 30 or 40 and occasionally up to 75 feet long (McKee 1933). Sloping, crossbedded layers such as these are generally thought to represent deposits formed on the down-current side of moving sand dunes — either desert dunes or underwater dunes.

Scattered throughout most of the lower half of the Coconino Sandstone are numerous fossil footprints of vertebrate animals and less common trails of worms and arthropods (Gilmore 1927; Brady 1947). The vertebrate tracks have been referred to as amphibians and/or as reptiles, but from the structure of the tracks the majority of them are most easily interpreted as amphibians. No other fossils have been found in the Coconino Sandstone (McKee 1933). Out of the hundreds of trackways that have been observed, almost all of them are going up the slopes of the crossbedded layers (Gilmore 1927). The discovery of a downhill trackway in the DeChelly Sandstone (a similar Permian crossbedded sandstone in northern Arizona and southern Utah with the same type of vertebrate tracks) was considered significant enough to warrant a separate publication (Vaughn 1963).

The current explanation of the origin of the Coconino Sandstone was developed primarily by McKee. His initial study of the Coconino (McKee 1933, 1945) focused on the physical characteristics of the sandstone, and he concluded that it was an eolian, or wind-deposited, sand accumulation. Later he also studied the footprints of living vertebrates and compared them with the Coconino fossil footprints (McKee 1944, 1947). From this work he concluded that the fossil footprints were most likely formed in dry sand, thus supporting his earlier conclusion that the Coconino Sandstone was a desert deposit

Identical or very similar fossil footprints also occur in several other crossbedded sandstone formations, and a number of authors have cited McKee's footprint studies in support of the idea that these other formations, as well as the Coconino Sandstone, were wind-deposited desert sands (Faul & Roberts 1951, Sarjeant 1975, Vaughn 1963, Walker & Harms 1972).

The implications of this work must be considered as we develop geologic flood models, and on the other hand perhaps our flood models can suggest new ways of looking at the Coconino Sandstone. A model or an idea is useful to science if it can suggest new lines of research that can be done successfully, and that improve our understanding of the subject we are investigating. Perhaps our flood model can suggest useful, new types of research that need to be done and that might not have been thought of by someone who did not believe in a flood of worldwide geologic significance.

The Coconino Sandstone is classified as a Permian deposit in the upper Paleozoic (Figure 1). As was mentioned earlier, the Paleozoic strata

above and below the Coconino Sandstone are believed to have been deposited by water. Some of the flood models that are being developed propose that much of the Paleozoic sequence was deposited in the early part of the flood activities, and in these models the Coconino Sandstone would be a deposit laid down during the main part of the flood. Could there be a large-scale deposit of wind-blown sand in the middle of predominantly flood water-deposited strata?

The geologic data tell us that even though the flood was a rapid geologic event, it was nevertheless a very complex geologic event. We cannot arbitrarily rule out the possibility of a deposit of wind-blown sand forming during an interval of lowered water level, but our flood models do suggest that it may be very profitable to reinvestigate the Coconino Sandstone to see if there might be another explanation of its origin.

But haven't the existing data demonstrated that the Coconino Sandstone was wind deposited? How can we justify questioning this conclusion? Actually some of the criteria that were used to identify wind or water-deposited sand are not clear cut, and also more recent research has produced some interesting findings relevant to our topic. The Jurassic Navajo Sandstone is also a crossbedded sandstone, similar in many respects to the Coconino Sandstone. The Navajo Sandstone was previously considered to be an eolian, desert deposit, but more recently several authors have restudied the Navajo and have interpreted it as largely formed by shallow marine sand waves, with part of the formation deposited as coastal dunes formed by onshore winds (Dott & Batten 1971, Marzolf 1969, Stanley et al. 1971). These authors made the following comments about this change in interpretation:

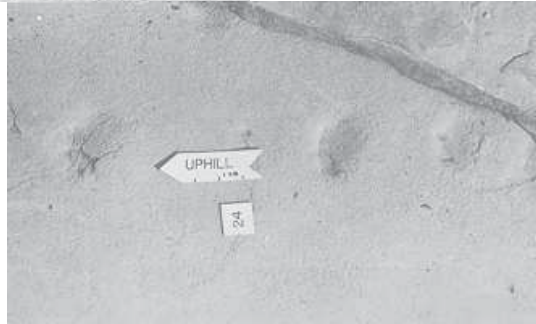
*Since 1903, most of the Navajo sands were assumed to represent ancient wind dunes formed on a vast Sahara-like desert; this became a ruling hypothesis....The Navajo problem originated years ago when geologists could conceive of large amplitude cross stratification as originating only in wind-formed dunes; no other modern processes that could form it had been studied. This highlights the major short-coming of reasoning by analogy, namely the limitation at a given time of known possible analogues. Today, knowledge of modern shallow marine sedimentation has broadened the spectrum of counterparts of analogues. Insight gained into remarkably large underwater dunes found on very shallow shelf areas provides as attractive a comparison for much of the Navajo sands as for lower Paleozoic quartz sandstones (Dott & Batten 1971, p 359).*

*Inasmuch as geologists are forced to interpret ancient sediments chiefly by analogies with modern phenomena, interpretations are severely biased if all possible modern analogues are not known; such was the case when the Navajo was first studied (Stanley et al. 1971).*

Sedimentary features that were formerly thought to be diagnostic of eolian deposits are now known to be non-diagnostic. Stanley et al. (1971)



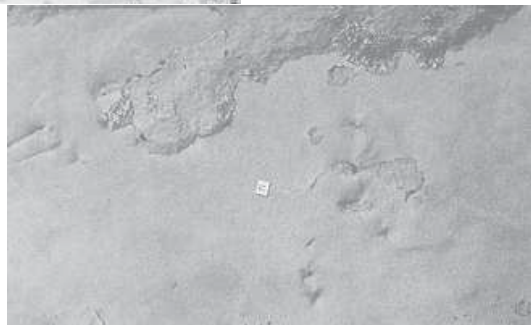
**FIGURE 2**



**FIGURE 3**



**FIGURE 4**



**FIGURE 5**

**Fossil footprints in uphill trackway in the Coconino Sandstone in Hermit Basin. All numbers and letters in all photographs are 4.5 mm high.**

pointed out that “grain frosting is no longer considered a criterion of wind transport,” grain size distribution statistics have been ambiguous (for the Navajo), and “it can no longer be assumed *a priori* that large festoon cross strata prove an eolian dune origin for the Navajo or any similar sandstone because of the essential identity of form and scale of modern submarine dunes or sand waves, as documented during the past decade” (e.g., see d’Anglejan 1971, Harvey 1966, Jordan 1962, Terwindt 1971).

The currently accepted interpretation for the deposition of the Coconino Sandstone was developed long before the above-mentioned work on submarine sand waves was available. My search of the literature has not yet revealed any significant recent studies on the Coconino Sandstone. Thus it does not seem unrealistic to propose other possible interpretations for the deposition of the Coconino Sandstone, and to carry out research to test those interpretations.

The research reported in this paper involved comparison of the Coconino fossil footprints with laboratory footprints of living animals made under a variety of conditions, to determine which conditions will produce footprints that are most similar to the fossil footprints (Brand 1977; in press).

## METHODS

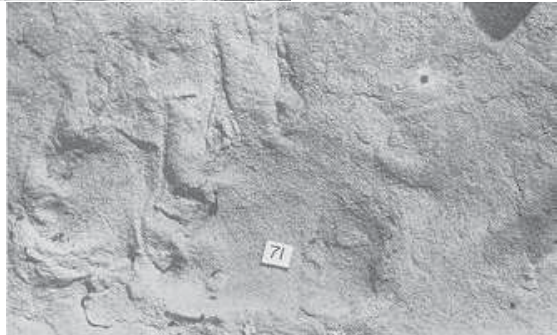
Fossil footprints in the Coconino Sandstone were studied in Hermit Basin of the Grand Canyon. An investigation of the Coconino Sandstone located 82 vertebrate trackways along the Hermit trail. Each trackway was identified with a number; notes were taken on physical features of the tracks, such as the presence or absence of toe marks and impressions of the sole of the foot; and most trackways were photographed. At each in-situ trackway location the directional heading of the trackways and the slope angle of the bedding plane was noted. The study area was also surveyed and mapped.

Trackways of living amphibians and reptiles were studied in the laboratory. Sand slopes were formed in two experimental chambers, 8 feet long and 6 feet long respectively. The animals were allowed to walk up and down the slopes. Each of the 236 experimental trackways was photographed, and identified with a number, and notes were taken on condition of the sand, the slope of the sand surface, and physical features of the tracks.

Laboratory tracks were studied mostly on 25° slopes, with some observations on 15° and 20° slopes for comparison. Four experimental conditions were used: 1) dry sand (simulating a dry desert environment), 2) dry sand moistened with a fine spray of water (simulating desert sand moistened by dew or light rain), 3) wet sand, with standing water at the base of the slope (simulating sand near the water table), and 4) underwater sand.



**FIGURES 6 and 7. Same as Figure 2.**



**FIGURES 8 and 9. Fossil footprints in the Coconino Sandstone going across the slope. Figure 9 is an enlargement of part of Figure 8.**



Most of the laboratory trackways were made on sand collected near Mt. Carmel Junction, in southern Utah. This sand was apparently derived from the Navajo Sandstone that forms the surface topography in that area, and was used because of its similarity to the sand grains in the Coconino Sandstone.

Table 1 lists the animals used in the laboratory studies. The underwater locomotion behavior of 5 species of salamanders was observed in the laboratory, and one species was also observed in Tenaja Creek, in the Santa Rosa Mountains, Riverside County, California in March and April 1975. The amount of time spent swimming or walking on the bottom was recorded to the nearest second. In this study an animal walking on the bottom and also using swimming movements of the tail was defined as swimming. Each individual was observed for 70 seconds of locomotion time, or until it disappeared from view or stopped moving for a considerable length of time. Photographs the lengths and widths of the footprints were measured to the nearest 0.5 mm. The Mann-Whitney U Test (Siegel 1956) was used to analyze the data for significant differences.

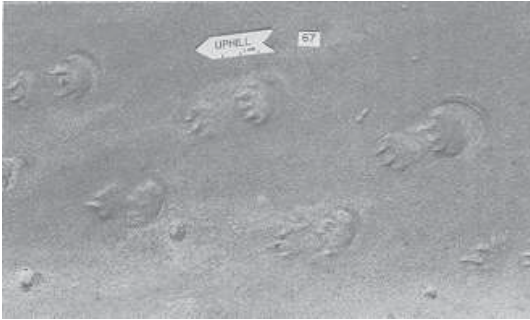
### FOSSIL TRACKS

The fossil trackways (Figures 2-10) were distributed through the lower half of the Coconino Sandstone (Figure 1). Within the track-bearing section, trackways occurred on a large number of the exposed surfaces. As reported by Gilmore (1927) almost all of the trackways were going up the slopes of the crossbedded strata towards the northeast. One indistinct trackway appeared to be going downslope.

Previous work on footprints in the Coconino Sandstone has usually been taxonomic comparison, but the present study emphasizes analysis of the physical characteristics of the entire population of trackways. Some of the Hermit Basin tracks were well defined with good impressions and

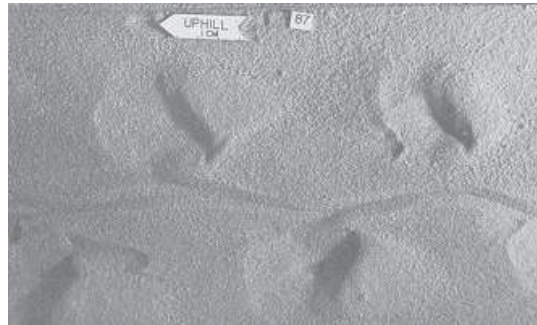
**TABLE 1**  
**Animals used in the laboratory footprint experiments.**

	Number of Individuals	$\bar{x}$ Weight (g)	$\bar{x}$ Snout-Vent Length (mm)
<b>Salamanders</b>			
<i>Taricha torsa</i>	23	10.5	72.3
<i>Taricha granulosa</i>	12	9.7	72.5
<i>Notophthalmus viridescens</i>	9	5.0	45.2
<i>Ambystoma tigrinum</i>	4	75.2	146.0
<i>Cryptobranchus alleganiensis</i>	1	495.0	380.0
<b>Lizards</b>			
<i>Sauromalus obesus</i>	2	159.8	154.0
<i>Sceloporus occidentalis</i>	5	13.8	73.7
<i>Dipsosaurus dorsalis</i>	3	51.0	124.0



**FIGURE 10.** Same as Figure 2.

**FIGURE 12.** Uphill laboratory track on a 25° dry sand slope using the lizard *Dipsosaurus*.



**FIGURE 13.** Same as Figure 12, only using the salamander *Taricha*.

**FIGURE 14.** Same as Figure 12, only using the lizard *Sceloporus*.





## FOSSIL TRACKS

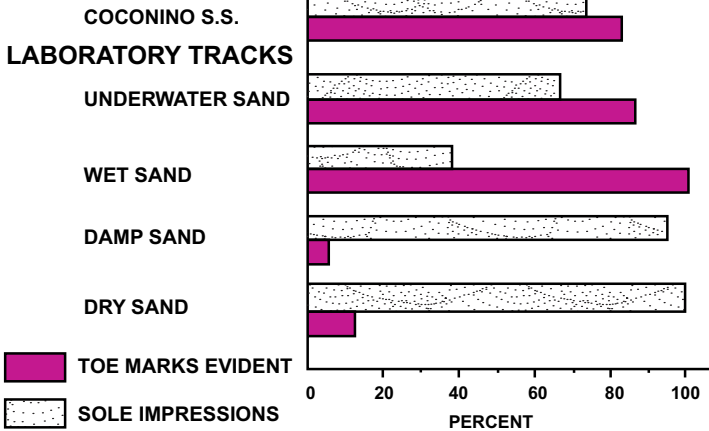


FIGURE 11. Percent of fossil footprints and laboratory footprints having evident toe marks and sole impressions.

toe marks (Figure 2), but the majority of the tracks were not as well defined or as complete. In some trackways the individual footprints did not have toe marks or other details (Figures 3-4), and in other cases the sole impressions were missing or were incomplete (Figures 5-7). Even though most of the footprints were not as complete as those in Figure 2, the majority of them did have evident toe marks and sole impressions (Figure 11). Tracks with sole impressions sometimes had small ridges of sand pushed up behind them, but these never extended back into the tracks behind them.

