

Creation Research Society Quarterly

Haec credimus:

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

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WILDFLOWERS AND VIEWS — GRAND CANYON OF THE COLORADO RIVER



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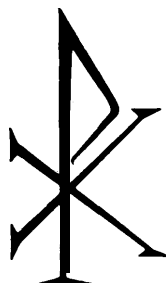
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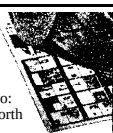
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Cover Photographs

Since the lead article concerns the erosion of the
Grand Canyon, here are some interesting plants and
views that can be seen there.

- A. White tufted evening primrose (*Oenothera
caespitosa*)
 - B. View from Thunder River Trail Head, Monument
Point (Whitney, S., 1982), North Rim.
 - C. View from Cape Royal, North Rim looking west.
 - D. Flower of cliff rose (*Cowania mexicana*).
- All photographs by Glen Wolfrom, June 1990.

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

3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.

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

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Contrary to my comments in the last issue of the Quarterly, there are two more articles in the Symposium on Variation. This collection of papers offers a wealth of opinion on a topic vital to the creation model. The series on the erosion of the Grand Canyon of the Colorado River continues in this Quarterly. Two more geological articles are included along with some interesting notes. Please write to me on any topic that may interest you.

Don B. DeYoung

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EROSION OF THE GRAND CANYON OF THE COLORADO RIVER PART II— Review of River Capture, Piping and Ancestral River Hypotheses and the Possible Formation of Vast Lakes

EMMETT L. WILLIAMS, JOHN R. MEYER AND GLEN W. WOLFROM**

Received 10 April 1991; Revised 8 September 1991

Abstract

The importance of the Muddy Creek Formation in the western terminus of the Grand Canyon, implying no through-flowing river at the time of deposition of the formation, is discussed. Piping, river capture and "ancestral" river path hypotheses are reviewed. When possible, suggestions based on the Flood model or after-effects of the Flood are offered.

Introduction

The antecedent Colorado River hypothesis in relation to the formation of the Grand Canyon was presented in Part I (Williams, Meyer and Wolfrom, 1991, pp. 92-98). Also the postulation was offered that the major cause in the formation of the Canyon was the erosive work of large quantities of rapidly-moving water laden with abrasive matter in a relatively short time span.

This part discusses evidence in the western Grand Canyon at the Pierce Ferry area that negates the antecedent river hypothesis. Piping, river capture and proposed "ancestral" river paths in relation to the formation of the Canyon are reviewed briefly. Whenever possible, remarks are offered within a Flood model construct. In mentioning time estimates, the authors are quoting the opinions of the various workers involved. We do not subscribe to the geologic timetable.

The Muddy Creek Formation and the Hualapai Limestone

Collier (1980, p. 34) explained that Powell's view of an already established Colorado River before the erosion of the Grand Canyon

... doesn't mesh with facts found just west of the Grand Wash Cliffs. There the Muddy Creek Formation contains rocks that had to be deposited before the Colorado River flowed along its present course through the Grand Wash Cliffs. The top of the Muddy Creek Formation is radiometrically dated at about six million years. Thus a through-flowing Colorado River must be younger than six million years old and could not ... have been established before the Kaibab Plateau rose during the Laramide Orogeny.

Likewise Hamblin (1976, p. 167) stated:

The Colorado River attained its present course across the Uinkaret and Shivwits plateaus sometime after the Muddy Creek Formation was deposited 10.6 m.y.B.P.* against the receding Grand Wash Cliffs.

*million years before present

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Nations and Stump (1981, p. 90) noted:

These deposits (the Muddy Creek Formation) and the absence of Laramide age sediments suggest that the Colorado River was not flowing there until after the uplift occurred.

Consider these remarks by Lucchitta (1988, p. 16):

Toward the interior of the plateau (Colorado Plateau), the gravels north of the Grand Canyon are overlain directly by six million-year-old basalt, indicating that the Western Grand Canyon did not exist even that recently. (Parenthesis ours)

Dunbar (1965, p. 375) claimed that the Colorado River either did not exist or did not have its present course in Miocene times because of the interior drainage deposits containing salt and gypsum over which the River flows near the Grand Wash Cliffs. Then in a note on page 385 he stated that since Miocene vertebrate fossils have been found in the Muddy Creek Formation, it proved that the river may have originated during that Epoch. See the comments by Foster, 1973, p. 606; Schuchert and Dunbar, 1946, pp. 134-136; Blackwelder, 1934, pp. 551, 553; Lucchitta, 1972, pp. 1933-1947; Longwell, 1946, pp. 817-835.

Muddy Creek rocks were defined by Longwell when he located the type section in Muddy Valley, Nevada and he extended the name to the area along the Grand Wash Cliffs. The rocks are considered to be classic, continental, interior basin deposits (exposed in the Pierce Ferry area) which consist of conglomerates, breccias, sandstones, siltstones and crystalline precipitates (Billingsley, 1978, p. 19; Lucchitta and Young, 1986, pp. 170-171). No Colorado River gravel is present (Hunt, 1976, p. 129). Lucchitta and Young (1986, p. 171) suggested that the Muddy Creek Formation was deposited in quiet water, indicated by even bedding and the presence of tuff, gypsum and carbonates. Hualapai Limestone, considered a lake deposit, is found over the Muddy Creek rocks in places. For an idealized section of the Formation in the Grapevine Wash—Pierce Ferry areas, see Figure 1. Also note Figures 2 and 3. The formation is over 2,700 feet thick along the Grand Wash Cliffs (Billingsley, 1978, p. 19). Because of the presence of this formation, the Willow Springs deposit (Figure 4) in the Peach Springs-Truxton

*For a description of the Bidahochi formation, see Repenning and Irwin. 1954.

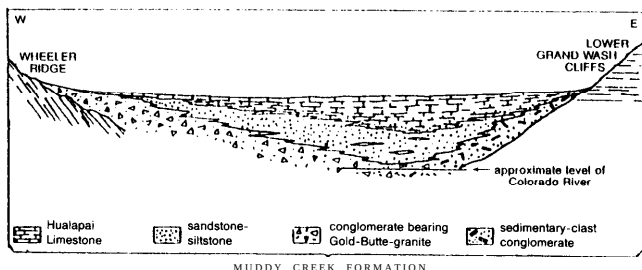


Figure 1. Idealized east-west section of the Muddy Creek Formation in the Grapevine Wash—Pierce Ferry areas (not to scale). The Colorado River has cut about 2000 ft. below the original basin-fill surface (after Lucchitta and Young, 1980). Drawing by Martha Smith.

area (see Lucchitta, 1972, p. 1943) and the lower member of the Bidahochi formation* (Figure 5) in north-eastern Arizona, McKee et al. (1967, pp. 56-58) concluded that no through-flowing drainage in these areas was possible during a period of ponding or lake development. Therefore it was concluded that the Colorado River did not flow through the western Grand Canyon until possibly during the Pliocene Epoch.

The problems caused by the Muddy Creek Formation and the overlain Hualapai Limestone (Figure 6) were noted by Hunt (1976, pp. 129, 131).

Moreover, unconformably overlying the Muddy Creek Formation is the Hualapai Limestone, an embankment deposit of freshwater limestone recording a lake about a 1000 feet deep—a body of water vastly deeper and more extensive than Lake Mead. The limestone centers about the mouth of Grand Canyon, the Lower Granite Gorge, yet includes no elastic delta.

Hunt (p. 138) also revealed that the presence of halite and anhydrite deposits associated with lacustrine deposits in the western Grand Canyon area

... poses the same kind of problems as does the Hualapai Limestone—no apparent source for the water; and a puzzling absence of interbedded elastic sediments.

Here is where Flood geologists can offer solutions, though probably not acceptable to uniformitarian geologists. Could the Muddy Creek Formation, Hualapai Limestone and the vast salt deposits have resulted from drying Flood waters or after-effects of the Flood where vast lakes were trapped by tectonic movements? Considering a possibly different climate after the Flood in the Grand Canyon area, extensive post-Flood rains could have maintained abundant water in the region. This possibility needs to be explored. See Blackwelder, 1934, pp. 559, 560 for a discussion of climate change.

Since the evidence indicates vast lake deposits in the western Grand Canyon area, geologists began to suggest different mechanisms for the formation of the Grand Canyon other than the antecedent river hypothesis.

Piping

Wishing to retain an older age for certain sections of the Colorado River and to satisfy the geologic evidences in the western Grand Canyon areas, Charles Hunt (1969, p. 116; 1976, p. 137) proposed that the

waters of the Colorado River were ponded by the Muddy Creek Formation as well as by uplift in the Peach Springs region. This reservoir would have been in porous Paleozoic limestone. The impounded water leaked through the limestone and was discharged through springs depositing the Hualapai Limestone and filling the lake in which that limestone was formed.

As Hunt (1976, p. 137) noted:

This is piping on a vast scale and many regard it an outrageous scale. At least the hypothesis has the merit of explaining the Hualapai Limestone, its lake and the absence of a elastic delta. When my editor first read the interpretation, he wrote, 'It made me feel flushed.'

As Hunt stated, "We have inferred that the Colorado River reached the Lake Mead area by underground drainage when the Hualapai Limestone was deposited" (pp. 138-139).

Moore (1958, pp. 493-494), in his historical geology textbook, posed the following question [1d] at the end of chapter 18:

Indians of the lower canyon country (Havasupai) hand down a story that the river in the canyon formerly was swallowed whole by the earth. Is this a geologic possibility, and if so, explain?



Figure 2a. Section of Wheeler Ridge near Pierce Ferry as viewed from Pierce Ferry Road. Photograph by Glen Wolfrom.



b. Wheeler Ridge as viewed from Grapevine Mesa. Photograph by Emmett Williams.



Figure 3. Panoramic view of Pierce Ferry area—the “end” of the Grand Canyon and the “beginning” of Lake Mead. Lower part of Grand Wash Cliffs can be seen in center of picture. Photograph by Glen Wolfrom.

One wonders if Hunt knew about the Havasupai legend when he postulated his piping hypothesis.

Such a view avoided the quandary of the lack of a through-flowing river in the western Grand Canyon area as well as allowing geologists to assume that the river system was older in the eastern Canyon region (Hunt, 1976, p. 129). Lucchitta and Young (1986, p. 172) pointed out the weaknesses in Hunt's proposal, stating that “interior-basin deposits of Miocene time are ubiquitous in the lower Colorado River region” and that there is no evidence for the springs postulated by Hunt. They contended that separate basins might have been involved in the formation of the Hualapai Limestone. Collier (1980, pp. 34-36) also claimed that Hunt's proposal was unsatisfactory because the segment of the Colorado River that defines the Arizona border with California and Nevada could not have existed as early as Hunt thought.

Interestingly, Nations and Stump (1981, pp. 90-91) conjectured that since there are marine deposits along the Arizona-California border. (Figure 7):

... the Gulf of California extended as far north as the Lake Mead area in middle Tertiary (Miocene) time, and it certainly extended north to Needles as late as Pliocene time.



Figure 4. Gravels of Willow Springs deposit exposed in road cut along Route 66. Location is 2.9 miles west of entrance to Grand Canyon Caverns. Photograph by Emmett Williams.

They call this area of deposition the ancestral Gulf of California. Could these have been Flood-deposited materials which remained as the Flood waters receded and the arid climate developed?

River Capture Hypothesis

McKee (1985, p. 34) conjectured that during the early Pliocene Epoch:

As the last great seaway withdrew from the Grand Canyon region toward the Gulf of Mexico near the conclusion of Chapter IV (Mesozoic Era), local stream drainage followed it eastward. Apparently drainage continued to move in that direction for a long time.



Figure 5. Section of Bidahochi Formation near Greasewood, AZ, view looking east from Navajo Route 15. Photograph by Emmett Williams.

Maxwell (1968, pp. 15, 16) showed what he considered to be the extent of the “Mesozoic Sea” in North America (Figure 8). Interestingly there should be similar formations in both the Grand Canyon and the Big Bend areas as well as similar fauna and flora if this vast area, particularly in Arizona and West Texas, became arid after the regression of the waters. This has been found to be true in two cases. The Petrified Forest Member of the Chinle Formation in Arizona



Figure 6. Hualapai limestone cap along top of Grapevine Mesa, view looking southwest. Photograph by Emmett Williams.

(Figures 9 and 10) is similar in appearance to the Gulfian Series of Formations in west Texas (Also see Williams, Howe and White, 1991). Flood geologists might speculate that the "Mesozoic Sea" shown in Figure 8 was evidence of remnant Flood waters.

McKee also discussed the major uplift of the Grand Canyon region and noted (1985, p. 34):

As the region came up, westward-flowing streams cut deeper and headward until eventually they



Figure 7. Shaded area represents distribution of Miocene-Pliocene marine deposits within the boundaries of Arizona (after Nations and Stump, 1981). Drawing by Martha Smith.

connected with or "captured" the Colorado River as it flowed south from Colorado and Wyoming.

When consulting the eighth edition of McKee's book (1945) no mention was made of a capture of the Colorado River. What happened in the intervening time between the 1945 and 1985 publications that caused the introduction of the river capture hypothesis? Edwin McKee hosted a conclave of outstanding geologists at the Museum of Northern Arizona in August 1964 to develop a hypothesis on the evolution of the Colorado River. They determined:

... that the ancestral Colorado River had indeed flowed down through Marble Canyon, but it then turned up the Little Colorado River to eventually spill into the Gulf of Mexico. Meanwhile, small tributary creeks on either side of the Kaibab Plateau were supposed to be carving toward one another by the processes of headward erosion. When they met, the westerly flowing stream captured the drainage of the easterly flowing stream. At this point, the Colorado River began to flow to the west ... through the Kaibab Plateau (Collier, 1980, p. 36).