### LABORATORY UPHILL TRACKS

Dry sand tracks (Figures 12-15) usually consisted of a series of depressions with no toe marks or other details (Figures 12-13). There was usually a ridge of sand pushed up behind each footprint, and often the sand in these ridges flowed back into the previous footprint, obscuring any details that may have been there. A few salamander trackways had toe marks at the back of each print, which were made as the animal's foot was lifted out of the print. Also a few tracks had marks that were made by the toes being dragged across the sand from one foot position to the next (Figures 14-15). All of these were counted as toe marks in Figure 11.

Damp sand trackways always had definite foot impressions distinct from each other, but toe marks were rarely present (Figures 16-17; Figure 11). The dampened surface formed a crust of sand that broke up into many pieces when the animals walked over it. The pieces sometimes



FIGURE 15. Same as Figure 13.

FIGURE 16. Uphill laboratory track on a 25° damp sand slope using the lizard *Sceloporus*.

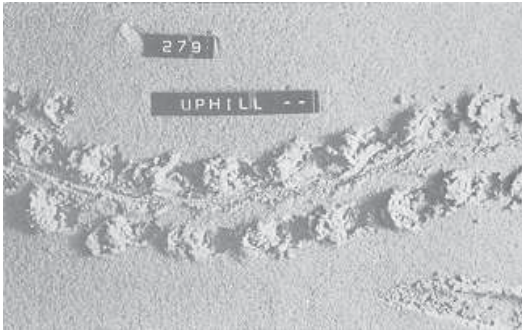


FIGURE 17. Same as Figure 16, only using the salamander *Taricha*.

FIGURE 18. Uphill laboratory track on a 25° wet sand slope using the salamander *Ambystoma*.



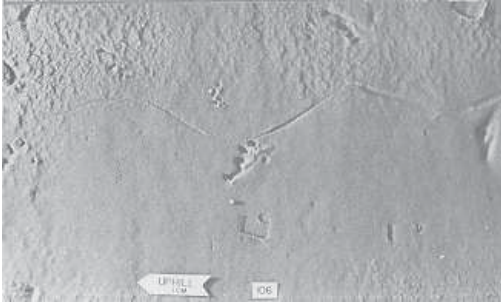
pushed up into a pile at the back of the footprint, and in other trackways they were scattered on the surface of the sand. If the damp crust of sand was thick enough so that the weight of the animal did not break it up, the only tracks produced were a series of small dimples left by the toes.

These dry sand and damp sand laboratory tracks differed from the Coconino Sandstone fossil tracks in several important features. Dry sand and damp sand tracks rarely had toe marks or other details, while the fossil tracks usually had definite toe marks. Dry sand tracks also had large ridges of sand behind them, which often flowed back all the way into the previous footprint, whereas the fossil tracks did not have very prominent ridges behind them. Jumbled pieces of damp sand crust around the damp sand tracks were never observed in the fossil tracks. Also, the proportions of the fossil tracks were quite different from the dry sand tracks. The dry sand tracks were longer than their width, but most fossil tracks were short in relation to their width (Figure 28). The outlines of most of the damp sand tracks were too poorly defined to allow precise measurements to be made. Consequently the damp sand and dry sand tracks observed in this study do not seem to provide an adequate model for the origin of the fossil tracks.

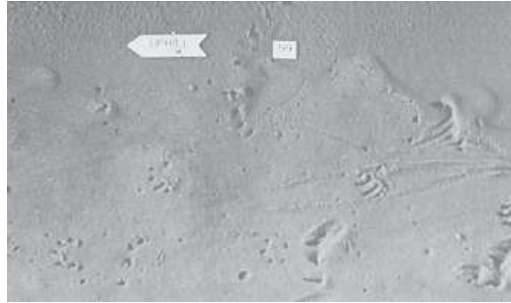
Tracks in wet sand, above water, were quite variable (Figures 18-21). The water seeps down through the sand quite rapidly, producing a gradient from lowest water content at the top of the slope to highest water content at the base. Footprints at the base of the slope were poorly defined. A little above the water level the tracks were variable, and some had clear toe marks and sole impressions. Higher on the slope, on more firm sand, the tracks consisted of toe marks only (Figures 19-21).

Many of the trackways on wet sand contained some footprints that were closely similar to the fossil tracks, but in several respects the wet sand trackways were consistently different from the fossil tracks. The wet sand trackways almost always made a marked transition from well-defined prints to toe marks only or almost no prints at all as they ascended the slope, as in Figure 18. This feature was not seen in the fossil tracks, even though some fossil trackways were several feet long. Laboratory wet sand trackways that were made some distance above the water table, where the wet sand was more firm, consisted of small scratches or other marks from the individual toes and were quite different from most of the fossil tracks.

McKee's (1947) photographs of dry sand, damp sand and wet sand trackways look very similar to my results. From his experimental results under those conditions and a personal communication from the paleontologist Peabody indicating that salamanders do not make tracks underwater, McKee (1947) concluded that the fossil tracks were most similar to the



**FIGURES 19 and 20.**  
Same as Figure 18, only  
using the lizard *Dipsosaurus*.



**FIGURE 21.** same as  
Figure 18, only using the  
salamander *Ambystoma*.

**FIGURE 22.** Uphill under-  
water laboratory track on  
a 25° sand slope using the  
salamander *Taricha*.



dry sand trackways, because only in dry sand were there definite prints of individual feet.

Peabody (1959) stated that salamanders usually swim from place to place rather than walk on the bottom; that when they do walk they are partially buoyed up by the water and do not leave footprints. There is no indication of how extensive his observations on this phenomenon were. My results were quite different from his. All five species used in my study walked on the bottom more of the time than they swam in the water (Table 2). In a laboratory tank, many of the salamanders swam vigorously along the surface, against the side of the tank, and tried to climb out. If the tank arrangement provided a resting place such as a sand bar or some other object, the salamanders' behavior was more like that observed in the field. They would commonly rest on this object, before swimming around under the water or walking on the bottom.

The substrate at my field study site was not suitable to produce footprints, but in the laboratory all five species produced tracks on the sand underwater (Figures 22-27). These trackways were composed of distinct footprints, which usually had toe marks, and sometimes had sole impressions also (Figure 11). In some cases the footprints had small ridges of sand pushed up behind them, but these ridges never extended back into the previous print.

Of all the laboratory trackways produced, the underwater tracks were most similar to the fossil tracks. Underwater trackways had toe marks as often as the fossil tracks, and they were uniform in appearance the full length of the sand slope, as the fossil tracks are. Also, the proportions of the fossil tracks were most similar to that of the underwater tracks.

Figure 28 compares the ratios of length to width of the fossil tracks and laboratory tracks. While dry sand tracks were longer than their width, fossil tracks, underwater tracks, and wet sand tracks were short in relation

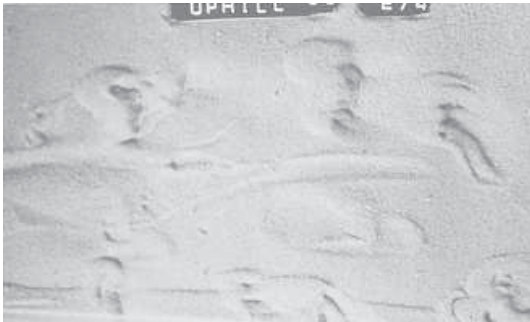
**TABLE 2**  
**Percent of total locomotion time spent in walking and swimming.**

Species	Number of Animals	Number of Trials	Walking	Swimming
Field Observations				
<i>Taricha torosa</i>	30-40*	42	74.5%	25.5%
Laboratory Observations				
<i>Taricha torosa</i>	12	20	68.4	31.6
<i>Taricha granulosa</i>	8*	20	51.3	48.7
<i>Notophthalmus viridescens</i>	10*	16	56.4	43.6
<i>Ambystoma tigrinum</i>	3	12	67.4	32.6
<i>Cryptobranchus alleganiensis</i>	1	12	60.0	40.0

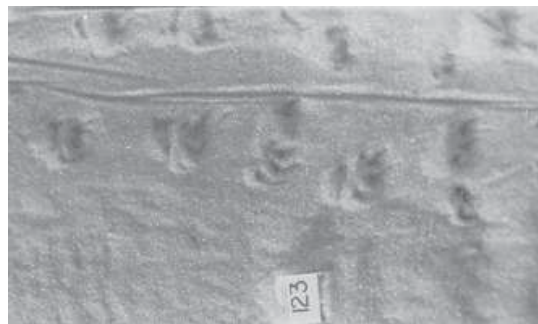
\*Estimated number



**FIGURES 23 and 24.** same as Figure 22.



**FIGURE 25.** Same as Figure 22, only using the salamander *Ambystoma*.



**FIGURE 26.** Same as Figure 22.



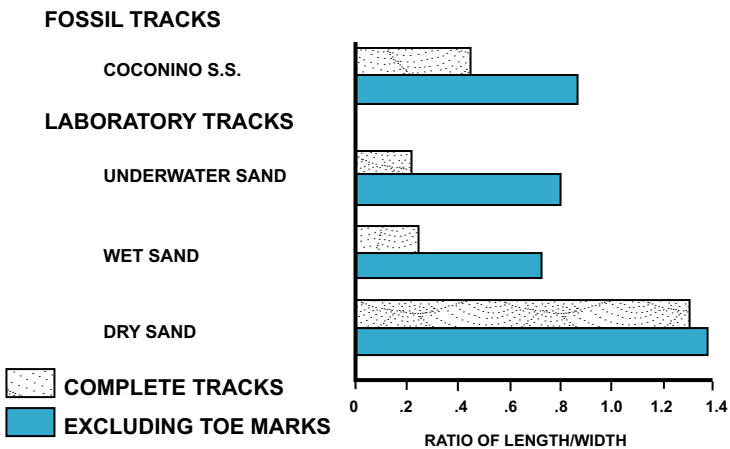
**FIGURE 27. Same as Figure 22.**



to their width. Wet sand tracks are often short because they are only toe marks. The underwater tracks tend to have sole impressions that are short in comparison to their width. This is because the animals are partially buoyed up by water, and they often push against the sand with their feet almost at right angles to the surface, rather than placing their feet flat on the surface. This produces tracks that usually have only toe marks or toe marks with a shortened sole impression — features that are also found in many of the fossil tracks. Statistical evaluation of the data shows that the difference between the fossil tracks (complete tracks) and the dry sand tracks was highly significant ( $Z=5.89$ ;  $p<0.00001$ ), but the fossil tracks and the underwater tracks were not significantly different ( $Z=.07$ ;  $p=0.47$ ).

Conspicuous tail drags were found in 40% of the laboratory trackways, but very few of the Coconino fossil trackways have tail drags. The only laboratory tracks that rarely showed tail marks were underwater trackways

**FIGURE 28. Length/width ratios of individual fossil and laboratory footprints.**



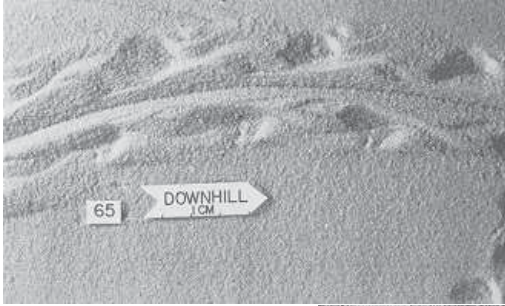


FIGURE 29. Downhill laboratory tracks on a 25° dry sand slope using the salamander *Taricha*.

FIGURE 30. Same as Figure 29, only using the lizard *Soromalus*.

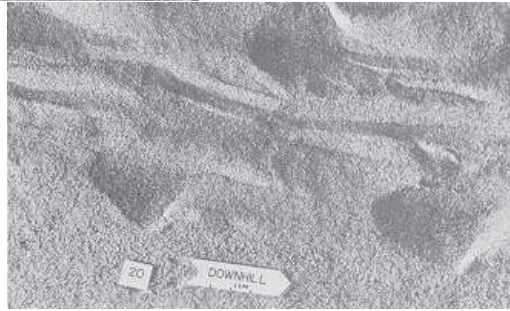


FIGURE 31. Downhill laboratory tracks on a 25° underwater sand slope using the salamander *Taricha*.

of the hellbender, *Cryptobranchus alleganiensis*. The hellbender had a much shorter tail than the other animals that I used, and it usually did not drag its tail on the sand enough to leave noticeable tail marks. Some of the fossil amphibians from Permian deposits were heavy-bodied, short-tailed animals. If these animals made the Coconino Sandstone tracks, this may explain why they rarely have tail marks.

### DOWNHILL TRACKS

It has been suggested by McKee that the near-absence of downhill trackways resulted from the animals' tendency to slide downhill, causing their tracks to be obliterated by sliding sand. This does not seem to be an adequate explanation. Downhill as well as uphill trackways were produced



under all four laboratory experimental conditions used (Figures 29-31). On underwater sand, wet sand, and damp sand almost all downhill trials produced easily recognized trackways. On dry sand, salamander downhill trackways were usually reasonably well defined, and lizards produced distinct downhill trackways when they moved at a walking pace or a slow run. If they were urged into running very fast then their tracks were almost unrecognizable. Thus the downhill laboratory trackways were often not quite as well defined as the uphill trackways, but the majority of the downhill trackways, in all of the experimental conditions, were more distinct than many of the fossil tracks; so an adequate explanation for their near-absence from the sandstone needs to be found. If the fossil tracks were produced under water, the preponderance of uphill trackways might be the result of some behavioral characteristic of the animals. For instance, they may have been swimming when going with the water current but would drop down and walk on the bottom when moving against the current. Behavioral traits of extinct animals cannot be tested, but this example illustrates that behavior can affect the tracks under water in ways that are not possible above water.

### **CROSS-SLOPE TRACKWAYS**

Several trackways were headed directly across the slope or at an angle across the slope (Figures 2, 8, 9), but with the toe marks of both back and front feet pointed upslope. These trackways can perhaps be best explained by animals being pushed by a water current moving at an angle to the direction of movement of the animal.

### **CONCLUSION**

The data presented by McKee (1947) have been used by him and others (Faul & Roberts 1951, Vaughn 1963, Walker & Harms 1972, Sarjeant 1975) as evidence that the Coconino Sandstone and some other cross-bedded sandstones were deposited in a desert environment.

The data presented in this paper indicate that fossil footprints of the type found in the Coconino Sandstone should not be used as evidence for eolian wind-blown deposition of dry sand. If the Coconino Sandstone was indeed dry when deposited, then several important features of its fossil footprints remain unexplained.

The footprints alone cannot provide the answer as to whether the Coconino Sandstone was water or wind deposited, but we can say that the tracks now point more in the direction of water deposition. The tracks suggest that it may be profitable for a sedimentologist to restudy the other characteristics of the Coconino also, in light of current knowledge about the deposition of crossbedded sandstones, to see if the data will indeed indicate that the Coconino was deposited by water.

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# ARTICLES

## SOME ISSUES REGARDING THE NATURE AND UNIVERSALITY OF THE GENESIS FLOOD NARRATIVE

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### WHAT THIS ARTICLE IS ABOUT

*Because the Genesis flood account does not provide many details about the events described, various theories have been proposed, and much speculation has caused diversity of opinion. To better understand the original meaning of the Genesis flood narrative, Dr. Hasel presents an exegetical study of three of its phrases.*

*While some commentators interpret the phrase “all flesh” in Genesis 6:12, 13 to refer to all living beings (both men and animals), others restrict “all flesh” to just mankind. “All flesh” appears in the Old Testament about 46 times, 13 of which are given in the Genesis flood account. An exegetical study of the overall use of this term reveals that it can mean the “whole body,” “all living creatures,” “all mankind,” or just “animals.” A contextual analysis of the 13 usages in the Genesis flood narrative shows that “all flesh” in Genesis 6:12, 13 denotes “all living beings.” Further support for this conclusion is given by an exegetical study of the terms “violence,” “way,” and “corruption.”*

*The use of the Hebrew term “mabbûl” to describe the Genesis flood has been thought to mean “heavenly ocean” rather than “flood and deluge.” Investigation shows the arguments for this theory to be unconvincing and, instead, it appears that “mabbûl” is consistently used to describe the deluge caused by both torrential rains and the bursting forth of subterranean waters.*

*In the final section of this paper, Dr. Hasel examines the two verses (Gen 8:3, 5) describing the receding of the waters at the end of the flood. In Genesis 8:3a, the idea is that the waters “returned” to their upper and lower spheres from which they came. The description in verses 3b and 5 indicate a gradual diminishing of the waters over a period of time, with a continuous movement somewhat like tidal activity, caused by the wind.*

The account of the flood as given in Genesis is brief, and many different interpretations have been given to the events described therein. Three expressions used in that narrative will be analyzed below in an attempt to show their original meaning.

### I. THE CORRUPTION OF “ALL FLESH” IN THE GENESIS FLOOD ACCOUNT

The subject of discussion under this heading deals with the question of what the phrase “all flesh” (*kol-bāsār*) means in Genesis 6:12, 13. Does it refer to the totality of mankind only or does it include all living beings, i.e., men and animals? Some commentators restrict the phrase *kol-bāsār* to mankind only.<sup>1</sup> There are equally prestigious commentators that suggest that the phrase *kol-bāsār* in this passage (Gen 6:12f) refers to the world of men and animals.<sup>2</sup> In view of this divergence of opinion a careful investigation of the meaning of this phrase is mandatory.

The Hebrew term for “flesh” is *bāsār*<sup>3</sup> and appears 270 times in the Old Testament. There are three usages of the Aramaic cognate in the Old Testament (Dan 2:11; 4:9; 7:5). An overview of the usages of the Hebrew term “flesh” in the Old Testament reveals that it is employed both with reference to mankind and also with reference to animals.<sup>4</sup> Although an investigation of the Hebrew term *bāsār* is of great significance for a general understanding of the concept of “flesh” in the Old Testament, the usage of the phrase “all flesh” is more crucial for an understanding of the meaning of this expression in Genesis 6:12, 13. It is, therefore, advisable to restrict our investigation to the meaning of this formula in the Old Testament. The formula “all flesh” (*kol-bāsār*) appears in the Old Testament about 46 times.<sup>5</sup> It is remarkable that 13 usages of the expression “all flesh” appear in the flood narrative (Gen 6:5 - 9:17).<sup>6</sup> The majority of recent translations render this Hebrew phrase in these 12 instances consistently with “all flesh” (Revised Standard Version, New Jewish Bible, Jerusalem Bible, New American Standard Bible, Anchor Bible), but some recent versions use a variety of renderings.<sup>7</sup> It should be noted that the expression “all flesh” appears in the Old Testament for the first time in the passage under discussion (Gen 6:12, 13) which makes it especially tantalizing.

Our first attention shall be placed upon the scope of the phrase “all flesh” throughout the Old Testament, leaving aside for a moment the employment of this expression in the flood narrative of Genesis. The phrase “all flesh” can refer to the “whole body” of man (Lev 13:13; Num 9:7) or animals (Lev 4:11; cf. 17:11, 14; Job 41:15). The emphasis in these texts rests upon “all flesh” in terms of the entire body in contrast to bones, skin, entrails, etc. In Proverbs 4:22 “all flesh” also refers to the “whole body” (New American Standard Bible).<sup>8</sup>

The second range of meaning of the phrase “all flesh” includes men and animals, namely “all living beings.”<sup>9</sup> In Numbers 18:15 reference is made to the first-born of “man or animal” which is summarized by the expression “all flesh.” This explicit statement designates “all flesh” to include “men and animals.” In both Numbers 16:22 and 27:16 Moses addressed God as “God of the spirits of all flesh.” In this epithet, as applied to God, Moses appeals to the God of all creation. It is evident that with the expression “all flesh” Moses refers to all creatures, both men and animals, and confesses that God is the Creator and Preserver of all creatures and gave and still gives life and breath to “all flesh.”<sup>10</sup> The author of Job expresses the idea that if God should gather together His spirit and breath “all flesh would perish together” (Job 34:15). The idea is again that God is the Giver of breath and the spirit of life to all perishable created beings. The Psalmist gives thanks to the “God of heaven” (Ps136:26) and testifies to Him as his God whose grace endures forever. He describes Him as the God of creation and history and praises Him for giving “food to all flesh” (v 25). As the Creator He feeds all living creatures which includes men and animals.<sup>11</sup> There are also several statements in the prophetic writings

which contain the usage of “all flesh” with reference to all living beings or creatures.

There are passages in which the scope of the phrase “all flesh” has still a meaning other than the two discussed thus far. It can be used in the sense of “all men,” i.e., the whole human race or all mankind. The author of Job contrasts “the life of every living thing” with the “breath of all mankind” (Job 12:10, New American Standard Bible). Literally the last phrase in Hebrew reads “all the flesh of man.”<sup>12</sup> The Psalmist comes to speak of God’s abundant favor to earth and man, expressing his conviction that God hears prayer and that to him comes “all flesh” (Ps 65:2, [3]). There can hardly be any doubt about the meaning of the phrase “all flesh” because it is used here in connection with prayer and appears therefore to refer to men.<sup>13</sup> In Psalm 145:21 the writer unites his personal testimony in praising God with a mandate that “all flesh will bless his holy name.” The ultimate purpose aims in asking the whole body of “all flesh” to join in the praise of God.

In discussing the remaining passages which speak of “all flesh,” we may turn first to Joel 2:28 (Heb 3:1) where God gives the great promise of the outpouring of His Spirit upon “all flesh.” What does “all flesh” mean here? It certainly does not mean “all living creatures,” men and animals, because the result of the outpouring of the Spirit of God is described in the following phrases in terms of prophesying, dreaming dreams, and seeing visions which are activities restricted to men. Some interpreters seek to understand this phrase in a very narrow sense as referring to everyone in Israel.<sup>14</sup> But this does not seem necessary. The phrase “all flesh” appears to have a broader connotation. We must keep in mind that in Genesis 6:3 God threatens that He will no longer let His Spirit rule the human race because it has become “flesh” (*bāśār*). The association of “flesh” with the “Spirit of the Lord” indicates that the restriction of the expression “all flesh” merely to the members of the literal Israel is too narrow. It has been said that the word “all” in this phrase does away with the limitation to one particular nation and that Joel 2:29, 30 does not exhaust the idea of “all flesh.”<sup>15</sup> Taking into consideration also the fulfillment of this prophecy at Pentecost where Peter quoted the Joel passage and applied it to the Christian Church — with a richer outpouring yet to be expected — we come to recognize that the expression “all flesh” refers to men generally in terms of members of spiritual Israel as well as literal Israel.<sup>16</sup> In Zechariah 2:13 (Heb 2:17) the expression “all flesh” refers to mankind (cf. Hab 2:20; Zeph 1:7).<sup>17</sup> It is often suggested that the phrase “all flesh” in Isa 40:5f; 49:26; 66:23f; Ezek 20:4, 9f refers to mankind as a whole.<sup>18</sup> While this may well be true, it is difficult to be certain in all instances. We may well ask with L. Köhler, when “all flesh” shall see that it is God who acts (Ezek 20:4), when “all flesh” shall see the glory of God (Isa 40:5), when “all flesh” shall know that the Lord has drawn forth His sword out of its sheath (Ezek 21:5), does “all flesh” mean indeed only man, or does it mean man and animals together?<sup>19</sup> If one considers Romans 8:22, an absolute answer cannot be easily provided.

The expression “all flesh” in the Old Testament (outside the 13 usages of this expression in the Genesis flood account) is used to mean at times: a) the whole body of either man or animals; b) sometimes all living beings, namely both men and animals; and c) sometimes all men.<sup>20</sup>

Let us turn our attention to an investigation of the 13 usages of the expression “all flesh” in the Genesis flood account. Leaving aside for the moment the crucial passage of Genesis 6:12, 13, we turn next to the expression “all flesh” in verse 17. Here God expresses His plan to bring the flood upon the earth in order to destroy “all flesh in which is the breath of life, from under heaven; everything that is on the earth shall perish” (New American Standard Bible). It is recognized by all commentators alike that the expression “all flesh” in this passage refers to men and animals. The same meaning of the phrase “all flesh,” namely referring to men and animals, appears again in Genesis 9:11: “And all flesh shall never again be cut off by the water of the flood” (New American Standard Bible).

It is especially noteworthy that in the covenant scene of Genesis 9:9ff, God emphasizes again and again that “all flesh shall never again be cut off by the water of the flood” (v 11, 15b). The expression “all flesh” refers again to both men and animals. This means that when God looks back to the destruction that has come upon the earth He speaks of “all flesh” in terms of the whole world of living creatures. This may have a bearing on the first appearance of this expression in Genesis 6:12, 13, to which we shall return later.

In the same covenant scene we find two times the expression of God making a covenant “between me and you [Noah] and every living creature of all flesh” (Gen 9:15a, 16). It is noteworthy that in both of these phrases the preposition *b<sup>e</sup>* is used before the phrase “all flesh.” The preposition *b<sup>e</sup>*, literally “in,” is in these instances explicative,<sup>21</sup> and can be rendered by the word “comprising”<sup>22</sup> or “namely” or “that is.” This means that this particular clause may be translated more properly: “between me and you and every living creature, comprising (namely, that is) all flesh.”<sup>23</sup> Thus it follows that “all flesh” refers to both men and animals. That this is the clear intention of the text is supported by 9:17 which speaks of the establishing of the covenant “between men and all flesh that is on earth.” “All flesh” is used here comprehensively to include every living being, namely men and animals. The meaning of the expression “all flesh” in the passages discussed so far in the Genesis flood narrative coincides with a usage of this phrase in other parts of the Old Testament.