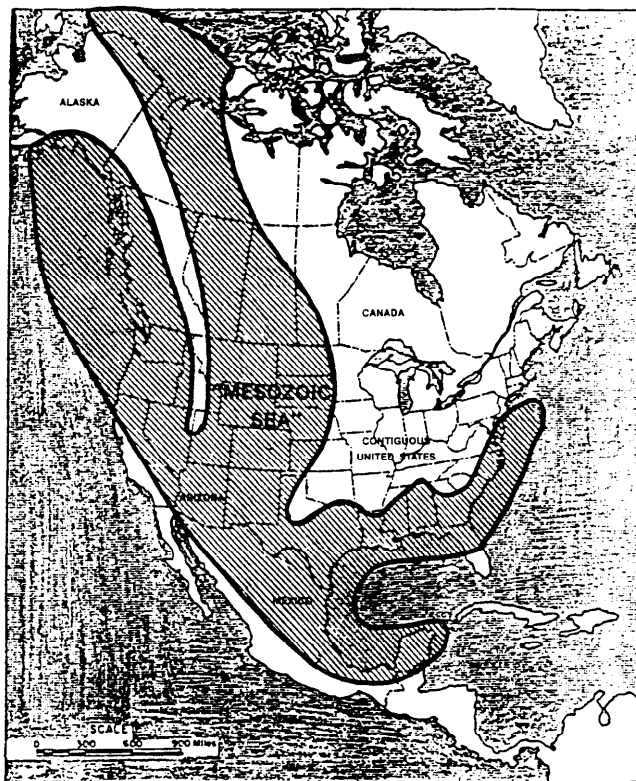


Figure 8. Map of North America showing extent of "Mesozoic Sea" (after Maxwell, 1968). Drawing by Martha Smith.

For complete details of the five stages of the evolution of the Colorado River proposed at the conference, see McKee, et al., 1967. Hunt (1976, p. 135) noted that

The ancestral river that began cutting (the) Grand Canyon, and that eroded perhaps the first half of it, appears to have been the Little Colorado River, and this was back at a time when the river was vastly larger than it is now. (Parenthesis added)

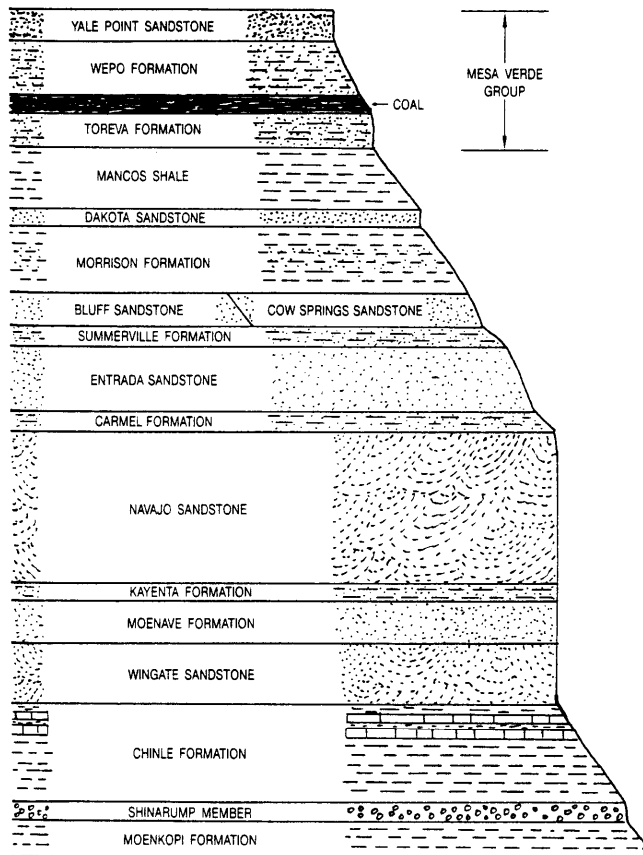


Figure 9. Idealized geologic cross section of Black Mesa in the Navajo Reservation to show position of Chinle Formation in relation to formations in the Grand Canyon and Petrified National Park areas (after Breed, 1975).

Again Lucchitta and Young (1986, p. 172) explained:

The lower Colorado River worked its way onto the Colorado Plateau by headward erosion, and captured an older ancestral upper Colorado River, probably in the stretch between the Kaibab Plateau and the mouth of the Grand Canyon. In the process, the Canyon as we know it today was formed.

Lucchitta (1988, p. 10) in discussing the proposals of the 1964 conclave noted:

... the ancestral Colorado followed its present course as far as the eastern end of the Grand Canyon, where it encountered the Kaibab Plateau. This Plateau prevented the river from flowing westward and deflected it southeastward along the course to the present Little Colorado and Rio Grande rivers into the Gulf of Mexico.

Lucchitta (p. 10) explained that by the process of headward erosion a youthful stream which emptied into a "newly opened" Gulf of California, captured the ancestral river somewhere in the eastern Grand Canyon. Nations and Stump (1981, pp. 88, 90) summarized the capture hypothesis by stating that it involved the following steps:

1. Uplift of Kaibab Plateau
2. Colorado River flowing west from the uplifted Plateau gradually cut the Grand Canyon into the up-

lift (headward erosion) until it captured the Little Colorado River that flowed south on the eastern side of the uplift. Evidence used: a. Flow direction of the Little Colorado River has been reversed from south to north flow since late Tertiary time; b. Large area of the Bidahochi Formation (late Tertiary lacustrine sediments) is considered to be the outlet for the ancestral Little Colorado River before the flow reversal.

Unfortunately, Collier (1980, p. 36) claimed:

No one has ever found the ancestral river bed of the Colorado where it was supposed to flow east and south across Arizona, New Mexico and Texas.

Also Lucchitta (1988, p. 11) said that evidence collected since 1964 "argues against the Rio Grande connection." The evidence he (pp. 16-19) used is listed.

1. The presence of "Rim gravels" (Figures 11 and 12) along the southern and southwestern edge of the Colorado Plateau. These gravels which contain pebbles of granite and gneiss do not occur on the surface of the plateau but can be found to the south and southwest. Thus the drainage must have been from generally south to north in the past.*

2. The presence of volcanic material such as the Peach Springs tuff (Young and Brennan, 1974) in the western Grand Canyon area (Figure 13) indicates a northeast drainage pattern before the western portion

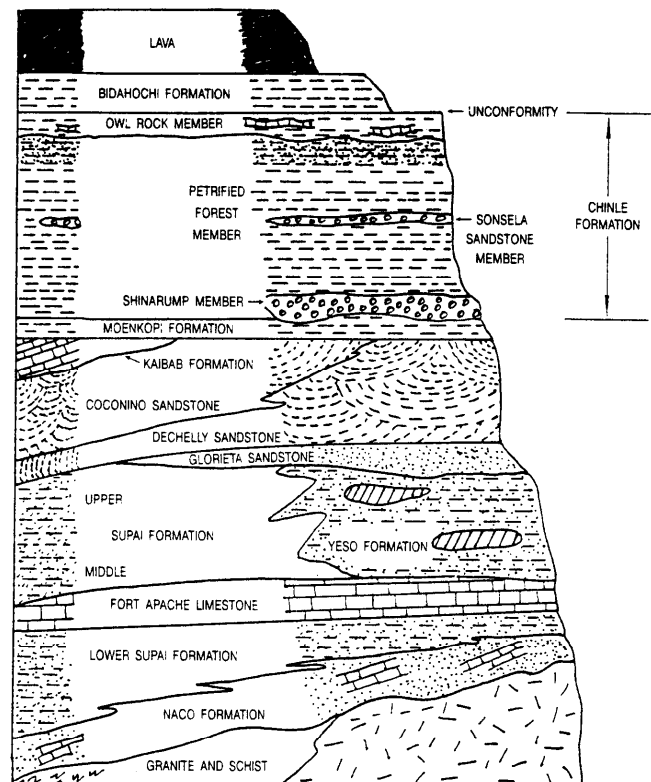


Figure 10. Idealized geologic cross section of Petrified Forest National Park, eastern Arizona to show position of Chinle Formation in relation to formations in the Grand Canyon and Black Mesa areas (after Billingsley and Breed, 1980). Unconformity includes Mesa Verde Group, Mancos Shale, Dakota Sandstone, Morrison Formation, Cow Springs Sandstone, Entrada Sandstone and Wingate Sandstone that are missing in the Park.

*For another discussion of rim gravel see Peirce, Damon and Shafiqullah, 1979, pp. 15-17.



Figure 11. Rim gravel deposit about two miles south of Show Low, AZ along Highway 60. Photograph by Emmett Williams.

of the Canyon formed. [Also see Lucchitta (1972) and McKee and McKee (1972)].

3. If the Little Colorado River is a candidate for an ancestral Colorado River, present drainage pattern is to the northwest "parallel to the regional strike (trend) of beds" (Lucchitta, 1988, pp. 16, 18). Thus he concluded that this drainage pattern predates any canyon cutting and the basalts that flowed down the valleys in the area indicate the same drainage pattern. Of course these conclusions are not accepted by all geologists and the hypothesis is still in a state of flux.

Lucchitta (1988, p. 11) preferred another interpretation for the ancestral Colorado River.

... the ancestral Colorado River did cross the Kaibab Plateau in the area of the present Grand Canyon, then continued northwestward along a

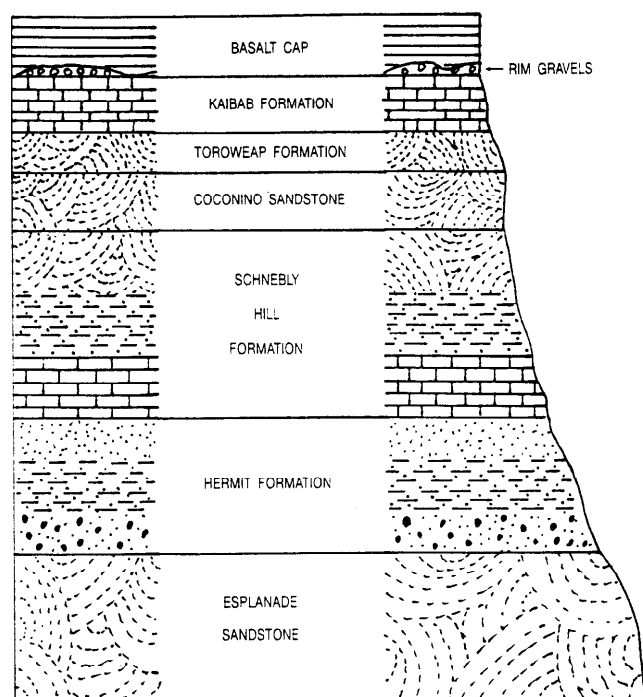


Figure 12. Idealized geologic cross section of Oak Creek Canyon. See Thiessen, 1986, p. 8 and Peirce, Damon and Shafiquallah, 1979, p. 16.

so-called 'strike valley' at the foot of a cliff line similar to those still visible in the plateau country. The valley would have been somewhere in the area of the present Kanab, Uinkaret or Shivwits plateaus.

He postulated that the river then flowed into either Utah or Nevada and was later captured west of the Kaibab Plateau. He felt that this capture is verified in California's Salton trough by the presence of fossils found only in Cretaceous Mancos Shale of the Colorado Plateau. Thus large basins isolated from the sea existed in Utah or Nevada to receive the ancestral Colorado River.

Collier (1980, p. 37) claimed that

The eastern Grand Canyon, with its steep walls and vigorous rapids, has a shaggy youthful appearance that belies the more dignified age that Lucchitta would assign it.

Collier also notes that the Utah basins needed to be studied more closely to determine if they could have accepted an ancestral river system and that:

the western Grand Canyon would have had to cut to within a few hundred feet of its present depth in something like three million years—a blistering rate of erosion (p. 37).



Figure 13. Peach Springs tuff and Willow Springs gravel exposed in road cut along Route 66. Location is 23.6 miles west of entrance to Grand Canyon Caverns. Photograph by Emmett Williams.

This blistering rate of erosion could have been "hotter" than Collier imagined if enough flowing water were present in the past.

Rice (1983, p. 291) pointed out that for the Colorado River to flow northwest into Utah, it would have had to travel up a rim higher than some of the proposed earlier channels in the area of Peach Springs. Hunt (1976, p. 133) stated that an antigravity waterfall would be required for the River to move out of the Grand Canyon as proposed by Lucchitta.

The "Ancestral" Colorado River Postulates

Besides offering his hypothesis of piping on a grand scale, Hunt (1969, p. 60) also proposed an outlet for the ancestral Colorado River.

We cannot be sure how much of the Colorado River basin drained off the plateau via the canyon

at Peach Springs. Probably the Little Colorado River drainage was first to leave the plateau via that canyon. . . . By middle Miocene time the canyon at Peach Springs was blocked by uplift and by deposits of volcanic materials and related sediments.

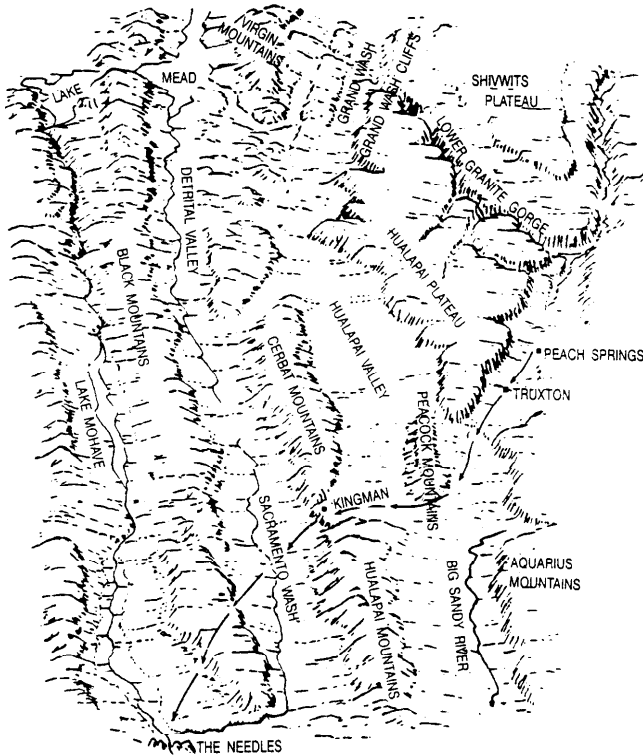


Figure 14. Possible ancestral path of the Colorado River in the basins and ranges west of the Grand Canyon as proposed by Hunt (after Hunt, 1969). Drawing by Martha Smith.