Let us discuss the remaining passages in the Genesis flood account. They reveal another usage of the expression “all flesh” which we have not yet encountered in the Old Testament. From Genesis 6:19 it is clear that Noah receives the command to take some of the animals into the ark to keep them alive, namely birds, animals, creeping things, which are summarized in the phrase “every living thing of all flesh.” In this instance the expression “all flesh” refers only to animals. The restricted sense of “all flesh” as referring to animals alone appears also in 7:15, 16, 21; 8:17.

What perished according to Genesis 7:21 was “all flesh that moved on the earth of (*b<sup>e</sup>*) birds and of (*b<sup>e</sup>*) cattle and of (*b<sup>e</sup>*) beasts and of (*b<sup>e</sup>*) every swarming thing that swarms upon the earth, and all men.” This literal translation seeks to bring out an aspect usually overlooked. The expression “all flesh” is here clearly limited in that it includes only the enumerated kinds of animals. The function of the preposition *beth* is used to specify which kinds of animals are destroyed by the flood.<sup>24</sup> The writer of the flood account wanted to specify clearly the constituents of the animal world that perished in the flood. He attempted to exclude the water creatures which belonged to “all flesh” but would not perish in the flood.

It has become apparent that the expression “all flesh” in the Genesis flood narrative (aside from 6:12,13) expresses either the notion of all living beings, including men and animals, or is used merely with reference to animals, excluding water creatures. It is to be noted that a fourth major meaning for the expression “all flesh,” namely animals on land, has become apparent which is so far not encountered anywhere in the Old Testament.<sup>25</sup> It now remains for us to return to the initial question whether the expression “all flesh” in Genesis 6:12, 13 refers to “men and animals” or just to “men.” On the basis of the investigation of the expression “all flesh” in the Old Testament and in the Genesis flood narrative it has been shown that this expression can refer to: a) a body of men and animals;<sup>26</sup> b) all living beings, including men and animals; c) all men, i.e., the whole of mankind; and d) the whole animal kingdom. It is striking that in the flood account only two of the four usages appear, namely “all living beings,” including men and animals, and just “animals.” The latter usage does not appear again anywhere in the Old Testament. It is also striking that the expression “all flesh” with the meaning of men or mankind is not used anywhere in the Pentateuch.<sup>27</sup> On the basis of these observations it seems sound to suggest that the expression “all flesh” in 6:12, 13 denotes “all living beings,” namely men and animals, and is so used in six of the other occurrences in the flood account.<sup>28</sup> This interpretation is consistent with the other usages of this expression in the flood account.

There are a number of additional considerations which lend support to this view. In Genesis 6:3 the Lord says that His Spirit (*rūah*) shall not abide (*yādon*)<sup>29</sup> with man “inasmuch as he is also flesh.”<sup>30</sup> The term “flesh” here refers to “man” in the generic sense.<sup>31</sup> It seems that since “flesh” refers in 8:3 to “man” that the expression “all flesh” in 6:12, 13 would mean more than just “man.” This consideration supports the suggestion that “all flesh” in 6:12, 13 refers to “all living beings,” namely men and animals.

Another consideration is in place at this point. After the flood when God has destroyed men and animals from the face of the earth by the waters of the flood, God makes a covenant with “every living creature” (*kol-nepheš ḥayyāh*), an expression found three times in Genesis 9.<sup>32</sup> The repeated use of “all flesh”<sup>33</sup> indicates the universal application of the promise to “all living beings” of both men and animals “on the earth” (9:14, 16, 17). The fact that God established a covenant between Himself and every living



creature of “all flesh” (9:17) seems to indicate that both men and animals are also included in the identical phrase “all flesh” at the opening of the flood account. There seems to be an arc of connection between the continued life of every living being after the flood and the expression “all flesh” used in the beginning of the flood account (Gen 6:12, 13) where God speaks of its destruction as also in Genesis 9:15b which refers in its context to “all living creatures” of man and animals. This is further supported by the fact that in both 6:13 and 9:15 the Hebrew verb “to destroy” (*šāḥat*) is employed. These links indicate the same meaning for the same expression in 6:13 and 9:15, 17.

On account of the foregoing arguments it is fairly certain that the expression “all flesh” in 6:13 embraces indeed both men and animals. This is conceded even by some of those who would like to admit this meaning in 6:13 but would not allow it in 6:12.<sup>34</sup>

If the expression “all flesh” in Genesis 6:13 includes both men and animals, then it would seem to follow that the phrase “for the earth is filled with violence because of them” in the same verse would also have to refer to both men and animals. It has been objected that “all flesh” could not refer to “all living beings” because the Hebrew term for “violence” (*ḥāmās*) is used in the Old Testament only in connection with man.<sup>35</sup> It seems true that in the Old Testament this noun is used only in connection with man.<sup>36</sup> Whereas the regular meaning of this Hebrew word is “violence, wrong,”<sup>37</sup> it has been pointed out that this term makes reference to wickedness generally, to unrighteousness as a whole.<sup>38</sup> This noun is used in the Old Testament a total of only 59 times<sup>39</sup> and may therefore not give the total range of the usage of this word. The verb form, derived from the same root, appears several times in the Old Testament with the meaning “to treat violently” (Jer 22:3; Ezek 22:26; Zech 3:4; Prov 8:36) and is used also in connection with beings other than men (Job 15:33; Lam 2:6).<sup>40</sup> There may be, then, an indication here that the noun “violence” may also have broader connotations, although these do not often appear in other passages of the Old Testament. Let us look at one example.

The prophet Jonah says that “both men and beasts” are to take part in the mourning by being covered with sackcloth; both are to “call on God earnestly that each may turn from his wicked way and from their violence (*ḥāmās*) which is in their hands” (Jonah 3:8). The context shows clearly that “man and beast” is the subject of this clause and that beasts, therefore, along with men can have part in “violence” (*ḥāmās*).<sup>41</sup> No objection should be taken to the word “hands” as indicating that the “violence” can refer only to the wrong actions of men, because the Hebrew term for “hand” is *kaph* and used for both the “hand” and “foot” of man as well as the “foot” of a dove (Gen 8:9) and the “paws” of a quadruped (Lev 11:27).<sup>42</sup> In short, the Hebrew term for “violence, wrong” (*ḥāmās*) can be used in connection with “men and animals” as is clearly indicated by Jonah 3:8. This means that the argument used by C. Westermann that “violence” is used only in

connection with men<sup>43</sup> and that therefore the expression “all flesh” must be restricted to men is without force.

We cannot be certain as to the “violence” of the animals, because we do not have sufficient information from the Old Testament which would indicate clearly what it could refer to in the animal world. Some of the wrongs, transgressions, and sins expressed by the word “violence” in the Old Testament generally include the shedding of blood<sup>44</sup> and likely sexual aberrations (Jer 13:22) which defile the land (Lev 18:58; 20:22) and are to be punished by death (Lev 20:11-18). It is possible that these usages of “violence” give us a hint of the kinds of corruption in the animal world.

The writer of the biblical flood account wrote in Genesis 6:12: “And God looked on the earth, and behold, it was corrupt; for all flesh had corrupted their way upon the earth.” It seems that on the basis of the context<sup>45</sup> the meaning of “all flesh” in this verse is the same as in the following verse, namely “men and animals.”<sup>46</sup> This interpretation is supported by the fact that the expression “all flesh” in the Genesis flood narrative already refers seven times to “men and animals” (Gen 6:17; 9:11, 15a, 15b, 16, 17; 6:13) and that it otherwise refers only to “animals” (6:19; 7:15, 16, 21; 8:17). Since the meaning “animals” does not possibly fit into the context of this verse, the meaning “men and animals” seems the only other consistent choice. This is further supported by the fact that in 6:3 the term “flesh” specifically means mankind and that the more comprehensive designation “all flesh” would point to the inclusion of living creatures beyond the class of man.

The major argument advanced against the suggestion that in Genesis 6:12 the expression “all flesh” cannot include both men and animals rests upon the dating of the particular passages in the Genesis flood narrative in which this expression occurs (cf. Hulst, Westermann). Critical scholars customarily date this to the so-called Priestly (P) document which was supposedly written in the post-exilic period somewhere in the 5th century B.C.<sup>47</sup>

We do not agree with the hypothetical source division and redating of the Genesis flood narrative.<sup>48</sup> “If we examine the section of the Flood without bias and pay heed to its finished structure,...it becomes apparent that the section in its present form cannot possibly be the outcome of the synthesis of fragments culled from various sources; or from such a process there could not have emerged a work so beautiful and harmonious in all its parts and details.”<sup>49</sup> Those maintaining a source division of the Genesis flood narrative claim that the respective passages with the expression “all flesh” come from a late period (ca. 5th century B.C.). Thus, according to one commentator, “the most important argument” is that the term “all flesh” in prophetic writings “appears in connection with guilt and judgment and always means only men.”<sup>50</sup> This “most important argument” has cogency only on account of the redating of the Genesis flood narrative sections. If no such late date is proven for the sections, then this argument loses its force altogether.

The other argument advanced in favor of the position that the expression “all flesh” in Genesis 6:12 does not include animals is based upon the phrase “corrupted their way.” This phrase is said to be “applicable to man alone.”<sup>51</sup> This raises the question whether the verb “to corrupt” and the noun “way” are restricted in their usages only to men.

Let us turn our attention to the qualifying object “way” in order to see whether or not “only a moral being can corrupt its way.”<sup>52</sup> The Hebrew noun which is generally translated as “way” appears in the Old Testament 706 times.<sup>53</sup> This term can be rendered in English as “way, path, journey, undertaking, business, manner, custom, conduct, behavior, situation, strength.”<sup>54</sup> It is by no means true that the noun “way” is used only in connection with man. Proverbs 30:19 speaks of “the way of an eagle” and “the way of a snake.” In the same text reference is made also of “the way of a man with a woman” and in v 20 of “the way of an adulteress.” In the last two instances the word “way” is used in connection with normal sexual relations between man and woman (v 19) and even illicit sexual relations (v 20).<sup>55</sup> It may be possible that the expression “way of an eagle” can in this context refer to more than just the flight of a bird of prey. The same may be supposed for “the way of the snake” which may refer to more than just the gliding of a snake over a rock. In each case the “way” of the respective animal’s sexuality may also be referred to. It appears that the word “way” can be used as a metaphor for sexual relations.<sup>56</sup> If the noun “way” is used in the Old Testament as a metaphor for sexual relations, then could this mean that in Genesis 6:12 the corruption of the way of all flesh refers among other things to transgressions in the sphere of sexual relations between man and man, animal and animal, and man and animal?

It is evident, then, that the word “way” is not consistently restricted to man, as some have claimed (Keil, Leupold), but is indeed used in the Old Testament also in connection with animals (cf. Jon 3:8). The noun *derek* in Genesis 6:12 could accordingly be translated very properly with “conduct” or “behavior.”<sup>57</sup> It is a word that sums up the entire sphere of conduct, behavior and manner of life which had been corrupted by “all flesh,” namely men and animals.

The Hebrew verb that expresses the idea of corruption derives from the Hebrew stem *šht* and occurs 5 times in Genesis 6 (v11, 12 [twice], 13, 17) and twice in Genesis 9 (v11, 15). The very fact that we find this verb used 3 times in 6:11, 12 indicates that great emphasis is placed upon the idea expressed by it.<sup>58</sup> This is in harmony with the emphasis explicitly placed upon the great wickedness on “earth” that was mentioned several times before (6:5, 11). The corruption of the “earth” means the corruption of “all flesh.”

The emphasis on the corruption of all flesh seems to be intended as a definite contrast to the account of creation. In Genesis 1:31 it is stated “and God saw” which is followed by the appraisal of the divine inspection which resulted in the verdict, “it was very good.” The same opening phrase “and God saw (looked)” appears here in Genesis 6:12, and what He witnessed

now was the complete opposite, the corruption of all flesh on earth. The world as it emerged from the hands of the Creator was exceedingly good, but now, because of the conduct and behavior of all flesh, it was corrupt. Already in Genesis 1 we find a close association between men and animals in that the animals were created on the same day on which God created man (v 24ff). The same close association between man and animals appears in Genesis 2 where both men and animals were formed from the dust of the ground (v 7, 19).<sup>59</sup> The corruption of their “way” seems to include also sexual deviation as we have pointed out above. It has been shown that sexual deviations are also included in the universal corruption of mankind<sup>60</sup> and as 6:2 indicates where “the sons of God saw the daughters...and they took wives for themselves, whomever they choose.” The first part of this verse indicates intermarriage. It has been suggested that the phrase “whomever they choose” implies polygamy<sup>61</sup> and other sexual sins.<sup>62</sup>

The Hebrew verb “to corrupt” is used of animals as well as of man. In 1 Samuel 6:5 reference is made to mice which are said “to corrupt the earth,” using also the Hiphil form of the verb as in Genesis 6:12. This means that the claim that the phrase “corrupted their way” is applicable to man alone<sup>63</sup> cannot be upheld, because both the verb “to corrupt” is used with an animal as its subject (1 Sam 6:5) and the noun “way” is also used in connection with animals (Prov 30:19f).