The problem with this view is that there was no outlet for the River after Peach Springs Canyon was blocked. Thus Hunt chose to offer the piping mechanism to remove the water flowing into the western Grand Canyon. Also Hunt (1969, p. 119) stated:

The geology at the Peach Springs dry canyon indicates clearly that a sizable (sic) river was dis-



Figure 15a. Peach Springs Canyon looking northeast from Peach Springs toward the Colorado River.



b. Peach Springs Canyon closer to the Colorado River.



c. The Colorado River looking west at the beginning of Peach Springs Canyon. Photographs by Emmett Williams.

charging there from the plateau more than 18 million years ago, and it had been discharging long enough before that to have eroded a canyon 1,000 feet deep.

The course of Hunt's ancestral Colorado River in the western Grand Canyon area is shown in Figure 14. Also see Figure 15. Thus three directions have been proposed recently for the exiting waters of a supposed ancestral Colorado River.

- Southward up the Little Colorado River to the Rio Grande then into the Gulf of Mexico
- Northwest into southern Utah
- Southwest into Peach Springs Canyon across the Sacramento Wash to The Needles in California

Rice (1983) summarized the situation nicely and showed the possible suggested ancestral River paths. See Figure 16. Also see Corliss, 1988, pp. 215-217. Readers are urged to consult chapter 5 of the Institute for Creation Research guidebook on the Grand Canyon (Austin, et al., 1992, pp. 69-91). This book is an excel-

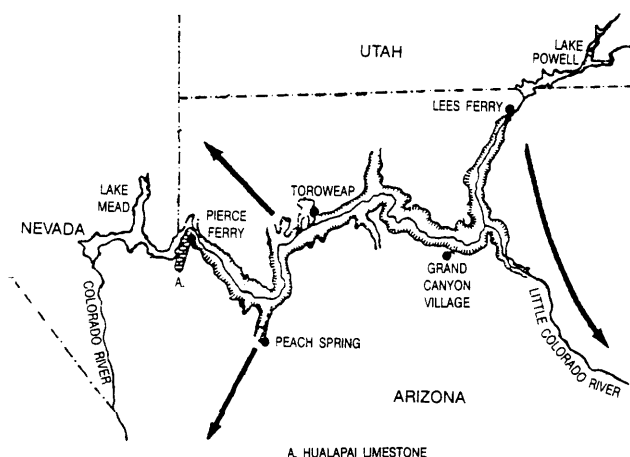


Figure 16. Proposed routes of the ancestral Colorado River in the Grand Canyon area indicated by arrows (after Rice, 1983). Drawing by Martha Smith.

lent scientific creationist study on all phases of the area's geology, biology, meteorology and archaeology.

The importance of basins and lakes on the Colorado Plateau, possible different climatic conditions and a discussion of possible mechanisms of rapid formation of the Grand Canyon will be presented in Part III.

Acknowledgement

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What does quantum physics reveal? That our world is more complex than most have ever dreamed. One scientist has noted that the universe seems "strangely overbuilt." Why is there such an intricate reality underlying a world that functions so ordinarily? He muses that it is as if God has created a beautiful, intricately-patterned golden chair and then overlaid it with common wood. The outside looks ordinary and functional, but within is a treasure waiting to be discovered and explored.

Brown, William E. 1990. Quantum theology: Christianity and the new physics. *Journal of the Evangelical Theological Society*. 33:487

SYMPOSIUM ON VARIATION XIV**

IS THE GENOME SUFFICIENT, WHERE IS THE DESIGN INFORMATION AND WHAT LIMITS VARIATION?

ROBERT E. KOFAHL*

Received 8 May 1991; Revised 5 September 1991

Abstract

Believers in both evolution and creation seem to assume that the genome and perhaps other physical structures of the cell are sufficient to code for all structures and systems of each organism. Persuasive evidence indicates this assumption to be erroneous. An alternative conceptual framework for genetics is proposed.

Introduction

Practically all discussion of the problem of biological design in relation to genetic information and the limits of or effective lack of limits to biological variation is conducted under the aegis of a grand unproved assumption. This assumption, made by all evolutionists and most creationists alike, is that the genome carries the total information required for the embryonic development and all of the housekeeping activities of the organism. Some have proposed that some genetic information is carried in structures other than the DNA in the fertilized cell (e. g., Sonneborn, 1970; Jones, 1982). I assert that there is compelling evidence to support the view that the genome is not sufficient, further, that the sum of physical structures in the cell is not sufficient. If this is indeed the case, the arena of discussion is changed, and the potentially achievable goals of biological research are correspondingly changed, as are also the interests of Christian biologists.

The proposal offered in this paper is highly speculative and is grounded in a Biblical theistic philosophy of science. This philosophy of science is metaphysical, but no more so than is the philosophy of materialistic monism which informs the current secular view of the questions addressed in this paper. In accord with a correct, philosophically neutral definition of science, Christian investigators and theoreticians have as much freedom to conduct their thought and research within their theistically grounded conceptual frameworks as do the secularists within their naturalistically grounded conceptual frameworks (for a discussion of the term, *conceptual framework*, see Kofahl, 1989). And in any event, both the secularists and the Christian theists should take note of the unproved assumptions underlying the current secular perspective in biology. Especially is this so if the secular assumptions fly in the face of hard scientific facts.

Is the Genome Sufficient?

The human genome contains approximately three billion nucleotide pairs (Darnell, et al., 1986, p. 138). Since the genetic alphabet is comprised of four different nucleotides, any one of which can occupy a particular position in the DNA of the genome, the maximum possible information which theoretically can be carried at one position is $I_1 = \log_2(4) = 2$ bits of information. Thus, a codon consisting of a sequence

of three nucleotides should carry $2 \times 3 = 6$ bits of information. However, the genetic code is degenerate, because in general more than one of the 64 (i.e., 4^3) possible codons codes for each of the 20 normal amino acids is used to construct protein molecules. This degeneracy reduces to about 4.15 bits the amount of information which can be carried by one codon in the DNA (Yockey, 1974, p. 381). This means, then, that the one billion potential codons in the three billion nucleotides of the human genome can theoretically carry a maximum of 4.15 billion bits of genetic information.

The crucial question which can now be asked is: Can 4.15 billion bits of genetic information provide for the embryonic development, housekeeping, functions and reactions of every organism? To begin with it can be asserted that currently the science of molecular genetics does not provide knowledge of the location in the genome of the design information for a single biological structure or organ. Where, for example, in the genome of a bird does the information for the design of a feather reside? Nobody knows. In fact, nobody has any sure idea of what form such information would take in the DNA, or just how it would be translated into the form of the finished feather. From this we may conclude that the idea that the DNA carries the design information for the construction of the organism is nothing more than a working hypothesis. Perhaps it is a false hypothesis.

In order to bring some quantitative basis to this discussion, let us consider the neural network of the cerebral cortex of the human brain. The question of how much information is represented by the neural network of the cortex was discussed by Bremermann (1967, pp. 70-72). The cortex contains about 10 billion neurons. Each neuron may have from 100 to thousands of dendrites connecting it to other neurons. Assume that each neuron has only 100 such dendrites making connections with other neurons among the 10 billion neurons in the cortex. How many different networks then are possible for this model of the cortex? If n is the total number of neurons and m is the number of interconnecting dendrites from each neuron, the number of possible different networks is:

$$N = \left[\frac{(n-1)!}{m!(n-1-m)!} \right]^n$$

If $n = 10^{10}$ and $m = 100$, we obtain for the possible number of networks:

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**Parts I-XIII are in CRSQ 27:144-153; 28:18-27, 50-59, 98-108.

$$N = 10^{8.42 \times 10^{12}}$$

So if brain networks are being produced at random with $n = 10^{10}$, and $m = 100$, the probability for a particular one to be formed would be:

$$p = 1/N = 10^{-8.42 \times 10^{12}}$$

This probability for the random formation of the particular network corresponds to an information content of:

$$I = -\log_2 p = \frac{-\log_{10} p}{\log_{10} 2} = 2.8 \times 10^{13} \text{ bits, i.e., 28 trillion bits.}$$

If we compare the possible 4.15 billion bits of information in the human genome with the 28 trillion bits for the neural network of the cerebral cortex, we see that the information capacity of the genome is insufficient by a factor of about 7,000. This factor becomes 140,000 if, as many geneticists believe, 95 percent of the genome's DNA is "junk." Bremermann (1967) considered a possible alleviation of this difficulty based on the fact that the cerebral cortex appears to be structured in subunits of about 10,000 neurons each. If a particular connecting dendrite needs to be targeted only to a particular subunit, rather than a single exactly specified neuron in the cortex, the number of different possible arrangements of this less specific neural network can be calculated by means of a modification of the formula for N given above:

$$N_s = \left[\frac{[(n/n_s) - 1]!}{m![(n/n_s) - 1 - m]!} \right]^n \text{ where } n_s \text{ is the number of neurons in a subunit, and thus } n/n_s \text{ is the number of subunits;}$$

So with $n = 10^{10}$, $m = 100$, and $n_s = 10,000$, we get the number of possible networks:

$$N_s = 10^{4.42 \times 10^{12}}$$

and the information content of a specific network is:

$$I_s = 1.47 \times 10^{13} \text{ bits, i.e., about 15 trillion bits of information.}$$

Thus, the information capacity of the human genome is still insufficient by a factor of about 3,500 to specify the neural network of the cerebral cortex.

Two possible solutions for this problem have been suggested. One is that the design of the neuronal network of the cerebral cortex makes repetitive use of smaller subnetworks. Thus the specification could be made by a program which calls for a certain set of specifications to be used x number of times. This would reduce the amount of information required for the specification. The evidence to support this concept has yet to be discovered. The idea that such a vast and global network could be repetitious enough reduces the required specification information by a factor of perhaps 1/50,000 to a fraction of 4.15 billion bits seems most unlikely. Another possible solution is that the development of the network is guided by a trial and error "learning" process. It is a fact that the development of the brain does require active use which probably coordinates with a type of "learning." This could presumably reduce the required information for specification of the brain network. But is the presumption supportable? The ability to "learn" and what to learn has to be encoded in the genome, so as

to produce the marvelous working structure of the adult brain network. Again, could this reduce the required information by a factor of 1/50,000? Our ignorance prevents a numerical answer to this question, but an affirmative answer seems to demand belief in the incredible.

No mention has been made about storage in the genome of information to specify the rest of the brain, not to mention the other structures in the human body. The human brain is said to be the most complex object in the universe, but the remainder of the human body evidences a vast complexity and sophistication of high technology. Moreover, much of the structure of the body is mapped back several times on the cerebral cortex and other parts of the brain through the nervous system which mediates to the brain different mappings for the senses of touch, pain, and heat and cold, as well as for motor control. The assumption that this can all be specified by a mere four billion bits of information really seems ridiculous. If all of this information to specify in exact scientific language the designs and building instructions for the human body other than the brain were known, to store it would probably require all the libraries in the world—if indeed such description and specification is possible to us mere humans. The genome appears to be insufficient.

New Proposals

McCann (1991) offers evidence which strongly supports the view that in development from the fertilized egg cell the embryonic cells appear possessed of "skill" to "govern" and "exercise control," and that this is suggestive of "a cellular level of intelligence." McCann uses modest, careful language. I think that we can be bolder. Taken with the information which McCann and others have advanced, the quantitative estimates given above for the insufficiency of the genome accord with the view that the intelligence required for development has to come from an external, immaterial source.

On the basis of the above facts I offer the following four-part proposal:

1. The information for the designs and construction of biological structures and in particular for those characters which define and maintain separate the originally created "kinds" (baramin) is imposed on the natural world by special divine providential power.
2. The information required for the biochemistry, metabolism, and other housekeeping processes of the organism is supplied by the genome and to some extent by other physical structures of the cell.
3. The genome provides for the genetic variation needed for the variation (microevolution) which is needed to make possible the adaptation of species to their changing environments.
4. Since the basic design information for biodesigns cannot be carried in the genome, mutations of the genome and natural selection are incapable of producing the evolutionary novelties which would be absolutely essential to make macroevolution a reality.

Conclusions

The first part of the above proposal is not a scientific hypothesis, for it incorporates the empirically

untestable principle of supernatural influence on nature. It is actually a metaphysical concept which is an element in a Christian conceptual framework for research in genetics. Parts 2 and 3 are long-established elements of the standard universally accepted perspective in biology, so they also are elements in a Christian conceptual framework for genetics. Part 4 is a logical conclusion which follows from parts 1 through 3. Valid scientific research in genetics can be carried on within the framework provided by the above four-part proposal. It is not a scientific hypothesis but, using Popper's words, it is "*a metaphysical research programme*—a possible framework for testable scientific hypotheses." (Popper, 1976, p. 168)

I predict that all biological data can be accommodated to the four-point proposal presented in this paper. Kuznetsov's research provides evidence for cellular mechanisms which block the translation of mutated genes (1991). Such mechanisms could serve as a barrier to macroevolutionary changes, as Kuznetsov suggests. They could also, however, simply serve to preserve the viability of the cells from generation to generation, macroevolution by mutation and natural selection being impossible for the reason asserted in parts 1 and 4 of my proposal above. The study of embryonic development over the past two decades, largely in *Drosophila*, has led to some understanding of the participation of DNA in development (Chisaka, et al., 1991; Gould, et al., 1990). The DNA homeobox genes and particular gene mutations have been shown to influence aspects of segmentation during development. However, the source of the designs and instructions for the construction of complex structures still eludes researchers. The fact that a particular mutation may cause a leg to replace an antenna or to appear in this segment or that one does not reveal the source of the design of the leg or antenna. John Maddox (1988) questioned the meaning of it all:

Is molecular biology running into a dead end?
... Future historians may think it odd that so much should have been learned about the molecules on which life depends while so little has been understood about their functions, or ... life itself.

Biology still needs God the Creator who is also the sovereign Lord and Sustainer of all His creatures. Vitalism*—of a supernatural kind as taught in the Bible—is not an inviable concept in biology. It has its proper place in the conceptual framework of Christian research scientists. Let there be more research by Christians who have this fundamental spiritual and philosophical commitment. But let us always be careful not to confuse divinely revealed truth, which does not change, with scientific knowledge which is perpetually subject to change.

"... You take away their breath, they die and return to their dust. You send forth Your Spirit, they are created . . ." Psalm 104:29-30

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*Readers may be interested in a brief discussion of vitalism that appeared in the Quarterly. Armstrong, H. L. 1984. Vitalism: A neglected weapon? *CRSQ* 21:78; Reply to Wolfe. *CRSQ* 22:49; Reply to Edwards, *CRSQ* 22:95-96; Edwards, F. 1985. Problem with creationism? *CRSQ* 22:95; Wolfe, S. T. 1985. Dooyeweerd on mechanism vs. vitalism. *CRSQ* 22:48-49.

Man, I believe, is a created being; there is a sacred essence in him. Man is on this planet in consequence of a mighty plan—of whose outlines we may gain faint intimations—and his life is used to further a vast purpose—of which we are given an occasional clue. If man is indeed a created being, and the members of a society act upon their belief that such is their nature, they will begin to frame political theories consonant with their convictions. They will erect political structures designed to safeguard the sacred essence in each person; the law will attempt to maximize each person's opportunity to realize his earthly goals. Believing that God wills men to be free, such a society will regard any trespass on the true liberty of even the lowliest individual to be a thwarting of some intent of the Creator. The deep conviction that each human being is a person and not a thing will generate ideas of equal, inherent rights; and this central dogma will exert pressure on personal attitude and conduct, on government and law, on every level of the free society, to bring all into harmony with the key belief that man is a created being.

But suppose man is not a created being. Suppose the human being is not a person, but a thing. If the universe is simply brute fact, mindless and meaningless; reducible in the final analysis to mass and motion—then man is a thing just like any other item in the catalogue of the planet's inhabitants. Suppose we assume—as do many of our contemporaries—that man is the chance product of the random movement of material particles. Man's haphazard appearance on a fifth rate planet is, then, a fluke; he just happened to occur, as the accidental by-product of physical and chemical forces. He's merely a part of nature, like every other species on the planet. Except that the human species is more foolish than the rest, and has a great gift for make-believe which renders its continued existence problematic!

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SYMPOSIUM ON VARIATION XV

THE FAMILY BLATTIDAE: AN EXAMPLE OF "EVOLUTIONARY STASIS"

BILL CROFUT*

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Abstract

The cockroach is one of the more popular extant biological organisms available for laboratory experimentation. It is identifiable in Carboniferous rock strata which has an assigned evolutionary age of 280-345 million years. Yet, the cockroach has an alleged phylogeny extending far back into Paleozoic time. This article reviews and critiques current evolutionary research and understanding.

Introduction

Creationists have long recognized that any position contrary to the accepted secular orthodoxy will result in less than complimentary response from evolutionists. A well known university professor has been given credit for one of the more demeaning rejoinders: "Biologist Stephen Jay Gould calls scientific creationism 'an oxymoron—a self-contradicting and meaningless phrase,'" (Fleury, 1987, p. 1513).

The technique of using quotation marks to denote the term scientific creationism as an oxymoron has also been a common evolutionist ploy (i.e., Pastner and Haviland, 1982, p. 1 and Cole, 1983, pp. 23-24).

The charge, however, would seem to look back at evolutionists. An attorney and hopeful evolutionist has noted the preoccupation of mathematical biologist Sewall Wright over living fossils (Macbeth, 1971, p. 121). What, then, is a living fossil? In my opinion, it is an evolutionist oxymoron: "... a number of animals, known as 'living fossils,' have persisted essentially unchanged for hundreds of millions of years" (Eldredge, 1975, p. 60).

The quote points up what seems to be an oversight and a possible blunder. Eldredge has excluded one entire biological kingdom from his definition. A Stanford University botanist included as living fossils such "... common American trees [as] the sycamore, oak, elm, willow, beach, tulip tree (*Liriodendron*) and others ..." (Campbell, 1944). A pair of researchers also included the gymnosperm, *Ginkgo biloba* Linnaeus (O'Mally and Kelly, 1988). More significantly, Eldredge's use of quotation marks would seem to lend support to my view of "living fossils."

A Living Fossil by any Other Name . . .

My own research, extensive though not exhaustive, consisting of nearly 100 technical documents, has produced no reference to the cockroach as a living fossil. Such exclusion, however, has not been limited to the cockroach. A zoologist has referred to the platypus as, "A living reminder of an ancient age . . ." (Fleay, 1988, p. 512). A biologist has written of the enigmatic fact, "... that sharks have been by-passed by the rest of vertebrate evolution, lingering on as a relic of what was once the dominant vertebrate group in the oceans" (Budker, 1971, p. 21).

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The cockroach has been chosen as the subject of this paper for two reasons. First, the amount of written material on the cockroach is relatively abundant and accessible. Secondly, it qualifies as a living fossil which makes it identifiable as a cockroach for a tremendous period of time by evolutionist reckoning.

A pair of biologists have credited an earlier researcher with placing this insect in the Carboniferous Period noting that it "... may be supposed already to have undergone a long period of evolution . . ." (Guthrie and Tindall, 1968, p. 8). An ecologist has charted the Carboniferous from 280-345 million years ago (Futuyma, 1983, p. 73).

How can anyone reasonably discuss the evolution of the cockroach? It would seem evolutionists have made a science of self-delusion. One of the more interesting disclosures contained in a paper described by Guthrie and Tindall (1968, p. 1) as a "... classic monograph . . .," precisely notes one of the reasons for my own incredulity: "The first thing that would strike an observer, looking at the ancient Cockroaches (sic), would be their *general* resemblance to the living" (Miall and Denny, 1886, p. 207). Empirical evidence, in fossil and extant form, would seem to expose as illusory any perceived value of research on the evolution of the cockroach. Yet the authors italicized the term "general." One could speculate at length as to the reason. Perhaps it was a necessary ploy which allowed them to see evolution "... unfettered by inconvenient facts" (Dickerson, 1978, p. 85).

McKittrick (1964, p. 117) was able to see two branches in this particular family tree:

Cockroaches have evolved along two divergent phyletic lineages . . . Members of the two most primitive families, the Cryptocercidae and the Polyphagidae bear certain resemblances to termites and to each other, but both have characteristics unmistakably linking them to the more derivative forms within their respective super-families.

His classic predecessors of nearly eight decades were also able to see evolution with what might be described as a more cautious interpretation:

We separate the living Cockroaches from other kinds of Orthoptera as a "family" group, and "Cockroaches" have existed since the Coal Measures at least; yet the structure of every one of the older types is really so peculiar that none of

them can be brought within the limits of the family as it now exists (Miall and Denny, 1886, p. 207).

Such a definitive statement must, of necessity, be based on overwhelming evidence. In fact, the extent of that evidence was revealed: "Three principle differences have been noticed between the ancient and modern forms of Cockroaches . . ." (p. 208). Those differences then, must be profound as suggested:

. . . similarity of the front and hind wings in the ancient types . . . the same number of principle veins is developed in the front and hind wings of ancient Cockroaches . . . distinction between palaeozoic and modern Cockroaches is found in the veinlets of the anal area (Miall and Denny, 1886, pp. 208, 210).

As noted, an earlier quote of Miall and Denny (1886, p. 207) revealed the use of quotation marks in reference to fossil cockroaches. That would seem to indicate the relationship of ancient to extant cockroaches could only be interpreted nebulously at best. Yet their own description of the differences would seem to be more superficial than significant.

I propose that slight (or even great) differences in wings, veins and veinlets do not constitute evolution of the cockroach in any meaningful sense. Rather, the identification of cockroaches preserved in rock allegedly 300 million years old argues against the evolution of this insect.

Reproduction

McKittrick (1964) has made sexual research observations that seem confusing if not contradictory. He reported (p. 11) that ". . . investigation of the male genitalia and the oviposition behavior proved invaluable for understanding evolution within the suborder . . . *Blattaria*." However, he acknowledged (p. 33), ". . . remarkably little diversification . . ." of the same characters in *Blaberidae*. He admitted (p. 99) that,

The female . . . genital structures . . . of cockroaches . . . have not heretofore been examined from the standpoint of evolutionary trends, nor have the homologies of the various structures been understood previously.

Nevertheless, he was able to write (p. 101) that

. . . the advent of the genital papilla and the shifting of the common oviduct opening to it from the laterosternal shelf, appears to be a major evolutionary change.

I feel justified in asking, What constitutes variation within kind?

So abundant are some of the fossil cockroaches that Miall and Denny (1886, p. 206) were inspired to write of ". . . the Coal Measures . . . [as] . . . the Age of Cockroaches." The coal measures (the Carboniferous Period) has, as previously noted, an assigned evolutionary age of 280-345 million years (Futuyma, 1983, p. 73). Yet, Guthrie and Tindall (1968, p. 100) and Parker (1984, p. 1186) have pointed out the dubious value of parthenogenetic reproduction in the cockroach. Sexual reproduction, then, would appear to be the only viable choice for perpetuation of the cockroach. Therefore it seems only reasonable that, for a

pair of cockroaches to have any chance to cooperate in propagation, they must first locate one another. An entomologist has written what appears a brief how-to manual: "To maximize their efficiency in finding pheromone-emitting females, males should occupy ranges above, over-lapping, or below the females' vertical ranges, depending upon the prevailing atmospheric conditions" (Schal, 1982, p. 1405).

That most probably includes all the possible variations of position. The suggestions do have a distinct postdictive character, based on observation of actual practice. My assessment is reinforced by Schal himself who admitted (p. 1406) that "Intraspecific separation is more difficult to explain." Undaunted by such unpredicted behavior he ". . . hypothesized that sexual stratification enhanced the efficiency of males in orienting to pheromone-emitting females" (p. 1406). He seems to have come very close to testifying that male cockroaches are able to find mates in spite of themselves. If that be the case, I am at a loss to understand how the cockroach has been able to survive, given the potential for "300 million years" of errant male behavior.

Location of a potential mate, at least with one species of cockroach, would seem to be only half the battle. In addition to a sexual litmus test, there is a role reversal from that reported by Schal. Biologists Moore and Breed (1986, p. 1162), referring to the work of an earlier pair of researchers, noted, "In *Nauphoeta cinerea*, females are pheromonally attracted to males." The situation is not necessarily advantageous for any given male, . . . because this species establishes strict linear dominance hierarchies. . . . Females are preferentially attracted to dominant male odours . . ." (p. 1160). As a consequence, the authors felt it important enough to report that, "Copulatory time was significantly shorter for subordinate males and males without status" (p. 1160).

If natural selection is truly a phenomenon of any particular influence, dominant males of the species *Nauphoeta cinerea* should be the rule and subordinate males the exception, given the alleged evolutionary history of the cockroach. This could mean that today we are dealing not really with subordination, but rather with relative levels of dominance. Then again, a relatively low level of dominance could be considered subordinate.

A University of Iowa biologist obviously does not share my reservation with regard to the importance of natural selection on at least one process vital for life: "Sexual selection has led to the evolution of traits whereby males can displace . . . or remove . . . the sperm of previous males" (Woodhead, 1985, p. 159). She also admitted that selection does not seem to work favorably in every case:

. . . since it always would be advantageous for males to evolve the ability to displace sperm, cases in which sperm mixing occur represent a conflict of male interest" (Woodhead, 1985, p. 159).

Empirical reality is that sperm mixing does occur. Such knowledge may very well fit the definition of what one evolutionist chemist has termed, ". . . inconvenient facts" (Dickerson, 1978, p. 85). Yet, even a conflict of interest can be reconciled to the evolutionary scenario:

"Large sperm loads may have evolved as a consequence of sperm mixing in some insects. . . . Males that transfer more sperm probably have increased fitness relative to other males (Woodhead, 1985, p. 163).

Symbiotic Research

Symbiosis has been defined as:

The consorting together or partnership of dissimilar organisms, as of the algae and fungi in lichens. The term ordinarily connotes an association which is mutually advantageous (Funk and Wagnalls, 1968, p. 1270).

Creationists have held up the symbiotic relationship (i.e., cleaning symbiosis) as an example of purposeful design diametrically opposed to the doctrine of evolution (Parker, 1978).

Since every feature of existence can be "explained" on the basis of evolution, it should be no surprise to creationists that an evolutionary interpretation has been appended to symbiosis. A pair of evolutionists has credited Kwang Jeon of the University of Tennessee with discovery of ". . . the evolution of a new organism . . . by symbiosis . . . not over millions of years but in eighteen months" (Sagan and Margulis, 1987, p. 26).

An earlier pair of investigators pointed out a general problem associated with attempts to research one particular symbiotic relationship:

Because of the intimacy inherent in their dependency, symbiotic organisms resist the separation that is necessary for a critical analysis of the relationship. . . . Among the insects, cockroaches have long been known to harbor bacteria-like objects (bacteroids) thought to be symbiotes . . . The exact nature of the intracellular bodies is still a matter of speculation (Brooks and Richards, 1956, p. 447).

Another five years of research has only superficially addressed the problem of identification: "It is now generally agreed that these symbiotic organisms (bacteroids) are bacteria, although their systematic classification is in doubt" (Bush and Chapman, 1961, p. 267). The one certain fact is, the "bacteroids" are there: "These micro-organisms have been found in every species of cockroach thus far investigated" (Bush and Chapman, 1961, p. 267). Therefore, a rational explanation for their presence must exist:

The intimate relationship between the egg membrane . . . and the bacteria . . . suggests that active synthesis of one or more substances necessary for egg development is possibly being carried out by the symbiotes (Bush and Chapman, 1961, p. 274).

Such a proposal certainly is a distinct possibility. Yet the reality of the situation with regard to research results is only guesswork.

A team of microbiologists recognized what was viewed as a shortfall in one specific research area: "In general, our overall knowledge of micro-organisms associated with the insect gut, in this case the cock-

roach gut . . . is fragmentary" (Bracke, et al., 1979, p. 945).

The investigation did provide an answer to one question: "From the present study it was apparent that only the hindgut of the alimentary tract of the cockroach possesses a complex microbial flora" (Bracke, et al., 1979, p. 954). As is often the case with empirical research, for every question answered, another is raised that adds to the pool of the unknown. While this is reason enough to continue research, it does point out the reality with which any researcher must come to terms:

The only readily recognizable morphotype occurring in chains or filaments was *Methanospirillum*. . . . Detailed morphological descriptions of other filamentous forms were not tabulated because of the number of different forms noted and because none seemed to possess any unique distinguishing morphological characteristics (Bracke, et al., 1979, p. 954).