On the basis of the foregoing evidence it seems safe to conclude that the expression “all flesh” in Genesis 6:12, 13 refers comprehensively to “men and animals.” To speak in terms of Genesis 6:7, “all flesh” included “man and beast and creeping things and flying creatures of the air.” The phrase “all flesh” is a summary expression of all living beings on earth which have “corrupted their way.” The corruption was universal and should not be restricted to man, for the latter had moral implications. Among the transgressions that corrupted all living beings were apparently also various deviations in the sphere of sexuality.

## II. THE TERM *MABBÛL* (FLOOD) IN THE GENESIS FLOOD ACCOUNT

The Hebrew term for the catastrophe described in the Genesis flood account is *mabbûl*, occurring everywhere in the flood account with the definite article<sup>64</sup> with the exception of two instances.<sup>65</sup> This usage suggests that for the ancient Hebrews this term was a well-known entity to which water belonged (Gen 6:17; 7:7). Its only other appearance in the Old Testament is Psalm 29:10. In the apocrypha it appears in Sirach 44:17.

The various theories that trace the Hebrew word *mabbûl* back to an Akkadian original have generally been given up and can be said to have been soundly refuted.<sup>66</sup>

In 1928 the suggestion was made that the Hebrew term *mabbûl* means in several passages “heavenly ocean” (Gen 6:17; 7:6, 7, 10, 17; Ps 29:10), whereas in other passages it simply means “flood, deluge” (Gen 9:11, 15, 28; 10:1, 32; 11:10; cf. Sir 44:17).<sup>67</sup> There are two primary arguments for this

distinction: a) It is based upon the separation of the Genesis flood account into two basic documents (P and J), each of which is interpreted by itself without reference to the other and then the differences are used to arrive at the distinction of these terms. For example, it is claimed that in the so-called P document God announced to Noah His intention at the beginning to bring the *mabbûl* of waters upon the earth (6:17). Accordingly it is claimed that the new thing for Noah obviously is not the well-known *mabbûl*, but the announcement of its being brought upon the earth. On this basis it is assumed that Noah knows very well what a *mabbûl* is. On the other hand, in the J document, Noah to begin with learns only God's intention to destroy the earth with water and only later is a first mention made of the *mabbûl* (7:10).<sup>68</sup> b) The other major argument rests on the usage of the only other biblical text in the Old Testament in which the designation *mabbûl* appears, namely Psalm 29:10.

With regard to the first argument we would like to point out that the source division of the Genesis flood narrative is entirely hypothetical and artificial. Therefore, no real case can be built upon such a division with regard to the meaning of this Hebrew term. A careful reading of the context of the first appearance of the word *mabbûl* in the Genesis flood narrative will throw much light upon the meaning of this term. The traditional translation of Genesis 6:17 is "For behold, I will bring a flood of waters upon the earth" (Revised Standard Version, New American Standard Bible). This traditional rendering has obscured the fact that the Hebrew reads *eth-ha-mabbûl mayim*. The fact that the article is used with the object *mabbûl* indicates that the word "waters" is not considered to be the genitive of the word "flood" (*mabbûl*) as the traditional renderings indicate.<sup>69</sup> This means that the words "waters upon the earth" are in apposition to the word "flood" (*mabbûl*).<sup>70</sup> A literal translation of this clause in Genesis 6:17 will therefore read, "And behold, I myself am bringing the flood — waters upon the earth — to destroy all flesh."<sup>71</sup> The appositional phrase "waters upon the earth" is not a later addition but necessary in this context.<sup>72</sup> In other words, Noah is being told that the *mabbûl* would be made up of the waters that cover the earth. Earlier God had revealed to Noah that He would destroy the earth (6:13); now Noah is told that the destruction comes by a "flood" (*mabbûl*), namely by means of "waters upon the earth."

There is no hint anywhere in the biblical flood narrative that the flood comes by means of the ocean. On the contrary, the flood is said to come by torrential rains and violent outbursts of subterranean waters. Contextually the waters of which the "flood" (*mabbûl*) did consist of is made up of "rain" (7:12) and "the fountains of the deep" (7:11; 8:2), the subterranean waters. This indicates clearly that with the term *mabbûl* reference is made to all the waters that came upon the earth and as such should be understood as a "flood" by waters of a "deluge."<sup>73</sup> This conclusion is further supported through the later expression "waters of Noah" (Isa 54:9) which is used for the "flood." In the Genesis narrative itself the flood is many times referred to as "the water" (Gen 7:18-20, 24: 8:1, 3, 4, 8, 9, 11, 13).

The usage of *mabbûl* in Psalm 29:10 can hardly be used to explain the term in Genesis, because the Psalmist's reference is a later one. The claim that *mabbûl* is "an old designation for the heavenly ocean"<sup>74</sup> can hardly be upheld because not a single piece of evidence can be marshaled in support of this conclusion.

It appears that *mabbûl* is an ancient Hebrew term. It has been suggested that it may be derived from the Hebrew root *ybl*, "to flow, to stream,"<sup>75</sup> which is also used in Ugaritic.<sup>76</sup> If the derivation from *ybl* is correct, then *mabbûl* is a technical term for waters flowing or streaming forth and as such designates the flood (deluge) being caused by waters.

In short, a careful investigation of the arguments for the suggestion that *mabbûl* in certain passages means "heavenly ocean" falls far short from being coercive. To the contrary, it appears that *mabbûl* is in the Old Testament a term consistently employed for the flood (deluge) which was caused by torrential rains and the bursting forth of subterranean waters.

### III. THE RECEDING OF THE WATERS OF THE DELUGE

The biblical flood narrative describes twice (Gen 8:3, 5) the receding of the waters after the waters from the sky and earth were stopped (8:2). A literal translation of the first part of Genesis 8:3 is as follows: "And the waters resumed *wayyāšubû* from the earth going and returning (*hālôk wāšôb*)." The wording in the original of this clause is not identical with the one in 8:5: "And the waters remained,<sup>77</sup> going and diminishing, until... (*wēḥāsôr*)." The idea expressed in Genesis 8:5 by the infinitive absolute *hālôk* is "to go on, to continue," namely a "long continuance"<sup>78</sup> in the process of gradually diminishing,<sup>79</sup> becoming less and less day by day.<sup>80</sup>

The idea of 8:3 is different. The verb "to return" (*šûb*) is emphasized in this text,<sup>81</sup> by being employed twice (*wayyāšubû* and *wāšôb*), a fact to which commentators pay usually no attention.<sup>82</sup> But on account of this emphasis it may be gathered that the waters "returned" to the respective places from which they came, i.e., the upper sphere and the lower or subterranean sphere. It may be well to remember that the waters of the flood (*mabbûl*) came from the heavens and the great deep (*tēhôm*).<sup>83</sup> The usage of "returned" (*wayyāšubû*) in 8:3a appears to refer to the "return" of the waters to the sources from which they derived.

The phrase "going and returning" (*hālôk wāšôb*) in Genesis 8:3b speaks seemingly of the protracted process<sup>84</sup> of the subsiding of the flood waters. The sources of the waters had stopped (8:2) and God had caused a "wind" (*rûaḥ*)<sup>85</sup> to blow across the earth causing the waters to subside (8:1; *wayyāšokkû*). The process of the subsiding and going down of the water is next described as "going and returning" (8:3b), i.e., the waters recede gradually over some period of time<sup>86</sup> with a continuous movement of "going and returning," rushing back and forth in an action that reminds of tidal activity. Contextually the only cause mentioned which contributed to the continuous "going and returning" activity of the receding waters is the "wind" (8.1). The passage (8:1-5) does not state whether other forces were also at work.



## ENDNOTES

1. Tuch F. 1871. *Commentar über die Genesis* (2nd ed.), *ad loc.*; Strack HL. 1905. *Die Genesis übersetzt und ausgelegt* (2nd ed.), *ad loc.*; Driver SR. 1909. *The book of Genesis* (7th ed.), *ad loc.*; Keil CF, Delitzsch F. 1878. *Commentary on the Old Testament: the Pentateuch* (3rd ed.), p141: "... the whole human race which had resisted the influence of the Spirit of God had become flesh"; Leupold HC. 1956. *Exposition of Genesis* (3rd ed.), I, 267: "Therefore 'all flesh' refers to the totality of mankind"; and others.
2. Delitzsch F. 1887. *Neuer Commentar über die Genesis*, p 169; Gunkel H. 1901. *Genesis* (Leipzig), p 129; Skinner J. 1930. *A critical and exegetical commentary on Genesis* (2nd ed., London), p 159f; Rabast K. 1951. *Die Genesis* (Berlin), p 137; Zimmerli W. 1967, 1. *Mose 1-11. Die Urgeschichte* (3rd ed., Zürich), p 305; Cassuto U. 1964. *Genesis* (Jerusalem), II, *ad loc.*
3. Discussions of the Hebrew term are provided by: Baumgärtel F. 1971. *Flesh in the Old Testament*. In: *Theological Dictionary of the New Testament*, VII, 105-110 (Grand Rapids, MI), hereinafter cited as TDNT; Gerleman G. 1971. *bāsār* Fleisch. In: Jenni E, Westermann C, editors. *Theologisches Handwörterbuch zum Alten Testament*, I, 376-379 (Munich), hereinafter cited as THAT; (c) Bratsiotis NP. 1972. In: Botterwek GJ, Ringgren H, editors. *Theologisches Wörterbuch zum Alten Testament*, I, 850-867 (Stuttgart), hereinafter cited as TWAT; (d) Lys D. 1967. *La Chair dans l' Ancien Testament "Bāsār"* (Paris).
4. A detailed account is provided by Bratsiotis, TWAT, I, 851ff.
5. Genesis 6:12, 13, 17, 19; 7:15, 16, 21; 8:17; 9:11, 15a, 15b, 16, 17; Leviticus 4:11; 13:13, 43a, 43b; 17:14 (three times); Numbers 11:18; 16:22; 18:15; 27:16; Deuteronomy 5:23 (26); Job 12:10; 34:15; Proverbs 4:22; Psalm 65:3; 136:25; 145:21; Isaiah 40:5, 6; 49:26; 66:16, 23, 24; Jeremiah 12:12; 25:31; 32:27; 45:5; Ezekiel 21:4, 9, 10; Zechariah 2:17; Joel 3:1.  
It is curious that the specialized articles on the Hebrew term usually say that there are about 40 usages of the formula "all flesh" (Gerleman, THAT, I, 378; Bratsiotis, TWAT, I, 852) whereas there are actually 46 instances in which it appears.
6. Genesis 6:12, 13, 17, 19; 7:15, 16, 21; 8:17; 9:11, 15a, 15b, 16, 17.
7. The New American Bible renders the Hebrew *kol-bāsār* with "all mortals" (Gen 6:12, 13), "all creatures" (Gen 6:17, 7:15, 21), "all bodily creatures" (8:17; 9:11), "all living beings" (9:15a), "all other living creatures" (6:19), "all mortal beings" (9:15b), "all mortal creatures" (9:16, 17), and "all species" (7:16). The New English Bible translates "all men" (6:12), "all mankind" (6:13), "every human being" (6:17), "living creatures" (6:19), "all creatures" (7:15), "all living things" (7:16), "every living creature" (7:21; 8:17; 9:11; 9:15b), "every kind" (9:15a, 16), and "all that lives" (9:17). In these two recent versions there is no particular pattern which can be detected that would explain why the identical Hebrew expression is rendered with such a variety.
8. McKane W. 1970. *Proverbs: a new approach* (Philadelphia), p 310; Hulst AR. 1958. *KOL BASAR in der priesterlichen Fluterzählung*. In: *Oudtestamentische Studien* 12, p. 52, hereinafter cited as OTS.
9. Numbers 18:15; 16:22; 27:16; Psalm 136:25; Isaiah 66:16; Jeremiah 32:27; Job 34:15; Daniel 4:9 (Aramaic). Cf. Gerlemann, THAT, I, 378; Baumgärtel, TDNT, VII, 106; Bratsiotis, TWAT, I, 852.
10. Hulst, OTS 12, p 42; (b) *Pentateuch*, III, 109.
11. Baumgärtel, TDNT, VII, 106; Bratsiotis, TWAT, I, 852; Lys, p 113.



12. Lys suggests that the phrase “all the flesh of man” is equivalent to the parallel expression “every living thing” (p 121).
13. Both the New English Bible and the New American Standard Bible translate the Hebrew phrase as “all men.” According to its context this is certainly justified. Cf. Dahood M. 1968. Psalms II (Anchor Bible; Garden City, NY), II, 110; Weiser A. 1962. The Psalms (Philadelphia), p 463.
14. Wolff HW. 1963. Dodekapropheten: Joel (Neukirchen-Vluyn), p 80; Rudolph W. 1972. Joel-Amos-Obadja-Jona (Gütersloh), p 71; Lys, p 91f.
15. Cf. Keil. 1956. Commentary on the Old Testament: Minor Prophets (Grand Rapids, MI), p 211.
16. Here we agree with those interpreters that recognize in the phrase “all flesh” a broader concept than literal Israel. Cf. Hulst, OTS 12, p 47ff; Bratsiotis, TWAT, I, 852; Keil, p 210-218; Hengstenberg EW. 1970. Christology of the Old Testament (Grand Rapids, MI), p 521-534.
17. See: Lys, p 90; Baldwin J. 1972. Haggai, Zechariah, Malachai (Tyndale Old Testament Commentary; Downers Grove, IL), p 112.
18. Bratsiotis, TWAT, I, 852ff.
19. Köhler L. 1957. Old Testament theology (Philadelphia), p 136.
20. It should be noted that in the Hebrew part of the apocryphal book Sirach 40:8 the expression “all flesh” appears with reference to “all living creatures,” man and animals included, whereas in Sirach 1:10; 14:17 this very phrase is used with reference to “all mankind.”
21. Cassuto, Genesis, II, 139; Williams RJ. 1967. Hebrew syntax: an outline (Toronto), p 48.
22. Speiser EA. 1964, Genesis (Anchor Bible; Garden City, NY), p 59.
23. Against the forced exposition of: Scharbert J. 1967. Fleisch, Geist und Seele im Pentateuch (2nd ed., Stuttgart), p 53f.
24. Williams, Hebrew syntax, p48 #250; Gesenius W, Kautzsch E, Cowley AE. 1910. Hebrew grammar (Oxford), p 379 #1191.
25. It should be pointed out also that the usage of the Hebrew phrase “all flesh” as referring to animals appears also in Sirach 13:16; 17:4.
26. In Ezekiel 10:12 it seems to refer also to the body of the cherubim.
27. Job 10:12; Psalm 65:3 (2); 145:21; Isaiah 40:5, 6; 29:26; 66:23, 24; Ezekiel 20:4, 10; 21:5; Joel 2:28 (3:1); Zechariah 2:17. Cf. Sirach 1:10; 14:17.
28. Genesis 6:17; 9:11, 15a, 15b, 16, 17.
29. The interpretations proposed for this word are legion. For an overview of the discussion the reader may turn to: Skinner, Genesis, p 143f; Cassuto, Genesis, I, 295f; Westermann C. 1972. Genesis (Neukirchen-Vluyn), p 506f.
30. The present writer follows here the Masoretic Text which has the reading of *bēš-aggam*, i.e., “inasmuch as he also” which consists of the Hebrew preposition *bē* and the relative particle *še* and *gam*. The ancient versions have understood this word in this way (LXX, Syriac, Vulgate, Targum Onkelos) and a number of recent commentators: Cassuto, Genesis, I, 295f; Kidner D. 1967. Genesis (Chicago), p 84; Westermann, Genesis, p 57f.
31. Gunkel, Genesis, p 52f; Westermann, Genesis, p 508.
32. Genesis 9:12, 15, 16.
33. Genesis 9:11, 15a, 15b, 16, 17.

34. For example, Keil, *Pentateuch*, I, 142; Scharbert, *Fleisch, Geist und Seele im Pentateuch*, p 52; Bratsiotis, *TWAT*, I, 861.
35. Westermann, *Genesis*, p 560.
36. On a discussion of this term, see J. Stoebe, "hamas Gewalttat," *THAT*, I, 583-587.
37. Holladay WL, editor. 1971. *A concise Hebrew and Aramaic lexicon of the Old Testament* (Grand Rapids, MI), p 109.
38. Cassuto, *Genesis*, II, 53; Hulst, *OTS* 12, p 55-60.
39. Köhler L, Baumgartner W. 1958. *Lexicon in Veteri Testamenti Libros* (Leiden), p 312, hereinafter cited as *KBL*.
40. *Ibid.*, p 311.
41. We cannot follow the suggestion of many commentators who strike out arbitrarily the Hebrew words "and beasts" (recently again Rudolph, *Joel-Amos-Obadja-Jona*, p 358f), because there is no warrant for this whatever in any Hebrew manuscript. We must, therefore, accept the Hebrew text as it stands without forcing it into the modern patterns of thought (with Keil, *Minor Prophets*, I, 409).
42. See Holladay, p 162; *KBL*, p 449f.
43. Westermann, *Genesis*, p 560.
44. *Genesis* 49:5f; *Judges* 9:24; *Isaiah* 59:6; *Jeremiah* 51:35; *Ezekiel* 7:23; *Joel* 4:19.
45. We agree with the emphasis of C.F. Keil "that the precise meaning of the word must always be determined from the context" (*Pentateuch*, I, 142).
46. Among those holding this view, see above, notes 2 and 4.
47. See the standard critical introductions to the Old Testament, e.g., Eissfeldt O. 1965. *The Old Testament: an introduction* (NY), p 204-208; Fohrer G. 1968. *Introduction to the Old Testament* (Nashville), p 178-185; Robert A, Feuillet A. 1970. *Introduction to the Old Testament* (Image Books; Garden City, NY), I, 187ff; Kaiser O. 1969, *Einleitung in das Alte Testament* (Gütersloh), p 95. Not all critical scholars, however, are agreed on a post-exilic date. F.M. Cross believes that an "Exilic date for the major Priestly work seems almost certain now." (Cross FM. 1968. *The Priestly tabernacle*. In: Sandmel S, editor. *Old Testament issues* (NY), p 53. Y. Kaufmann (1960. *The religion of Israel* [Chicago]), p 153ff, puts P as the earliest document into the time of the establishment of the Hebrew monarchy. For a comprehensive assessment of these critical views, see: Harrison RK. 1969. *Introduction to the Old Testament* (Grand Rapids, MI), p 19ff; Archer CL. 1964. *A survey of Old Testament introduction* (Chicago), p 73-110; Cassuto U. 1961. *Documentary hypothesis* (Jerusalem); Segal NH. 1967. *The Pentateuch: its composition and its authorship and other biblical studies* (Jerusalem).
48. For pertinent critiques of the source division of the *Genesis* flood narrative, see: Kidner D. 1967. *Genesis* (Chicago), p 97-100; Jacob B. 1930. *Die biblische Sintfluterzählung. Ihre literarische Einheit* (Berlin); Cassuto, *Documentary hypothesis*, p 36, 47f; Cassuto, *Genesis*, II, 33-43.
49. Cassuto, *Genesis*, II, 34.
50. Westermann, *Genesis*, p. 560, who follows in this argument Hulst, *OTS* 12, pp. 28-68.
51. Keil, *Pentateuch*, I, 142.
52. Leupold, *Exposition of Genesis*, I, 267.

53. Nötscher F. 1963. Gotteswege und Menschenwege in der Bible und in Qumran (Münster), p 17-69; Sauer G, “daeraek Weg,” THAT, I, 456-460.
54. Holladay, A concise Hebrew and Aramaic lexicon of the Old Testament, p 74.
55. McKane, Proverbs, p 658.
56. Scott RBY. 1965. Proverbs-Ecclesiastes (Anchor Bible; Garden City, NY), p 181.
57. Sauer, THAT, I, 458.
58. Cassuto, Genesis, II, 54.
59. Bratsiotis, TWAT, I, 861.
60. Skinner, Genesis, p 159.
61. Rabast, Genesis, p 132.
62. Ibid., p 81f.
63. Keil, Pentateuch, I, 142; Leupold, Exposition of Genesis, I, 267.
64. Genesis 6:17; 7:6, 7, 10, 17; 9:11, 28; 10:1, 32; 11:11.
65. Genesis 9:11, 15.
66. This is the assessment of Begrich’s study (Begrich J. 1928. *Mabbûl, Eine Exegetisch-Lexikalische Studie*. In: *Zeitschrift für Semitistik* 6:13f, hereinafter cited as ZS; by Albright WF. 1939. The Babylonian matter in pre-Deuteronomic primeval history, *Journal of Biblical Literature* 58:98; and followed by Marks JH. 1962. Flood (Genesis), in: *The Interpreter’s Dictionary of the Bible* (Nashville), II, 279f.
67. This suggestion has come from the study of Begrich, ZS 6:135ff and has been accepted by many. For example, Albright, *Journal of Biblical Literature* 58:98; Zimmerli, I. *Mose 1-11*, p. 311; von Rad G. 1961. *Genesis*, a commentary (Philadelphia), p 124; Marks, *Interpreter’s Dictionary of the Bible*, II, 280; Kidner, *Genesis*, p 89. This view is also reflected in the two standard Hebrew lexicons: KBL, p 491; Holladay, p 181.
68. A summary of these arguments is found in Marks, *Interpreter’s Dictionary of the Bible*, II, 280, but an extensive elaboration is provided by Begrich, ZS 6:139ff.
69. Williams, *Hebrew syntax*, p 12f.
70. Ibid., p 16 #68.
71. This translation is much like the one in the New Jewish Version and by Speiser, *Genesis*, p 47, both of which translate: “For My part, I am about to bring the Flood — waters upon the earth — to destroy all flesh.” This translation is essentially also supported by the New American Bible which abbreviates as follows: “I, on my part, am about to bring the flood [waters] on the earth.” This recent Catholic version puts the word “waters” in square brackets indicating that it is a gloss. Many exegetes regard the word “waters” (*mayim*) as a later addition and it is marked as such in the standard critical Hebrew Bibles (Kittel, *Biblia Hebraica*; *Biblia Hebraica Stuttgartensia*). This view, however, has nothing to support it, because the text is well preserved so that there is no textual support for this supposition.
72. Skinner, *Genesis*, p 162.
73. This meaning of *mabbûl*, referring to the “flood, deluge,” is supported by a great number of commentaries and exegetes: Orlinsky HM. 1969. Notes on the new translation of the Torah (Philadelphia), p 75; Rabast, *Genesis*, p141, Cassuto, *Genesis*, II, 66f; Keil, *Pentateuch*, I, 143; Skinner, *Genesis*, p 162; Leupold, *Genesis*, I, 273; Speiser, *Genesis*, p 47-49; and many others.

74. Begrich, ZS 6:141.
75. Cassuto, Genesis, II, 66f; Marks, Interpreter's Dictionary of the Bible, II, 280.
76. The root "ybl" appears in an Ugaritic inscription used in the sense of "to cause to come, to bring" waters in the form of rain and from the deeps or subterranean sources (Gordon CH. 1965. Ugaritic textbook [Rome], I Aqht 42-43), cf. Cassuto, 1939, *Orientalia* 8:239.
77. The Hebrew verb here is *hayû* and cannot have the two following infinitive absolutes joined with it and treated as a mere auxiliary as the traditional translations render it: "and the waters were decreasing." Cf. König FE. 1897. *Historisch-comparative Syntax der hebräischen Sprache*, #402b. It seems, therefore, that *hayû* must have a meaning like "remain" or "exist."
78. Gesenius-Kautzsch-Cowley, Hebrew grammar, p 344 #113u; cf. Williams, Hebrew syntax, p 41 #206: "To express continuous action or repetition it [inf. absolute] follows the finite verb." Brockelmann C. 1956. *Hebraische Syntax* (Neukirchen-Vluyn), #93a.
79. Holladay, A concise Hebrew and Aramaic lexicon of the Old Testament, p 79f; "*hālôk* expresses the continuation and progress of the action ... 'further and further' Gn 12:9."
80. Cf. Cassuto, Genesis, II, 106.
81. So rightly Cassuto, Genesis, II, 106.
82. Among notable exceptions are Leupold, Genesis, I, 310; Cassuto, Genesis, II, 102.
83. Genesis 7:11.
84. How Leupold, Genesis, I, 310, arrives at the suggestion that this refers to a "pronounced fall" is an unexplained mystery.
85. This term is employed over 100 times in the Old Testament for "wind," KBL, p 877f. For a description of the violent force of this wind, see White EG. 1958. *The story of patriarchs and prophets* (Mountain View, CA), p 107, 108.
86. Cassuto (Genesis, II, 102) suggests that the waters of the flood rose only during the first forty days. This seems hardly supported by the total picture of the flood account (cf. 7:18, 20, 21ff, 24; 8:1).

# NEWS AND COMMENTS

## SUING THE SMITHSONIAN

Is the Smithsonian Institution — the treasure house of America — violating the First Amendment to the U.S. Constitution by promoting the religion of secular humanism through its displays on evolution?

The answer is yes, according to Dale Crowley, Jr., and he hopes that the courts will agree with him. In April 1978, on behalf of the National Bible Knowledge Association and the National Foundation for Fairness in Education, he filed suit against the Smithsonian's Museum of Natural History, which is completing a \$463,000 Hall of Evolution. Its five sections — struggle for existence, genetics, natural selection, differentiation of population, and environmental variation and extinction — are designed to promote the general theory of evolution as a fact.

The lawsuit is significant because of the Smithsonian's prestigious position in the world of science. The Institution began as a dream of a lonely English scientist who desired to perpetuate his name and at the same time serve the human race. In 1826, James Smithson bequeathed his fortune of \$500,000 "to the United States of America, to found at Washington, under the name of the Smithsonian Institution, an Establishment for the increase & diffusion of knowledge among men."

This strange bequest caused much debate, but the dream finally became a reality in 1846, when Congress passed an act creating the Institution. Its earliest secretaries were scientists, and it seemed natural that this new establishment should concentrate primarily on scientific investigation and the publishing of its findings. Smithson's wish for "increase & diffusion of knowledge" meant that no branch of knowledge could rightly be excluded, but the secretaries agreed that the Smithsonian would not engage in any activity that was adequately provided for by other agencies.

Through the years, under the sponsorship of the U.S. government which provides 90% of its support, the Smithsonian has gradually expanded its duties to preserving the nation's treasures through art galleries and museums, studying American ethnology, maintaining a national zoo, facilitating the international exchange of scientific publications, and supporting scientific research by carrying on field exploration and laboratory investigation through its own projects and through grants to outside workers.