Apparently there are times when an abundance of available data for study can be a hindrance rather than a help. Yet, if there is one characteristic that seems to be a consistent part of the evolutionist mind set, it is the ability to impart on the evidence, however meager, a measure of conformity with what has all the indications of a predetermined agenda:

"Due to the density of aerial forms, coupled with the underlying attached flora, no direct microscopic evidence was obtained to indicate that the microbial filaments were attached to cuticular wall or cuticular filaments. However, there was some indication that they may be in close association with cuticular filaments and with the wall (Bracke, et al., 1979, p. 954).

Nor does the typical evolutionist lack for the courage of his convictions even if those convictions must be stretched to the limits of assumptive optimism:

Recently it was shown that short-chain acids, e.g., acetic, propionic, and butyric acids, were transported through the gut wall. We speculate that short-chain end products of anaerobic fermentations may be transported and utilized by roaches (Bracke, et al., 1979, p. 955).

It further appears that some evolutionists will make subtle use of comparative data that could well border on the incredible: "Perhaps an analogous situation (with that of the lamb and the calf) occurs in the cockroach, with the microbial flora having some role in the development and physiology of its host" (Bracke, et al., 1979, p. 955).

Nobility of purpose and thirst for knowledge notwithstanding, the research presently under consideration has produced little in the way of tangible results. "The metabolic diversity of the roach-gut flora has yet to be determined. . . . The biochemical microbe-microbe and microbe-host interactions in this complex ecosystem remain to be elucidated" (Bracke, et al., 1979, p. 955).

Creationists have long insisted that evolution is accepted as a fact in spite of the evidence that refutes it

(i.e., Gish, 1978, p. 24). A team of researchers has given credibility to the charge:

Early cockroaches evolved the cryptic lifestyle and generalized form that have enabled them to survive since the Paleozoic era. Fossil cockroach remains from Upper Carboniferous deposits are grouped in the extant order Blattodea and are thought to have evolved in the Lower Carboniferous or even earlier. These remains show that cockroaches are little changed since then . . . (Wren, et al., 1989, p. 276).

A pair of creationists has given evolutionist George Gaylord Simpson credit for the declaration that evolution is the be-all-end-all explanation for the existence of the universe and everything in it (Whitcomb and Morris, 1961, pp. 442-443). On the microcosmic level, such philosophical predisposition seems to be the conclusion derived from a later investigation:

The overall inference that can be deduced from these results is that the evolution of the endosymbionts occurred in tandem with the evolution of the hosts, indicating that this symbiotic system has been in existence since before cockroaches evolved the present-day forms on which their taxonomy is based. The demonstrated dependence of the cockroaches on their endosymbiont flora supports this idea, as does the fact that the geographical origins of the species examined are widely disparate (Wren, et al., 1979, p. 280).

A well known evolutionist, perhaps from necessity, has lent his full support to the practice of inferring what one wants empirical data to provide:

As a paleontologist and evolutionary biologist, my trade is the reconstruction of history. . . . Scientists who study history, particularly an ancient and unobservable history not recorded in human or geological chronicles, must use the inferential rather than experimental methods (Gould, 1978, p. 22).

Such proclamation is based more on convenience than science. The researchers presently considered would seem to have based inference upon the assumption of evolution:

One of the most intriguing aspects of their physiological makeup is the relationship that cockroaches have established with the bacterium *Blattabacterium cuenoti* . . . [although] the relationship . . . has never been fully explicated.

What is known is that serious deleterious effects are caused in cockroaches by destruction of the endosymbiont bacteria. This finding has led to the hypothesis that the microorganisms and their hosts are engaged in a mutualistic relationship (Wren, et al., 1989, p. 276).

Based on the research, the hypothesis would seem to be empirically sound. What I cannot understand is how the investigators can validly proceed from the obvious endosymbiotic relationship to tandem evolution. Perhaps the key word is validly.

Cockroaches and Termites

Among the recent writers of more generalized literature, there is a consensus that the cockroach and

termite have a shared evolutionary history (McKittrick, 1964, p. 98; Guthrie and Tindall, 1968, p. 3 and Bell, 1981, p. 1). A more current researcher has offered a reason for such opinion:

Living species of the cockroach family *Cryptocercidae* have intestinal symbionts that are cogenetic with some of the gut protozoa found in *Isoptera*. Presence of such closely related symbionts in *cryptocercids* and in termites has been frequently interpreted as a uniquely derived homologous character shared between the two xylophagous groups (Thorne, 1990, p. 37).

Such reading of the evidence, however, has been challenged: "This may not be the most parsimonious interpretation" (Thorne, 1990, p. 37). The reason for caution was explained as what has apparently been seen as a contradiction with regard to equally valid evidence:

One complication is that if there was a common ancestor with the symbionts, then that implies that there was a secondary loss of the gut fauna and coincident change in diet and habits, in all other roaches (Thorne, 1990, p. 37).

It has been my experience that the typical evolutionist is reluctant to denounce the research labors of another. Perhaps the following testimony was an attempt on the part of the later investigator to disagree diplomatically:

It is fairly certain that some of the intestinal protozoa found in the termites and in *Cryptocercus* are derived from a common ancestral flagellate. The protozoa are morphologically very similar, and immunological characterizations of the protozoa suggest that the symbionts of the two hosts are related (Thorne, 1990, p. 37).

Yet, the newer proposal still stands in opposition to the older: "It is possible, however, that these flagellates were not inherited by *Cryptocercus* and termites via a common ancestral host, which is the general assumption" (Thorne, 1990, p. 37).

The relationship has been touted as an observational fact: "Termites and wood-dwelling cockroaches depend on symbiotic intestinal fauna for aid in digestion of cellulose" (Thorne, 1990, p. 37). The need for explanation was proposed with greater prudence:

By occasionally killing and consuming an intruder from the other group, gut protozoa could have been acquired and exchanged between termites and *Cryptocercus* or their ancestors, under natural conditions and before the life histories of the protozoa became specialized within the host orders (Thorne, 1990, p. 37).

Rare indeed is the research proposition that is without contestation. The present offering was no exception:

Suggestions of natural transfauna have been repeatedly discussed, however, because of various life-history and morphological differences between flagellates found in *Isoptera* and *Cryptocercus* (Thorne, 1990, p. 38).

The research arena has, however, proved a fertile ground for point-counterpoint exchanges: "... differences in morphology and life history between protozoa found in living termites and in *Cryptocercus* reveal nothing about the characters of ancestral flagellates" (Thorne, 1990, p. 38).

Perhaps, laboratory testing that tends to lend support to an hypothesis, bears out the adage that 'the best offense is a good defense':

Successful protozoa transfaunaion between *Cryptocercus* and *Zootermopsis* has been repeatedly demonstrated under experimental conditions . . . All previous research suggests that the consumption of gut contents from recently dead individuals does result in successful symbiont transfaunaion within termites . . . or between *Cryptocercus* and *Zootermopsis* (Thorne, 1990, p. 39).

Yet, ensuing testimony would seem to be an admission that experimentation was of little or no practical value:

". . . documented presence or absence of transferred live protozoa to modern insects following consumption of the other host is irrelevant to the proposed theory. Survivorship of protozoa that may have been transferred between the ancestral groups millions of years ago is pertinent, but impossible to assess (Thorne, 1990, p. 40).

The last quoted statement is applicable to all attempts to investigate evolution. There is no evolution, in any meaningful sense of the term (i. e., transformation of species), taking place today. Therefore, evolution is historical and hence, "impossible to assess." Such admission, however, did not prevent a conclusion which is partially assumptive and partially careful testimony: "Cryptocercidae are clearly primitive roaches, but it is most likely that the family is a sister group to other cockroach taxa rather than a sister group to modern termites" (Thorne, 1990, p. 40).

Current Research

Cockroach experimentation has covered such diverse topics as the implantation of female germ cells (oocytes) into males (Mundall, et al., 1979) and the study of water loss in cockroach integument (Machin, et al., 1986). The topic which has received the most attention (35%), nearly twice that of the next most frequent, is the neurone: "A nerve cell with all its processes and extensions" (Funk and Wagnalls, 1968, p. 853).

Some of that activity has been concentrated on micro-electrode recordings of neurones in the cockroach brain and eyes which are interrelated (Mizunami and Tateda, 1986). Brain research has included injection of certain neurones with octopamine (Schofield and Treherne, 1986), injection with current (Christensen, et al., 1988) and injection with potassium (Schofield, 1990). Research on the eyes included illumination and other sensory stimuli (Ohyama and Toh, 1986) and illumination in a variety of ionic solutions (Mizunami and Tateda, 1986; Mizunami, et al., 1987).

A pair of researchers made readers aware of a pioneering spirit in their work:

The blood-brain barrier of insects has been suggested by several investigations to be formed chiefly by the superficial layer of neuroglia of

the central nervous system, the perineurium. . . . Hormonal control of the perineurium or other neuroglia in insects has never been studied (Schofield and Treherne, 1986, p. 423).

The procedure by which the desired information would hopefully be obtained was outlined:

The hypothesis that external application of . . . octopamine to the cockroach nervous system lowers the [sodium] permeability of the blood-brain barrier . . . was tested by examining the effect of such exposure upon the interstitially recorded trans-perineurial potential (Schofield and Treherne, 1986, p. 425).

One result was conjectural:

An effect of octopamine upon the basolateral membrane (i. e., depolarization of . . . e.m.f., together with some reduction in . . . resistance) could easily be accompanied by an effect upon some other parameter of the perineurium (Schofield and Treherne, 1986, pp. 434, 435).

Another was more conclusive: "Octopamine has been shown in preliminary experiments to cause a reduction in the net [potassium] permeability of the perineurium (Schofield and Treherne, 1986, p. 435).

A team of insect physiologists chose to concentrate their efforts on an area which would seem to have been virtually ignored: ". . . little is known about the evolution of excitability or the types and distribution of voltage-sensitive ion channels in the developing insect neurone" (Christensen, et al., 1988, p. 194). Methodology was briefly noted: "One approach to the study of the development of excitability is to investigate embryonic cells during maturation in culture" (Christensen, et al., 1988, p. 194). Acknowledgement was made of procedural restriction: ". . . we can understand the excitable properties of the neurone only by isolation of the underlying conductance changes into their individual components" (Christensen, et al., 1988, p. 194).

Limitation posed by laboratory procedure was explained:

Although some information about excitability can be obtained using current-clamp techniques, a thorough analysis of the membrane currents that underlie the voltage changes . . . requires the use of voltage-clamp technique (Christensen, et al., 1988, p. 194).

The results of the technique employed were positive:

The voltage responses during depolarizing and hyperpolarizing current steps demonstrate the rectifying properties of these cultured neurones . . . most of the voltage change during depolarization results from a voltage-dependent increase in membrane conductance to potassium (Christensen, et al., 1988, p. 197).

Most of what was learned in the forgoing exercise would seem to be less than inspirational:

Investigation of neuronal excitability in the intact insect nervous system has suggested that the cell membrane includes voltage-gated sodium, calcium

and potassium channels . . . In this respect, cultured cockroach neurones do not appear to differ from their intact counterparts . . . action potentials associated with activation of voltage-sensitive calcium channels can be evoked, at least under the special conditions where barium replaces calcium and the outward rectification is blocked (Christensen, et al., 1988, p. 210).

Information remained obscure:

Whether these calcium channels are important for regenerative activity or to serve as a means of calcium entry for activating other channels, for example a calcium-activated potassium channel, remains to be determined (Christensen, et al., 1988, p. 210).

The earlier admission of knowledge gaps regarding . . . the evolution of excitability . . .“ stands.

Ocellar System

A pair of biologists published some well known facts of a generalized nature based on empirical research:

Many insects possess two or three dorsal ocelli in addition to the paired compound eyes. The dorsal ocellus is characterized by a high convergent ratio of many reticular axons upon several thick second-order neurones in the posterior region of the ocellus (Ohyama and Toh, 1986, p. 405).

However, it was also admitted that the accumulation of generalized observational data had not provided certain specific knowledge which was considered important: “. . . our knowledge about how information is processed in the ocellar system is limited” (Ohyama and Toh, 1986, p. 405).

The main focus of research activity was described for one of the more popular species of cockroach:

. . . several thin processes, which respond to various sensory stimuli other than ocellar illumination, are included in the *Periplaneta (americana)* ocellar nerve and are referred to here as small multimodal ocellar interneurones (SM-neurones) (Ohyama and Toh, 1986, p. 405).

A listing was provided of the other excitation modes:

The SM-neurones respond with spike discharges to the following stimuli: illumination to compound eyes, movement of antennae including tactile stimuli and air puffs to antennae, air puffs to cerci, vibration to legs, and spontaneous/forced wing beats (Ohyama and Toh, 1986, p. 405).

A brief review of laboratory test procedure was provided: “Recordings from suction electrodes attached to a mid-region of the ocellar nerve revealed spikes originating in more than two SM-neurones” (Ohyama and Toh, 1986, p. 405). Yet, all the described flurry of activity resulted in proposals that appear more speculative than substantive.

The SM-neurones found in this study may be homologous to the ocellar efferent fibres of dragonglies . . . The functional role of SM-neurones in the ocellar system is not properly known, because the ocellar contribution to behavior itself is not

known in *Periplaneta*. However, some possible function may be inferred by referring to ocellar function reported in other insects (Ohyama and Toh, 1986, p. 408).

A team of biologists undertook the investigation of certain nerve cell processes in an insect often used in research: “The ionic basis of the action potential in the large second-order neurones (L-neurones) of the ocellus of the cockroach, *Periplaneta americana*, was studied” (Mizunami, et al., 1987, p. 259). The methodology was briefly described: “The ionic mechanism of the action potential was studied by changing the ionic environment . . .” (Mizunami, et al., 1987, p. 261).

Some of the accumulated data, which was based on observation was presented:

The ocellus of the cockroach contains about 10,000 photoreceptors which have synapses onto four large second-order neurones, the L-neurones. The L-neurones extend dendritic branches into the ocellus, and their axons project into the ocellar tract neuropile of the brain, through the ocellar nerve. In the ocellar tract neuropile, L-neurones make synaptic contacts with the higher-order neurones (Mizunami, et al., 1987, p. 261).

As a result of this research, a conclusion was drawn: “The action potential of the cockroach L-neurone originates in the ocellar tract of the brain” (Mizunami, et al., 1987, p. 270). The investigation additionally produced useful information on the other side of the ledger, though apparently not as definitively:

The results also suggest that under normal conditions sodium ions have little role in generating the action potential since treatment with sodium-free saline did not affect the size or shape of the action potential (Mizunami, et al., 1987, p. 269).

While preparing this portion of the paper, I could not dismiss the feeling that the activity described had more to do with the operation of electrical measurement equipment than neurological research on the cockroach. One researcher even provided evidence tending to support this:

Potentials recorded from the perineurium were interpreted in terms of an electrical model. . . In electrical terms, the circuit consists of a loop composed of the shunt and the two membranes (Schofield, 1990, p. 338).

Conclusions

If research is to have any particular value the result should be an increase in the useful knowledge of the subject under study. Even if the effort is unsuccessful, such intent would constitute justification for the particular undertaking. The key word is *useful*. I am unable to discern any useful knowledge which has been gleaned from the research described in this paper. On the other side, I may be making this more complicated than it actually is. Perhaps I should not look beyond the pressure to be published.

Forced evolutionary interpretation of empirical evidence does not give proper weight to other possible explanations. The cockroach is recognizable as an extant biological organism. Described superficial differ-

ences notwithstanding, it is identifiable as a fossil form in sediment alleged to be between 280 and 345 million years old. Therefore, evolution is not the best explanation for the existence of this biological organism.

Is there other motivation for so much research on the cockroach? A biologist has promoted one particular species on the dual bases of observational variety and economics:

The Maderia cockroach, *Leucophaea maderae*, has been used extensively . . . in the illustration of biological principles. A wide range of experiments, including both ecological and biochemical approaches, are possible with this insect. . . . The use of this animal is particularly effective in crowded, low-budget biology courses . . . (Yurkiewicz, 1970, p. 39).

A pair of biologists provided a more generalized purpose and were far less kind: "The advantage of cockroaches as laboratory animals is that they survive in spite of the technical assistance available in some laboratories!" (Guthrie and Tindall, 1968, p. 17).

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QUOTE

(Jay) Gould was thus a complex figure. In his private life he adhered to a Victorian code of conduct that was already crumbling when he died in 1892. Commerce was pursued in a laissez-faire marketplace where social Darwinism reigned supreme. At home, life, unfolded within a thick web of Christian morals and bourgeois propriety. While future generations would find the latter combination reeking of hypocrisy, it was the accepted ethical standard of Gould's day. The free market would create and diffuse wealth throughout society, while men saved their souls in private.

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PANORAMA OF SCIENCE

Plant Communication: "Calling All Wasps"

Two groups of researchers, working independently, have recently reported that damage to plants, particularly that caused by herbivorous caterpillars, results in the production of volatile substances which in turn attract parasitic wasps that "attack" the caterpillars. Such evidence is part of a growing body of literature suggesting that plants have the ability to "communicate" not only among themselves, but also with helpful pest-killing parasites (Chen, 1990a and 1990b).

Whitman and Eller (1990) demonstrated that when leaves from cotton, cowpea, and hyacinth bean plants were either chewed by caterpillars or cut with scissors, volatiles (so-called green-leaf volatiles consisting of alcohols, aldehydes and esters) were released from the leaves. Then, using a wind tunnel, these researchers learned that female parasitic wasps (*Microplitis croceipes* and *Neteliu heroica*) were attracted to the damaged leaves. The wasps were not attracted to undamaged leaves. It is proposed that this may be a defensive mechanism of plants under caterpillar attack. In response to release of the plant's chemical attractant, the wasp locates its caterpillar host, stings it into submission, and injects its eggs into its prey.

Employing corn seedlings, Turlings, Tumlinson and Lewis (1990) found that feeding by caterpillars (beet armyworm larvae, *Spodoptera exigua*) attracted female parasitic wasps (*Cotesia marginiventris*). Upon analysis of the volatiles released by the plants under caterpillar attack, several compounds were identified. These included aldehydes, an alcohol, an acetate, indole, and terpenoids. These chemicals were not released by the caterpillars themselves nor their feces, but only by the caterpillar-damaged seedlings. While all compounds were released in minute quantities upon fresh damage, larger amounts of the terpenoids were detected the following day. Thus, these researchers propose that these volatile terpenoids are produced as a defense mechanism by attracting the parasitic wasps. It was further learned that artificially damaged leaves do not release significant amounts of these terpenoids unless they are treated with regurgitated material from the caterpillar, and that undamaged leaves, with or without treatment with regurgitant, do not release these volatiles.

Many instances of plant/insect relationships have been cited by creationists as evidence of design and, thus, of a designer. Plant/insect defense strategies provide additional evidence in this regard. One respondent, commenting on these phenomena, was quoted as saying this was not a defense at all, but that it "just happens" (Chen, 1990b). For example, a half-eaten apple, upon turning brown and discouraging a person from eating it later, does not indicate that the apple is defending itself. Such an analogy, however, fails to account for the intricacies of the relationships described in this recent work.

Turlings, et al. (1990) discuss the role that experience may play in the wasps' behavior. Perhaps the young wasps, while still associated with the plant/host environment during their preflight stage, learn to associate

certain plant odors with their hosts. However, Whitman and Eller (1990) found that a significant proportion of naive wasps were attracted to the green-leaf volatiles, leading these authors to suggest this ability is genetically based. Although they also demonstrated that pre-test exposure to the volatiles significantly improves the wasps' response, it cannot be determined whether the improved ability is due to learning or to sensitization. Nonetheless, any ability of the wasps to learn also speaks of design, and does not negate the benefit that is realized by the plants.

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Is Scientific American "Scientific"?

Science writer, Forrest Mims III, who already had distinguished himself by his productivity, was in line for a regular position writing the column "The Amateur Scientist" for the popular magazine, *Scientific American*. Even though his writings dealt mainly with experiments in physical science, during an interview Mims revealed that he personally did not accept the popular concept of biological evolution. Because of this he was refused the position, and subsequently *Scientific American* discontinued "The Amateur Scientist."

The rejection of Mims appeared to be discrimination and the story was publicized by the *Wall Street Journal*, *New York Times*, *Washington Post*, *Associated Press*, *Science*, *Christianity Today*, and many other publications both Christian and secular.

The Creation Research Society is a scientific organization and does not officially become involved in any politico-legal matters including lobbying. However, the Board of the Society was deeply concerned about this apparent prejudice against a very prominent popular science writer because of his creationist beliefs. The Board recognizes the right of an employer to select the best candidate for a position, but all aspects of this case clearly seem to point to unjustified discrimination. Therefore, at the annual meeting in April 1991, the Board commissioned me to write a letter deploring the action of *Scientific American*. In response to this mandate I sent the following letter which to date has not been answered.

Mr. Claus-Gerhard Firchow, President
 Scientific American, Inc.
 415 Madison Ave.

New York, NY 10017

Dear Mr. Firchow:

At a recent meeting our Board unanimously approved a resolution to protest your action toward Forrest M. Mims, III because he is a creationist. We feel that this

*For a recent discussion of the production of chemical substances by plants for defense against herbivores see CRSQ 28:13.

is discrimination and a violation of the scientific spirit, and we urge that all necessary action be taken to assure that this kind of inappropriate judgment does not happen again in the future.

Sincerely yours,
Wayne Frair

The CRS itself was the victim of a similar intolerant attitude by *Scientific American* in 1978 when the Society attempted to place an advertisement in the magazine. A professional scientific ad was prepared by an agency and placed in *American Scientist*, *Bioscience*, *Nature*, and *Science*. Also the Society paid to *Scientific American* its fee of \$750 for publication of the same ad. However, *Scientific American* informed CRS that they would not publish the ad, and the fee was returned. A letter from publisher Gerard Piel indicated that their magazine felt no obligation to print material promoting other than "scientific" methods of inquiry. The CRS considered this to be grossly unfair and objected because *Scientific American* published liquor, tobacco, and other ads which certainly do not promote scientific methods of inquiry. This still is the case; for example the fall 1991 issues carried advertisements for the German State Lotteries.

Even though CRS was started by scientists and has had hundreds of scientists as voting members, including Board members, over the years since its founding in 1963, *Scientific American* was adamant in its rejection of appeals to publish a Society ad. Legal counsel was approached, but a suit did not follow because of expenses and also because there was an adequate number of other publishers willing to print CRS ads in their publications.

The Creation Research Society Board feels that the scientific enterprise itself is weakened by the type of intolerance and censorship evidenced by the staff of *Scientific American*. The CRS Board recognizes that there is room for differences of opinion within the scientific community. Not even all scientific creationists agree on all issues. But we certainly should work toward an understanding of alternate viewpoints within the scientific community.

Wayne Frair, President, CRS

Population Control Without Predation

Mass Migration

When writing an article on a desert millipede (Williams, Howe and White, 1991, pp. 7-16), several facts concerning this class of animals were uncovered. One phenomenon noted was the occasional mass migration of millipedes. One such instance is of particular interest (Burton and Burton, 1989, p. 1614):

. . . when 75 acres of West Virginia farmland were covered by these animals in 1918. Cattle would not graze and men hoeing in the fields became nauseated and dizzy from the smell. In the end, most of the millipedes, about 65 million, were killed when they halted at a cliff bottom and were parched by the sun.

Population Size

Burton and Burton (1989, p. 1614) claimed that the size of millipede populations does not appear to be

controlled by predators and parasites although both types are quite abundant. Millipedes possess amazing defense systems (Williams, Howe and White, 1991, pp. 9-11; Eisner, et al., 1978) which may discourage some predation. Their secretive habits (*O. ornatus* is an exception) keep the creatures hidden from many predators. Burton and Burton (1989, p. 1614) cite physical conditions (amount of moisture, organic content of the soil, etc.) as the governing factors in population control.

Population Control

Smith produced an outstanding manuscript (1970, pp. 91-96) on population control in nature before and after the Fall of Man. He discussed several instances of intrinsic population control mechanisms (i.e. cannibalism, fertility, infant mortality, resorption of embryos, clutch size, number of broods per year, size of the breeding population, etc.) and claimed that they were an evidence of design or a "built-in" balance of nature. Disease, predation or starvation are not necessary to control a population (p. 96).

What about the occasional mass migration tendencies of millipedes such as the one noted in West Virginia? In any mass migration of millipedes, many of them are likely to expire by various means. Is this atypical mass migration tendency "built-in" by the Designer to control the population? Possibly overpopulation or a change in environmental conditions trigger such an event. It amounts to a virtual suicidal tendency when the light-shy millipedes in mesic environments leave their normal habitats (under cover such as stones and decaying wood) and march to their destruction at the bottom of a cliff even though they are capable of locomotion up vertical obstacles (Williams, Howe and White, 1991, pp. 14-15). Why does a population of millipedes forgo its normal secretive habits and migrate *en masse* causing its own destruction? Is this population control mechanism accidental or designed and intrinsic?

Suggestions

One could postulate that in the instance mentioned the millipedes could have stopped at the base of the cliff because of exhaustion and died before they could escape up the sides of the cliffs. However this does not solve the problem of what triggered the migration. Considerable research has been done by Hans Selye and others concerning a "stress syndrome" that can occur when population densities of mammals approach harmful levels—see Odum (1971, pp. 194-195). Changes in glands produce changes in behavior which may be one of the factors leading to massive self-destructive migrations in lemmings. Possibly some similar stress response develops in millipedes when population densities become too great.

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Number Game

Introduction

In recent years many Christian scientists have given up trying to reconcile Genesis with geology and have turned instead to the Literary Framework Hypothesis. One advocate of this theory is Henri Blocher of Vaux-sur-Seine, whose *In the Beginning* (1984) is often quoted with approval. He denies that Genesis 1-3 was ever meant to be an actual history of creation. Rather, it is semipoetical, a hymn in which “the regular flow of thought conceals a careful construction which uses symbolic numbers: 10, 3, and particularly 7” (p. 33).

We admire its author as a wise man . . . very fond of manipulating numbers, particularly the number seven. From such a writer the plain straightforward meaning, as in two-dimensional prose, would be most surprising (p. 51).

In passing we may note that when a word does not fit into his 10 - 7 - 3 scheme, because it occurs five times, he ingeniously reduces it to three: “. . . the verb ‘create’ is used at three points in the narrative, the third time thrice” (p. 33) !

Now, why does this theologian thus juggle with Genesis and discover latent subtleties which escaped the notice of almost all commentators for 1900 years? I think we all know: because he has accepted the scientific consensus on evolution and millions-of-years geology. Therefore some way must be found of salvaging the veracity of Scripture, which he as an evangelical Christian believes.

An Instructive Parallel

Is there any other chapter of the Bible comparable with Genesis One, in that it narrates a series of miracles? Yes, Exodus 16, which tells the story of the first seven days of manna. Now suppose a Christian scientist were to stumble on this chapter for the first time. He looks up *manna* and is told that science knows nothing of the substance described by Moses, but no fewer than 16 different botanical organisms have been put forward as candidates for the role including lichens, legumes, and also the resin of oaks, pears, cedars, and willows. Our scientist deduces that the text *cannot* mean what it says, so there *must* be a different interpretation. Perhaps the clue to this “three-dimensional” meaning will be found in the *number* of times important words are repeated. This is what he finds:

Seven miracles are recorded in the giving of manna:

- 1) *One* day’s supply comes down every day, Sunday to Friday.
- 2) *Double* the quantity falls on the sixth day.
- 3) The manna *melts* when the sun comes up. No food known to science melts in this way and yet provides enough calories for good health.

4) On the seventh day *no* manna falls. This might be a ‘fluke’ one day of the year, but that it should happen with perfect regularity every seventh day for 40 years, is quite inexplicable by science.

5) The manna kept over from Friday to Saturday does not go bad, but it does go bad if kept on any other day.

6) The manna put in a pot in the Tabernacle does not go bad even after 40 years.

7) The manna *stops* the very day the Israelites enter Canaan and begin to eat the corn of the land.

So our Christian scientist says to himself: This is far too neat a story to be literally true. It goes against all human experience, and manna has never been found anywhere in the world. Let us look at the text again:

1) The chapter can be divided into two equal parts: both Exodus 16:18,36 are concerned with the Hebrew measure, an ‘omer’. Clearly this division is artificial.

2) Moses is mentioned 17 times (10 + 7), manna 5 times, and the Lord 22 times (17 + 5). Surely this is significant.