Now, the Smithsonian represents an authoritative source of cultural and scientific information. Each year, busloads of children from all over the United States visit the National Museum of Natural History. If these

impressionable young minds are shown the Hall of Evolution, without seeing alternative views of origins, they will doubtless accept evolution as a fact.

According to Crowley, the Smithsonian is using taxpayers' money to indoctrinate the children in a religion, i.e., a theory that requires faith. This is a violation of the First Amendment which requires the government to remain *neutral* toward religious matters. The plaintiffs are therefore requesting the government to neutralize its preference to the religion of secular humanism by providing equal time and funds to present biblical creationism as an alternative view of the origin of life.

The government moved to dismiss the lawsuit, saying that the request for an exhibit on creation would represent an establishment of religion, which is prohibited by the U.S. Constitution. A hearing was held on November 9, and one month later, U.S. District Judge Barrington D. Parker ruled in favor of the Smithsonian, saying that it "in no way treats evolution as part of a religion, secular humanism or otherwise."

Crowley says he will appeal the ruling, because "evolution is a matter of faith, strictly.... I object to the idea that my children go through this museum and are indoctrinated by sheer speculation presented as fact." Further developments in this case will prove interesting.

Katherine Ching

## LITERATURE REVIEWS

*Readers are invited to submit reviews of current literature relating to origins. Mailing address: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA. The Institute does not distribute the publications reviewed; please contact the publisher directly.*

### **TWO REVIEWS OF A COMPREHENSIVE OVERVIEW — A**

THE CREATION-EVOLUTION CONTROVERSY. R.L. Wysong.  
1976. East Lansing, MI: Inquiry Press. 455 p.

*Reviewed by Jerry Bergman,  
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Ever since the modern theory of evolution by natural selection was proposed by Herbert Spencer and Charles Darwin, discussion and debate have raged as to which theory — creation or evolution — more fully explains the extant empirical data. The debate, which tends to be characterized by a high degree of emotionalism on both sides, peaked in the 20s with the Scopes trial and was relatively dormant in the 30s and 40s. The formation of several creationist movements in the early 60s and the reexamination of some difficulties with the evolutionary position has produced a strong resurgence of this debate. Evidence can be seen in the recent establishment and growth of a large number of creationist organizations, many of which are on college campuses.

Today there are literally hundreds of books that espouse the various “creationist” positions. Unfortunately, writers in this area tend to dichotomize their views when discussing this subject. Many of the more vocal creationists advertise their position as being the most scientifically correct concept and the evolutionary position as a plot by God-hating atheists. On the other hand, many evolutionists preach the evolutionary position to be the only scientifically correct position and picture the creationists as being uninformed, unaware, ignorant and uneducated.

It is common for adherents of each side to devour volumes of material which support their beliefs and then conclude that one must be absolutely stupid to accept any other hypothesis. Tragically, people on both sides often never study in depth the “other side.” Furthermore, many neither have an intellectual understanding of the other side, nor even realize it can be believed by the intelligent and informed. Much of this antagonism is unnecessary. There are logical, rational arguments for both theories.



Both reveal strengths and weaknesses in answering the data. Stacking the cards is easy for both sides but does little to reduce antagonism or permanently convince one's opponents. Honestly attempting an objective look at all of the data is the only way this debate will be solved.

Wysong's *The Creation-Evolution Controversy* is one of the few recent attempts to present *both* sides in a logical, understanding manner so the reader can be informed on the issues, regardless of the position for which he opts. In reality, most of us are somewhere between the two extremes of "atheistic evolution" and "instant, divine fiat creationism." While Wysong takes the creationist position, he is able, in most cases, to present the evolutionary position adequately and fairly, for he was a committed evolutionist during most of his undergraduate and graduate studies.

Each chapter defines the terms and presents the necessary background material for a specific area. After the subject is discussed, the evidence for evolution is presented, followed by the evidence for creation. Because much has already been published in this area, it is impossible for the author to present a complete discussion within the scope of this book. He is therefore forced to skim only the highlights of the chemical and mechanical principles and laws relative to the origin and development of plant and animal life.

The book begins with a discussion of methodology, i.e., the scientific method and other "methods of knowing." This background material is necessary for us to understand the controversy adequately. Unfortunately, many of those with definite opinions are not familiar with the nuances of the scientific method and especially the techniques used to evaluate a source of data. In this area, emotions strongly influence many of our views. Wysong attempts to eliminate emotional distortions (and the irrationalities that result) by a clear separation of verifiable data and suppositions based upon emotions, desires, and even defense mechanisms.

A key element in Wysong's discussion is his commendable use of reasoning and semi-formal logic. Complex suppositions are broken down into the basic problem, the data are presented on each side, and then conclusions are postulated. The effort to incorporate a large amount of "pure reasoning" is somewhat unusual in discussions of this kind. While reasoning of some type is included in most discussions, it is more a flow of ideas designed to reach a predetermined conclusion. Though evolutionary theories are almost always based on scholarly erudition, there is typically a lack of serious consideration of various alternative viewpoints.

Wysong's discussion of biochemistry illustrates this technique. He explains that there are two main amino acid enantiomers (amino acids

which are alike atomically but are different mechanically), the L and D forms. Although amino acids can exist in both forms, all proteins derived from living organisms, with insignificant exceptions, are composed of only the L forms. Yet, when amino acids are synthesized in the laboratory for commercial use (or when they are formed under conditions theoretically duplicating those found on the primitive earth), there is always a 50-50% mixture of the D and L forms. Creationists use this to support the contention that amino acids were formed by design. On the other hand evolutionists argue that the L and D forms exist randomly, but natural selection has selected the D forms. But since both the D and L forms function in the life process in identical ways, neither theory provides an adequate reason as to why L forms are preferred in nature to D forms.

This reviewer believes that the creationist position has a great deal of scientific validity behind it, but unfortunately many creationist writers either do not, or cannot, discuss this position adequately and scientifically. All too often creationists resort to name-calling or ignoring evidence which their theory cannot explain. Probably most evolutionists also would have difficulty defending their views in the presence of an informed creationist. Neither side has considered the other viewpoint as a viable concept, and a correct conclusion cannot be made until both views are considered fairly and impartially and until both sides acknowledge the existence of presently unanswerable problems. Wysong's book is a step in this direction.

The occasional bias towards creationism in the text and some of the diagrams is not a major detriment to the book, but may alienate those who are oriented towards the theory of evolution. This reviewer looks forward to a revision of the book where some of the current flaws can be corrected. Possibly then this book can become a standard text used to bridge the gap between the two extremes in this important field.

Crisp, clear thinking with logical conclusions characterize Wysong's approach. Many of the stock arguments for creationism, including the complexity and variety of life (and the inability of the evolution hypothesis to account for this) and the uselessness of an organ such as the eye until fully developed, are cited. In addition, many original ideas are developed from logic, using logic to a greater degree than many books in this area. Wysong is in a particularly good position to examine evolutionary evidence. As a licensed and practicing veterinarian, his studies have included similarities and differences of the various types of animals.

The ease with which mathematics can be applied to a science is a measure of its "scientificness." Wysong makes extensive use of mathematics to help understand the creation-evolution issue, especially in his arguments using probability theory. According to the evolutionists' own

rules, probability theory should be able to be strictly applied, but it is difficult in that the probabilities for so many occurrences happening by chance are astronomical — a problem solved by the argument of “given enough time, anything will happen.” Though this argument sounds plausible, it simply is not true. Events occur according to laws, i.e., they are a result of a set of antecedent events and always follow according to the specific set of antecedent events. Time permits them to happen but does not cause them. We have difficulty predicting outcomes because we do not know all the antecedent events. The search should be for more data instead of a dogmatic assurance that “evolution did it” or even that “creation did it.”

A large number of visual aids, charts and diagrams clarify the discussion. This, along with the author’s effort to discuss complex scientific ideas in a clear, readable fashion, enables the book to be utilized with profit by laymen and scientists alike. Because the book has amassed a wide variety of information about creationism with hundreds of references, many from secular sources and reputable journals, the book is a good general review of the evolution-creation debate for both the beginning and advanced student. A large number of quotes from respected scientific publications bolsters the validity of the arguments the author presents. Probably a complaint of the book is that it covers too much material — he uses an impressive array of information from biochemistry, anatomy, history, geology, and philosophy, and therefore cannot cover any material in depth. But Wysong’s purpose was to introduce the field, and for this purpose the book is well suited.

As a whole, the book is excellent in producing a better-documented, substantial overview of the creation-evolution controversy. By and large, criticisms and name-calling are avoided, even though Wysong sometimes loses his admirable objectivity. As the number of scholarly works supporting creationism increase, this book will probably take an important place among them.

## LITERATURE REVIEWS

*Readers are invited to submit reviews of current literature relating to origins. Mailing address: ORIGINS, Geoscience Research Institute, 11060 Campus St., Loma Linda, California 92350 USA. The Institute does not distribute the publications reviewed; please contact the publisher directly.*

### **TWO REVIEWS OF A COMPREHENSIVE OVERVIEW — B**

THE CREATION-EVOLUTION CONTROVERSY. R.L. Wysong. 1976. East Lansing, MI: Inquiry Press. 455 p.

*Reviewed by R. H. Brown, Director, Geoscience Research Institute*

After a thorough and critical reading, I must describe Dr. Wysong's book as the best comprehensive treatment of scientific creationism that has become available prior to mid-1977.

Many readers will appreciate the author's efforts to present a fair treatment of contrasting evolutionary and creationist views. The approach taken throughout the book is to present a set of facts, offer an evolutionary and a creationist interpretation, and leave the reader to decide the relative merits of the interpretations. The extent to which the author's creationist bias is apparent in varying degrees throughout the range of topics he covers is no discredit to his effort to present a fair and balanced treatment. Readers who wish to investigate more fully any of the topics treated by Wysong will appreciate his extensive documentation.

The 138 illustrations, about one for every three pages of basic text, combine with the author's clear, straight-forward style to make the subject material more easily comprehensible than many readers of this type of literature may have thought possible. A number of these illustrations will be useful to individuals who have occasion to present lectures on origins.

Chapters 1 and 2 briefly sketch the influence of evolutionary thought throughout modern society, contrasting the good and the undesirable consequences that may be attributed to both the creationist and the non-theistic evolutionary models. Wysong proposes the interesting viewpoint that creation and contrasting evolution models are theories of human behavior. From his experience as a veterinarian he observes that attempts to correct social ills, like attempts to correct physical ills, will depend for success on having a correct model for diagnosis.

Chapter 3 gives a survey of the possibilities for explaining life on Earth, and also provides good discussions on the nature of reality, the need for open-minded investigation to find a solid basis for truth, and

the difference between hypothesis, theory and law; between philosophy and science.

Individuals who have had difficulty grasping probability considerations regarding the abiotic formation of biochemicals will appreciate the treatment given in Chapter 5. The discussion in paragraph 2 on p 78 would be more consistent, and the effort required by the reader minimized, if the number 24 rather than 16 were used for the number of coin flips required to realize the 1/8 chance of getting heads three times in a row.

Chapter 6 provides an excellent discussion on the origin and development of DNA in biological systems. Some difficulty in following this discussion may be caused by the confusion of probability with number of molecules at the beginning of paragraph 2 on p 115. The opening sentence should read, "...10<sup>89,190</sup> DNA molecules," not 1/10<sup>89,190</sup>. This and the following chapter provide a more complete and more accurate treatment of probability considerations related to the origin of life than has been previously available in the creationist literature.

Much sound evidence for a short history of the life-support system provided by planet Earth is given in Chapter 10. One of the best lines of evidence is that provided by river deltas (p 163).<sup>1</sup> Unfortunately, the author's treatment of geology, geochemistry and radiometric dating is principally based on uncritical borrowing from previous creationist literature and does not compare with his handling of philosophy, molecular biology and genetics. For instance, at the bottom of p 153 it is stated that most radiometric dates are not "scientific." Any carefully determined radiometric data (age) are scientific, irrespective of its interpretation in terms of real time. The "error" (p 154) in most cases is not in the radiometric dates but in the *interpretations* in terms of real time.

In the discussion on biogenesis and spontaneous generation in Chapter 11 the author presents an interesting treatment of the problem posed by extension of the law of biogenesis to the Creator. The nature of the Creator's existence and the on-going relationship between Creator and creation are confronted in a helpful philosophical discussion which continues into the following chapter. There the question is raised, Is life a property of matter, or matter a property of life?

Subsequently the author returns to a consideration of biopolymer formation, with an excellent, easily understood qualitative treatment. The prebiotic atmosphere necessary for evolutionary models of origin and a discussion of both the evolutionist and creationist views regarding thermodynamic arguments related to origins are well presented.

Three chapters are devoted to a discussion of biological variation. A choice collection of authoritative quotations on the genetic aspect of evolution is given, as well as an excellent discussion of the "survival of

the fittest” principle, including an imposing list of negative examples for “natural selection.”

The question concerning circular reasoning in geology is treated in Chapter 20, which contains a choice selection of quotations from authorities who affirm that paleontological criteria are the basis for determining the time sequence of geologic strata.