3) ‘Murmuring’ (verb or noun) comes seven times—the sacred number again!

4) The whole story fits exactly into *seven days* . . . just like Genesis One.

Beyond doubt, our scientist reasons, we have no ordinary history such as might be written in response to a simple request to be told how God sustained two million people in the wilderness for 40 years. We have instead the work of a Master whose thought is profound and expansive. He has used a three-dimensional *parable* to enforce the law of *sabbath* -keeping!

Of course this ‘interpretation’ is a spoof . . . but no less plausible and no more absurd than Henri Blocher’s analysis of Genesis One. Exodus 16 bears every mark of a straightforward chronicle of events over seven consecutive 24-hour days—events, nevertheless, which science is at a total loss to explain. Exactly the same is true of Genesis One. The creation of the world, like the creation of manna, was supernatural and unique, yet at the same time locked into a God-given time-scale. Experience has proved that this same time-block is precisely correct for the work-rest rhythm for the human frame. So man’s week and manna week together have blown the whistle on the number-game.

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Reprinted CRSQ Volume 7

Introduction

The *Creation Research Society Quarterly* has been published since 1964 (27 complete volumes). Many of the early Quarterlies are out-of-print, yet these past issues contain articles of continuing interest and value. In an effort to make these volumes available, the Board of Directors has incurred considerable expense to reprint them. In order that those interested in good scientific creationist articles, sound criticisms of the evolutionary hypothesis, along with the needed litera-

ture citations accompanying the treatises will have a general idea of the contents of each volume, brief synopses will be written to appear in this and future Quarterlies. See Williams, 1991, pp. 113-114.

Astronomy

George Mulfinger (1970, pp. 7-24) wrote an extensive critique of stellar evolution. He discussed star formation, stellar aging, galaxy formation and the problems with the formation of planets. The author developed a thermodynamic calculation to show that "cloud condensation" to form a star involves a decrease in entropy which means that the supposed process would not be spontaneous in a real universe. Age discrepancies of various stellar objects were presented. His strong conclusions given below revealed the hopelessness of postulating the formation of the universe by natural means alone.

1. There are many weak links in the hypothetical evolutionary life cycle of a star. The weakest of these is the alleged spontaneous birth of stars from interstellar material. Both scientific data and Scripture militate strongly against the doctrine of continuous star formation. This idea has undoubtedly come about as a consequence of the implicitly atheistic assumptions that underlie the majority of present-day astronomical speculations.

Observation and revealed truth both point to the creation of all stars at a definite time in the past by *processes totally dissimilar to present processes*. The present astronomical economy involves degeneration, dissipation, and "running down" in stars, whereas there must clearly have been an initial period of organization and "winding up."

2. The problem of how galaxies are supposed to structure themselves from primordial material is one of the most enigmatic questions in the whole realm of cosmogony. Few cosmogonists have been willing to undertake study of this problem. Those who have attempted it have failed disastrously.

The question of the inability of galaxies to maintain their structure over long periods of time is one that needs serious study by Christian men of science. This would appear to be a promising avenue of research for establishing a recent Creation.

3. There is still no acceptable evolutionary explanation for the existence of planets. According to our present understanding, solid particles would fail to agglomerate to form even small chunks of material, let alone planets. That planets do form spontaneously is held today strictly as an article of evolutionary faith.

4. Astronomical dating methods appear to be entirely devoid of scientific value, since they involve guessing at an evolutionary history for the object being dated. The fact that astronomers disagree widely on such imagined histories accounts for the many serious age discrepancies in the literature today.

Age estimates are continually being inflated to keep step with the philosophical views of the times. Why, if cosmogonists are actually in possession of the truth at any given moment, must

they change their theories and age estimates the next moment?

5. The evolutionary approach is utterly bankrupt when it comes to explaining the ultimate origin of anything. To the evolutionist, each stage of development requires a previous stage. Never can there be a true beginning. Yet scientific data and Scripture both demand such a beginning. The most satisfactory explanation for the origin of stars, galaxies, and planets is a rapid and miraculous Creation which endowed the heavens initially with all the diversity of structure and function that we observe today.

Harold Clark (1970, pp. 25-29) noted that the naturalistic theories for the origin of the universe are scientifically weak. Then he proposed that the biblical viewpoint offers the only realistic possibility for the origin of the physical world. In a qualitative thermodynamic discussion, Williams (1970, pp. 46-50) attempted to determine if the universe could be viewed as a thermodynamic system. He deplored the use of unqualified speculation by naturalists when discussing "scientific" origins for the universe. He suggested that the universe could be viewed as an isolated system from biblical evidence. This particular treatise can be treated as a companion article to "The Initial State of the Universe" (Williams, 1983, pp. 27-40) that appears in *Design and Origins in Astronomy*, a monograph published by the Society. Thomas Barnes (1970, pp. 51-53), well-known for his model for the decaying magnetic field of the earth, wrote on the origin and development of the universe employing the first two laws of thermodynamics. He explained that naturalistic hypotheses cannot escape a conflict with these scientific principles. The only hope to understand the origin of the physical world is to accept the creation account.

Life Elsewhere in the Universe?

Since so much of the taxpayer's money has been spent attempting to detect signals from "intelligent creatures" on other planets throughout the universe, two creationists explored the possibility of life on other planets. Frank Cousins (1970, pp. 29-37) examined the following three naturalistic postulates.

1. There are numerous planetary abodes for life in the Milky Way and in the extragalactic nebulae.

2. Simple life developed by a fortuitous assemblage of inorganic matter in the primeval oceans of the earth.

3. Life has evolved from a simple beginning on earth and it proceeded in a similar manner on other planets.

The author concluded that the above are open to question, and are of very doubtful validity. Harold Armstrong (1970, pp. 38-42) discussed scientific observations concerning living beings outside the earth, noting that the evidence is negative. Then he presented Scriptural data and concluded that all evidences, both revelational and observation information, mitigate against the concept of life beyond the earth.

Origin of Life

In parallel articles to the concept of life on other planets, Duane Gish (1970, pp. 42-45, 83) and Gary Parker (1970, pp. 97-103) investigated the "scientific" speculations concerning the origin of life. Gish observed

that the attainment of any *direct* evidence is not possible. In viewing the various theories, he called attention to their scientific weaknesses and indicated that any *planned* experimentation on the subject using intelligence violates the naturalistic concept of natural process origin of life by brute, random means. Using data from DNA-protein relationships, statistics and thermodynamics principles, Parker highlighted the shortcomings of evolutionary thought and efforts. Scientific evidence actually favors the creationist viewpoint that intelligence was involved in the creation of life.

Biology

Willard Henning (1970, p. 74) briefly discussed certain movements of the tropical gecko from the design criterion. Norbert Smith (1970, pp. 91-96), in an interesting article, noted several methods of population control without predation. He commented that intrinsic population control means such as cannibalism, fertility, death-age of adults, infant mortality, resorption of embryos, clutch size, number of broods per year and size of breeding populations were better explained within a creation model. This manuscript deserves serious study in light of the overemphasis on predation by popular science media programs. The thesis of Stroud (1970, pp. 104, 116) was that the origin of sex from the standpoint of evolution is highly unlikely while the existence of sex is strong evidence favoring special creationism.

Brauer (1970a, pp. 118-119) considered the Parathyroid gland function in humans from the design standpoint. In a later article (Brauer, 1970b, pp. 152-154) he claimed that the defense systems of the human body could only have been created by God. Evan Shute (1970, pp. 147-151) related that many resemblances between animals and plants of different genera, families and orders defy evolutionary explanation. Such circumstances can best be explained by a creation model rather than resorting to convergence.

Geology

An answer to a criticism of Flood geology was written by Clifford Burdick (1970, pp. 142-147). He noted that the imagined differences between uniformitarian and Flood geology are based more on semantics than actual evidence. He observed that uniformitarians are more and more allowing catastrophism into their model. Catastrophism has an obvious important place in the creationist model of science. The author pointed out that the burial of fossil life required catastrophism and how evolutionary biologists will doubt physical evidence when it opposes their hypotheses. Walter Peters (1971, pp. 193-200) presented his field work on cyclical black shales. The author interpreted his results by rapid tidal deposition of materials during and after the Flood. Human footprints in stone have always fascinated creationists. Wilbert Rusch (1971, pp. 201-213) wrote on this interesting topic and included a discussion of an iron pot found in a lump of coal. Rusch suggested some criteria that should be applied when attempting to determine if the prints are actual physical tracks or carvings. This area of study has invoked some serious debate among creationist and evolutionist scientists. It is noted that even obscure dinosaur footprints in rock are generally accepted

without any question but evidence such as a human footprint in rock is doubted immediately.

Randall Hedtke (1971, pp. 214-221) attempted a geocological explanation of the fossil record from the viewpoint of Flood geology. He discussed index fossils and the relative fossil production potential of a certain organism in the presentation of his thesis. Steve Austin (Nevins, 1971, pp. 222-226) discussed the Mesa basalt of the Northwestern United States. He considered the world's largest lava flow (covering areas in Oregon, California, Nevada, Idaho and Washington) which presents many problems for uniformitarianism. This single volcanic event was developed within a Flood model of geology. The author felt that certain depositional events occurred during the Flood whereas others were aftereffects of the Flood.

Radioactive Dating Methods

Melvin Cook (1970, pp. 53-56) explained that the nonequilibrium method of carbon 14 dating indicated that the atmosphere of the earth is less than 10,000 years old. Dr. Cook's work with C-14 dating deserves serious study by all creationists. Robert Whitelaw (1971, pp. 56-71, 83) collected 15,000 radiocarbon ages, categorized them, and with this information suggested that a world-wide disappearance of man and animals for a long period of time occurred about 5000 years ago. This disappearance was correlated with the Flood. Readers should consult Whitelaw's work on carbon-14 dating. Some serious defects in the current models of radioactive dating of rocks was presented by Clementson (1970, pp. 137-141). The assumption that radioactive disintegration commenced when the parent mineral entered the sedimentary rock was shown to be flawed. No realistic ages can be obtained from any of the methods.

General

In a detailed article surveying the scope and dogmatism of evolutionary teaching, John Moore (1970, pp. 105-116) offered constructive arguments against such practices. He explained that megaevolution (molecules-to-man) cannot be inferred from microevolution (variation). Most of the evolutionary teaching in this area amounts to brainwashing. The fossil record was discussed, noting that no transitional forms necessary for evolutionary development have been found. The impact of evolutionary thought on various fields of study was noted. The author concluded that megaevolution should not be taught in science courses. This article should be read by all who are interested in the extent of evolutionary presuppositions in all areas of human thought.

Interested creationists also can find many technical notes, book reviews and letters to the editor on various topics in this volume of the Quarterly.

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BAKED ROCKS

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Abstract

Metamorphic Rocks are either igneous or sedimentary rocks whose texture, composition or appearance has been altered by heat and/or pressure. This process is called metamorphism. Any one, or two or more characters may be affected. Examples of metamorphism are: limestone changed to marble, sandstone to quartzite, shale to argillite, and granite to gneiss. This article describes some metamorphic observations in Colorado. It is written as a field guide.

The Exposures in the Purgatoire Valley, Colorado

When leaving Trinidad, Colorado, via State Road 12, driving westward, one passes through the Purgatoire Valley toward the Sangre De Cristo Mountains. Along the way one encounters a series of formations dipping gently towards the east. However the dip is so gradual that the formations appear to be lying horizontally.

The pertinent generalized geologic section of this area is given in Table I. It shows the sequence as well as the nature of the formations encountered. Some consider the Apishapa shale and the Timpas limestone to be equivalent to the Niobrara formation of the Cretaceous period. This outcrops in Kansas and other adjacent areas west of the Missouri River. Furthermore, all of the Tertiary deposits in this area are often lumped together as part of the Raton formation.

As one proceeds westward up the valley, some formations are exposed in the canyon wall. The sequence listed is from the surface downward. The uppermost, at the city's western border, is the Pierre shale, followed by the Trinidad sandstone.

About three miles out of town, one can see the Trinidad-Vermejo contact on the right (north) wall. Then after traveling approximately another 5 miles, the first Vermejo-Raton contact can be seen in the railroad cut on the right (north). The Raton formation then can be followed for the next 25 miles.

About five miles out of town, coal seams begin to appear in the Raton formation (Figure 1). Unconformities and sandstone lenses (channels) also can be seen intruding into the Raton formation in the road cuts to the north.

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After traveling about 10 miles west of Trinidad, one can identify numerous channel sandstones in the Raton on the right. About 16 miles out of town, a basalt sill intruding into the coal seam can be observed in the road cut on the right (Figure 2). Since this intrudes into the coal, the coal has been baked and altered to natural coke. This phenomenon can be seen plainly when one examines the basalt and coal contact at close range. The cooling rate of the basalt must have been rapid enough to produce a fine-grain aphanitic texture. A slower cooling time would probably have resulted in a coarse grain phaneritic texture with possible phenocryst formation.

About 20 miles out of Trinidad there is a railroad crossing over the Colorado and Wyoming Railroad. This line runs from a connection with the Santa Fe in



Figure 1. The Raton formation: a coal seam is shown at the top.

Table I. Generalized Geologic Section

Unit	Age	Description
Alluvium	Q	Unconsolidated, heterogeneous gravel deposits of the Cuchara Creek drainage system.
Lower level alluvial deposits and upland valley flats.	Q	Fine grained, unconsolidated, alluvial sediments on pediment surfaces and upland valley flats.
Upper level gravel	Q	Heterogeneous unconsolidated sediments containing boulders as much as 25 cm. in diameter.
Cuchara sandstone	E	unconformity White to pink, medium to coarse grained sandstone (ss) and some conglomerate (cgl)
Poison Canyon formation (fm.)	E	unconformity Yellow micaceous shale, fine to coarse grained, yellow arkosic ss., becoming white to pink in middle part, and boulder cgl. in upper 800 m.
Raton fm.	E	Coal, etc.
Vermejo fm.	K	unconformity Medium grained, gray, arkosic ss. coal and gray to black carbonaceous shale
Trinidad fm.	K	Massive, medium-grained, yellow to gray ss. in upper half, becoming thin-bedded and containing shale breaks in lower half.
Pierre shale	K	Brown shale.
Apishapa shale	K	Thin-bedded gray calcareous shale.
Timpas limestone	K	Blue-gray limestone (ls.) shaly in upper levels.
Carlisle shale	K	Brown shale becoming blue-gray in middle part capped by medium-grained brown ss.
Greenhorn limestone	K	Thin-bedded blue-gray fine grained ls. containing <i>Inoceramus</i> fossils.
Graneros shale	K	Brown shale, gray towards base.
Dakota sandstone	K	Medium grained white to yellow ss.
Purgatoire fm.	K	Shale and ss. in the upper members, and ss. and cgl. in the lower members.
Morrison fm.	JR	unconformity Red and green shale and compact gray ls.
Sangre de Cristo	P	Red and maroon arkose and sandy shale.