Critical readers of this book will often be perplexed to determine whether a parenthetical statement within a quotation is a comment by Wysong or part of the original text which is being quoted. The book would have benefited from the services of a professional editor. The use of *tenant* for *tenet* on p 56, *stalagtites* for *stalactites* on p 172 and the expression “the earth is surrounded by thousands of square miles of sedimentary strata” on p 355 provide examples. At times the author indulges a vigorous, unconventional style that will delight some readers, and possibly dismay others. Frequently encountered are non-dictionary terms such as *quantitate*, *complexify*, *complexification*, *multiquadruple-doupleillions*, and *scavengerized*. More serious, perhaps, are unprofessional expressions such as: “keeping his clammy little hands out of the pot,” regarding evolutionist origin-of-life experiments, on p 237; “the second law says it just won’t done ain’t gonna happen” on p 257; “a million billion quintuplatillion umptaplatillion, multuplatillion impossibidillion fantasticatrillion years” on p 347; and “sudden ‘poof!’ creation” on p 411.

Unfortunately the author tends to oversimplify certain concepts and bases some of the “proofs” on either results reported under highly specialized and artificial laboratory circumstances, or on unverified theoretical models. Space does not permit an exhaustive list of some serious technical errors in this book, but I would like to point out a few examples.

Wysong’s discussion of the geomagnetic moment on p 161 involves several hazardous simplifications. The available geomagnetic field data have been collected over a period of only 130 years and must be extrapolated on a strictly uniformitarian basis over ten-fold to obtain the 1400 year half-life estimate. An additional uniformitarian extrapolation of nearly ten-fold must be made to reach the desired conclusion. Linear, exponential or sinusoidal decay can be fitted to the available data. While exponential decay is the preferred choice in Wysong’s discussion, a sinusoid section can give a slightly better fit. Since paleomagnetic evidence establishes beyond question that there have been numerous geomagnetic reversals during the time igneous and sedimentary features have been formed, there is a good possibility that the recent decrease in geomagnetism could

be the initial stage of another reversal, rather than evidence for a unidirectional change throughout Earth history.

The atmospheric helium interpretation given on p 163 does not take adequate account of several facts. Hydrogen is known to escape rapidly from Earth's atmosphere.<sup>2</sup> Helium escapes from the outer atmosphere in the order of 1/50 as fast as diatomic hydrogen and 1/300 as fast as monatomic hydrogen.<sup>3</sup> Earth's atmosphere is 0.934 percent argon which contains nearly 10,000 times more argon-40 than does primordial argon.<sup>4</sup> The most reasonable explanation for this high concentration of argon-40 is the accumulation of argon-40 produced by potassium-40 radioactivity.

Of the seven plus locations specified on p 373, human footprints in immediate association with dinosaur footprints have been reported for *only* one — the Glen Rose area of Texas. An individual who wishes to utilize this evidence in support of the contemporaneity of men and dinosaurs should make a first-hand observation of the footprint features in the Dinosaur State Park area. The dinosaur footprint evidence there is unquestionable, possibly the best in the world. But a large number of conservative creationists, including many scientists with doctorates, who have studied this area find the presumed evidence for human footprints highly questionable at best. A number of human footprints quarried from the Paluxy River bed have been proven to be carvings made for sale to tourists. Pictures taken of irregularities in the rock that have been wetted by water or oil to obtain better photographic contrast are far more convincing than first-hand observation of the unretouched features. The wetting process introduces subjective bias on the part of the photographer.<sup>5</sup>

One conclusion that the reader of this review may make is that its author is unduly critical. I trust that my readers will consider this review as an effort to be constructive, an effort to place scientific creationism on a more solid scientific base and give it a posture less susceptible to attack by well-informed persons.

A second conclusion that may be reached is that the scope of topics Wysong has attempted to cover is probably too great for a single writer. Creationist writers would do better to confine their efforts to the area(s) in which they have specialized to the extent of attaining adequate competence. The cause of creationism is not well served when one writer (or speaker) in good faith uncritically borrows the weaknesses and errors of another writer. Conviction concerning the truth of creationism, or of a particular model of creationism, does not assure competence to discriminate between good and unsound supporting arguments. A book that attempts the wide scope covered by the *Creation-Evolution Controversy* should be a team effort, or at least should in its development be critiqued by specialists in each of the areas covered.



Finally, it can be observed that there is a firm and ample scientific basis for a creation model of origins in contrast with a non-theistic evolutionary model. But a corresponding firm and ample scientific basis for the traditional Hebrew-Christian short chronology view of planet Earth as a life support system does not exist, at least at present. Claims that the scientific evidence, *of itself*, inductively leads to the short-chronology inherent in a straightforward grammatical-historical reading of the Bible should be expected to have a negative effect on unsympathetic scientifically informed individuals. Every effort should be made to develop sound models for relating scientific evidence to a biblically based viewpoint in a manner that will minimize the barriers encountered by scientifically informed individuals who become sympathetic toward this viewpoint, and that also will meet the needs of individuals whose educational experience makes it difficult to retain a biblically based viewpoint. Dr. Wysong is to be commended for the progress he has made toward these goals.

#### ENDNOTES

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4. Cherdyntsev VV. 1961. *Abundance of chemical elements*. Chicago: University of Chicago Press, p 69-70.
5. Neufeld B. 1975. Dinosaur tracks and giant men. *Origins* 2:64-76.

## LITERATURE REVIEWS

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### CAN EVOLUTIONISTS RESCUE THIS ONE?

BIOLOGISTS, HELP! Larry Azar. 1978. *Bioscience* 28:712-715.

*Reviewed by Ariel A. Roth, Geoscience Research Institute*

During the past century evolution has held a dominant position in Western thought. However, in the minds of many, the question is far from settled (*Origins* 1:94-95; 2:42-43). In the scientific literature a small but persistent dissenting voice from the pens of a variety of scholars keeps appearing (*Origins* 4:4-10). The article "Biologists, Help!" by Larry Azar is one of the latest examples. Azar, who teaches in the Department of Philosophy at Iona College in New York, poses some perceptive questions about the "doctrine of evolution." He is not a biologist and would like some answers from them. He states, after watching the progress of evolutionary ideas for years, "I am still floundering, not because I am unwilling to listen, but rather because all I hear are opposing views on some of the basic issues." He then proceeds to describe eight fundamental areas of evolutionary thinking that are confused. Examples follow.

ONTOGENY AND PHYLOGENY. During the last century the German biologist Ernst Haeckel proposed that biogenetic principle which states that ontogeny recapitulates phylogeny. Stated otherwise: as an organism goes through its embryological development, it reviews its evolutionary history. Because the principle has been rejected for some time, Azar wonders why biologists still continue publishing it.

CHANCE OR PURPOSE. There is contradiction regarding the nature of evolutionary change. The geneticist Waddington states that present-day evolutionary processes "are essentially random," while the paleontologist Simpson states that "evolution has orientation...; it obviously is not random." Azar then probes the more significant question of the role of biology in being able to answer the problem of purpose. While observing the persistent rejection by biologists of any non-naturalistic ideas he states: "For a biologist to note that he is not a philosopher is indeed legitimate. However, can ignoring a philosophical question be

interpreted as answering it?” Later continuing in the same vein he queries, “Is the biologist unwittingly implying that his vision of nature is so complete as to render unnecessary any consideration of nonbiological doctrines?”

**THE REVERSIBILITY OF EVOLUTION.** The Belgian paleontologist Dollo stated that evolution is not reversible. This has been called Dollo’s “law.” Simpson states that “evolution should be reversible — and it is.” Azar wonders how a view could be so quickly transformed into a law only to be dethroned later. He asks, “What criteria are at work in the acceptance of biological laws?”

**WHAT IS EVOLUTION BASED ON?** The author quotes paleontologists who point out that evolution is based on the developmental sequence of fossils found in succeeding sedimentary deposits, then quotes a past president of the Geological Society of America who states that “fossils have furnished...an amazingly effective key to the relative positioning of strata in widely separated regions and from continent to continent.” Azar asks, “Are the authorities maintaining, on the one hand, that evolution is documented by geology and, on the other hand, that geology is documented by evolution?” He also considers the question of the ubiquitous missing links, quoting from D. Kitts in the journal *Evolution*: “Evolution requires intermediate forms between species, and paleontology does not provide them.” He then equates the evolutionists with “the man of religious faith who says, ‘I believe, even though there is no evidence.’”

**SPONTANEOUS GENERATION.** The question of how life could arise spontaneously is cast in the context of the uniformitarian concept, namely, that the present is the key to the past. Life does not arise spontaneously now; therefore evolutionists have to postulate different conditions than the present for the spontaneous origin of life. Are they consistent when they deny the uniformitarian concept to postulate conditions that may have favored the spontaneous origin of life in the past (see *Origins* 2:59-63; 3:66-84), while they use the uniformitarian concept to show that the earth is very old? Geologic processes are going on very slowly now, and on this basis it would take a lot of time for some apparent changes to occur. Can evolutionists on one hand deny the uniformitarian principle when convenient, then again apply it when it seems to support the idea of long ages which is essential for evolution?

Other controversial questions mentioned by Azar include: are acquired characteristics transmitted? has evolution terminated with man? and do species really exist?

It is usually very helpful to have an outsider such as Azar take a fresh look at a discipline. One benefit is that problems that have been

placed on the shelf can again be brought into focus. To have this done by one with philosophical training may be especially useful, since more fundamental questions will be asked. In this paper Azar has done evolution a real service.

Probably most evolutionists will reject many of Azar's queries on the basis of lack of familiarity with details or by pointing out that disagreement and change are normal in the course of science. If they do, they have missed the meaning of his essay, which is: why is there such inconsistency regarding the fundamental tenets of evolution? This inconsistency is all the more surprising in view of the widespread acceptance of the theory.

Some of the points made by Azar do not represent the present status of thinking. For instance, many stratigraphers will be uncomfortable with the assumed exclusive reliance on fossils for correlation. Many other factors are employed in correlation of strata from various locales. Some other areas of disagreement not mentioned by Azar may be worthy of note: for instance, the raging controversy regarding which factors are important in determining evolutionary relationships in taxonomic research and the problems of devising a scenario for evolving by random mutations complex structures such as the eye or reflex pathways that are inept and would not provide survival value until fully functional. Also, a review of the scientific literature about evolution gives the impression that a double standard is in vogue. Evolutionists seem to abandon accepted scientific standards of demonstrability and repeatability when the issue of the general theory of evolution is involved. Usually data that are not repeatable 19 out of 20 or 99 out of 100 times are rejected in biological research; yet, evolutionists resort to extremely improbable events, such as one chance out of numbers consisting of hundreds or thousands of digits, in trying to explain their theory.

In this reviewer's opinion Azar has very adequately documented his thesis that a search of evolutionary literature leaves one with the impression that there is considerable disagreement regarding the basic principles of evolution. No theory of origins is free of problems. What is surprising is that a theory such as evolution should survive through so many revisions of its basic tenets, and that a theory with such wide acceptance is found upon close examination to be based on significant inconsistencies. The article is strongly recommended for anyone interested in the question of origins.

# GENERAL SCIENCE NOTES

## HOW RAPIDLY CAN WOOD PETRIFY?

R. H. Brown

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Petrified wood is possibly the fossil type with which most people have greatest familiarity. One of the most frequently expressed questions among a group visiting a petrified wood exposure is "How rapidly does petrification occur?" The answers to such questions have often expressed speculation, but seldom have been based on dependable data.

Anne C. Sigleo in a paper entitled "Organic geochemistry of silicified wood, Petrified Forest National Park, Arizona" that appears in the September 1978 issue of *Geochimica et Cosmochimica Acta* (42:1397-1405) demonstrates that silica mineralization is an impermeation or void-filling process in which mineral matter is deposited in cracks, openings between cells, and spaces left by cell fluids. This process takes place while the wood is relatively intact. Consequently petrified wood preserves the original pattern of cell structure, and often contains carbon and organic compounds. For noncarbonaceous petrified wood the organic material was degraded and removed subsequent to mineralization. The most probable mechanism for wood silification as proposed by Dr. Sigleo is hydrogen bonding between silicic acid  $[\text{Si}(\text{OH})_4]$  and the hydroxyl functional groups in cellulose.

Silica mineralization evidently takes place within the chemical (impurity concentration) and pH (acidity-alkalinity) range of most surface waters. Dr. Sigleo cites experiments which indicate that silica deposits at the rate of 0.1 to 4.0 millimeters per year on wood immersed in alkaline springs at Yellowstone National Park;<sup>1</sup> fresh twigs will partially silicify within 24 hours at room temperature in a sodium metasilicate solution at concentrations of 5-10 parts per thousand;<sup>2</sup> fresh wood can be silicified within a year by alternate immersion in water and ethyl silicate.<sup>3</sup> The latter process does not represent naturally occurring

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Editor's Note: The original pagination was 113-115.



**FIGURE 1.** The writer examines an unusually large petrified tree stump having a diameter of about 4 meters. This upright stump extends from near the foot of the author to the left part of the picture. It is partially covered by moss and lichens. This is one of the largest petrified trees found in Yellowstone National Park and is located in the Specimen Creek area.

conditions. Ethyl silicate is used because in the presence of water it decomposes and releases a high concentration of monomolecular silicific acid within the wood tissue. Also of interest but not mentioned by Sigleo is the observation that plant tissue silicifies after several years of immersion in jars of water containing 750 parts per million of silica.<sup>4</sup>

These examples provide some possibilities regarding the formation of petrified wood and suggest that wood could become petrified within a few years if it remained saturated with water that had percolated through a layer of fresh volcanic ash.

## ENDNOTES

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