Q—Quaternary K—Cretaceous E—Eocene P—Permian JR—Jurassic

Trinidad to the Allen Mine up the Purgatoire Valley. This mine is an operation of the Colorado Fuel and Iron Company located in Pueblo, Colorado.

About 53 miles out of town is the junction of State Road 12 and State Road 111. State Road 111 turns left into the Tercio Anticline, also known as the Whiskey Creek Anticline. State Road 12 continues east.

On State Road 12, about 54 miles beyond Trinidad, the road passes through a gap in what mistakenly might be considered a dike. However, close examination of the rock face reveals that instead of an igneous intrusion, it is a resistant member of the Dakota sandstone. This bed has been tilted 90° to form a vertical wall. Locally the community is known as Stone Wall, Colorado (Figure 3).

Shortly after passing through the gap, the road turns to the right, following along a nearly vertical wall



Figure 2. A basalt sill intruding into a coal seam.

composed of the Sangre de Cristo formation. The white sandstone found below the Dakota and Sangre de Cristo on the right is the Entrada sandstone. Ahead to the north is West Spanish Peak.

To the right is Monument Lake, named for the up-thrust rock in the body of the lake. When one turns right into Monument Lake Park and on the left (north) several basalt dikes intruding into the Pierre shale can be seen. The contact of basalt and shale is a layer of argillite. This is a metamorphic rock formed by the baking of the shale. This phenomenon will be found repeated at several places along the road. The dike

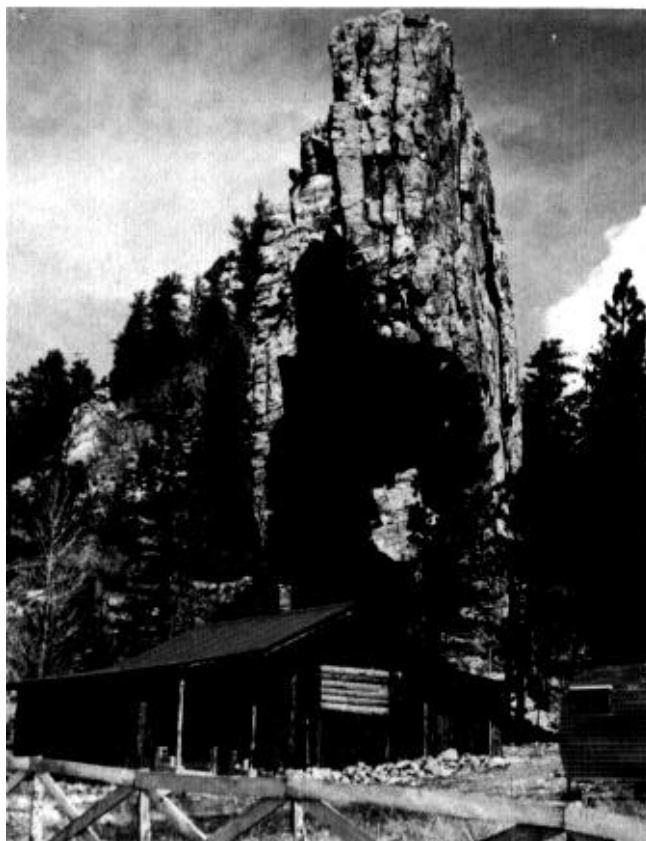


Figure 3. Vertical sandstone formation in Stonewall, Colorado.



Figure 4. Cobble formation.

that is the source of the baking has radiated out from the magma pool associated with the Spanish Peaks.

In numerous locations in this area, there is an interesting variation in the weathering of the basalt in several of the exposures. In some of the faces, the normal weathering of the face gives rise to some general debris which falls to the base of the exposure. However in others, a criss-cross pattern of vertical and horizontal fissures develops, that gives rise to a rounded type of cobble formation (Figure 4). The cobbles then fall to the base. General examination fails to reveal any obvious variation in the basalt.

Return to State Road 12. Turn right and continue north. Cross over Cuchara Pass and continue north along Colorado State Road 111. About 83 miles out of Trinidad, the feature known as Devil's Staircase is observed ahead to the north as a series of giant steps crossing the road. When alongside this feature, it is observed to be a large dike that extends almost to the road.

A few meters past the Devil's Staircase are what appear to be two dikes relatively close together. However, close examination will reveal that in reality these are two resistant sandstone ridges. Each has been metamorphosed from sandstone into quartzite by the heat of the intruding basalt dike in between them (Figure 5). The result is the superficial appearance of a pair of dikes that are close together. However, examination reveals that the material separating them is weathered basalt. The 'dikes' are actually metamorphosed sandstone! The appearance of the resultant

weathering indicates that the quartzite is more resistant than the basalt.

General Thoughts

The location of the basalt sill suggests that it is post-Raton time, given that the basalt intrudes into the Raton stratum. Certainly the picture of the basalt intrusion into a soft coal seam, metamorphosing the coal but leaving the seam otherwise in place is a bit challenging.

This whole area lies within the general vicinity of the Spanish Peaks. That is why this region provides a wealth of opportunities to study various volcanic features such as dikes, sills, and plugs, as well as other volcanic phenomena. Dikes are so plentiful that the term "dike swarms" is used to refer to them. Obviously in addition, the peaks themselves provide for a good



Figure 5. Basalt dike between quartzite dikes.

deal of fascinating study. The several weathering patterns associated with the argillite formation are also interesting.

The case of the double quartzite dikes in the vicinity of the Devil's Staircase demonstrates a need for caution in drawing conclusions from superficial appearances.

Although desolate country, particularly in the dry season, I have found it to be extremely fascinating and certainly worthy of detailed study. After leading classes there for some 12 years, I never tired of visiting the area. I had planned to return and do some detailed study after retirement. Unfortunately the opportunity never materialized.

When I was a boy I believed that 'Darwin discovered evolution' [but] in Keats, in Wagner's tetralogy, in Goethe, in Herder, the change to a new point of view had already taken place. Its growth can be traced far further back in Leibniz, Akenside, Kant, Maupertius, Diderot. Already in 1786, Robinet believed in an 'active principle' which overcomes brute matter, and *la progression n'est pas finie*. For him, as for Bergson or de Chardin, the 'gates of the future are wide open.' The demand for a developing world—a demand obviously in harmony with the revolutionary and the romantic temper grows up first; when it is full grown the scientists go to work and discover the evidence on which our belief in that sort of universe would now be held to rest. There is no question here of the old Model's being shattered by the inrush of new phenomena. The truth would seem to be the reverse; that when changes in the human mind produce a sufficient disrelish of the old Model and a sufficient hankering for some new one, phenomena to support that new one will obediently turn up. I do not mean at all that these new phenomena are illusory. Nature has all sorts of phenomena in stock and can suit many different tastes.

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ISOTOPE RATIOS AND VARIABLE CONSTANTS**

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Abstract

Evidences and possible mechanisms for variable nuclear half-lives are explored. The basis for the definition of physical constants is examined.

Feedback Mechanism

The uncertainty of past rates of radioactive decay suggests the need for a rethinking of today's physical theories, especially the controversy between ether theories and the atomistic approach to matter and fields. By this I refer to the different mental concepts or pictures of fields possessing wave characteristics and the quanta or particles which compose the field. I think that there are attractive arguments on both sides of this controversy. The implications of the experiments of Alain Aspect performed in Paris (Fry, 1984), which show the reality of non-local correlations, do not seem to have been fully explored in this context. This is important because it shows that radiation phenomena, and in particular radioactivity, are not "one-way-street" schemes. They are in reality feedback schemes. This means that mother and daughter nuclides are still in connection after separation and that the energy aspects involved may play a part also. Further it seems to say that radioactivity is "coordinated," not simply a "stochastic" or "random" process, but embedded in a larger structured, energetic environment. This aspect may hold some surprise in the future for the problem of accelerated, historical radioactive decay.

Variable Radioactive Decay

The creationist models for variable radioactive decay so far offered include: variance of permittivity, permeability, and a strong perturbation of the nucleus. It is known that some isomers remain in an excited state for a fairly long time, and that while in the excited state they have different decay rates for the alpha decay mode, for instance certain Polonium isotopes such as Po-212. It is well known that many alpha-emitters end in several distinct energy levels. The "alpha-branching ratios" show the different energies of emission involved. This implies that an alpha emitter decays under different half-lives (partial half-life) simultaneously. The half-life is the time that would be required for one half of an initial number of radioactive atoms to decay. A partial half-life is based on the fraction of the total number of atoms that decay in a given mode per unit time. For instance, U-238 decays with two different alpha decay modes: 4.182 MeV (million electron volts) radiation with 77% of the decaying U-238 nuclides involved and 4.135 MeV with 23% of the decaying U-238 nuclides involved. Likewise, U-234, a later daughter of U-238, decays according to six different energy levels of alpha particles and there-

fore six different partial half-lives: 4.768, 4.717, and 4.60 MeV (and three further levels of very low percentage). The percentages corresponding to these levels are about 72%, 28%, and 0.3%. It is evident that U-238 and U-234 can emit alpha particles with different partial half-lives or energy levels. Pu-238, seemingly a very similar nuclide to U-238, has a half-life of less than 90 years, while U-238 is about 4.5 billion years. Both are even-even nuclides (that is, the numbers of both protons and neutrons are even) but differ enormously in their half-lives. The Pu-238 has two extra protons and hence extra Coulomb repulsion inside the nucleus. But the extra Coulomb energy is a small fraction of the nuclear binding energy. Hence this example shows that a very small change in permittivity, permeability, or some other parameter may drastically change the half-life of U-238 and U-234 also. The energy level structure of the nucleus changes with the Coulomb field. Hence a change of the order of a thousand electron volts can result in significant change in half-lives due to the shift in relative importance of these different decay modes.

Concepts concerning the theory of alpha decay were already worked out in the first half of this century, for instance by E. C. Kemble (1937) and F. Rasetti (1936). Time dependent wave functions were constructed for the emission of alpha particles, together with the Coulomb force and other parameters involved. References for the above partial half-lives, energy levels and further work on alpha decay may be found in Preston (1975).

Tunneling Effects

One must not overlook the possibility that there may exist appropriate mechanisms which couple to "tunneling" effects or to the fields of neutrinos or other exotic particles. But certain facts must be taken into account; for example the existence of the same isotope ratios (U-238:U-235 = 137.8:1, approximately) in moon rocks and earth rocks. The fact that these isotope ratios are the same indicates that if the decay rates varied, the change occurred in the same manner on the moon as on the earth. The effect of such variations on the diameters of Gentry's halos (Gentry 1988) is not an obstacle. It is mainly the later very short lived daughter nuclei that shape the halo, since the later decays have higher energy. Also, the time of increased decay rates may have been during the Genesis Flood, and halos may not have been produced at that time. The time of the Flood would seem likely since it was a time of judgment and destruction, hence also decay. For example, in Deuteronomy 8:4 and 29:5 God reminded the people that in the desert their shoes or sandals as well as their clothes did not decay. So decay is connected with destruction and judgment. Genetically related isotopes are isotopes for which one decays into an-

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**Editor's Note: Readers interested in the subject of variable constants should consult the following articles in the minisymposium on that topic: CRSQ 26:121-131; 27:6-15, 60-72, 98-105. A complete list of references is included in many of the papers.

other. Experiments show that the separation of genetically related uranium isotopes on passage into solution is not dependent on uranium oxidation but is only a consequence of excess recoil atoms in metamict minerals. Metamict minerals are radioactive minerals exhibiting lattice destruction due to radiation damage while the original external morphology is retained. When radioactive atoms decay the parent nucleus recoils, so in metamict minerals there will consequently be many sites where recoil nuclei have been deposited. Because U-234 is preferentially leached in rocks, this provides evidence that U-234 decayed within these rocks (Chalov and Merkulova, 1968). To achieve the radioactive equilibrium between U-238 and U-234 observed in closed systems today would take about 6 to 10 half lives of the shorter lived U-234, that is, 6 to 10 times 245,000 years. This indicates to a young earth creationist that decay rates may well have varied.

Variable Constants

I conclude that most "constants" are not constant at all. This includes the gravitational constant, permittivity, permeability, and Planck's constant. The notion that these are "constants" seems to be a product of the misunderstanding of the underlying facts. Therefore, Dirac's and van Flandern's suggestions that the gravitational constant may have varied with the passage of time are not necessary. By this I mean that theories such as Dirac's (1973) could turn out to be wrong and there could still be a basis for variable constants. There seems to be much confusion about permittivity and permeability. Let it be understood that it was James Clerk Maxwell himself who invented these "constants" solely to give his equations symmetry with respect to magnetism and electricity. It seems to be forgotten that Maxwell's equations are nothing but definition-equations, somewhat similar to Einstein's definition of the velocity of light in his equations as a constant and the maximum possible speed. Maxwell further assumed the time-independence of both of the "constants" he invented, namely the dielectric constant defining permittivity and the magnetic constant defining permeability of the vacuum. According to modern physics the vacuum is not a void but is filled with virtual particles. Maxwell introduced these defining equations to explain his ether concept that conformed to the wave equation. Maxwell required that either

$$\epsilon_0 = 1 \mu_0 = c^{-2}, \text{ or } \mu_0 = 1 \epsilon_0 = c^{-2}$$

Here ϵ_0 is the permittivity of free space, μ_0 is the permeability of free space, and c is the speed of light in vacuum.

Nobody knows what the dielectric constant defining permittivity, or the constant of permeability are in reality, i.e. what their underlying nature is, independent of Maxwell's equations. The only thing we know is how both perform in a *medium*, nothing more. The reference frame for these constants, the vacuum, is also a medium. But even there the meaning is only by definition, not what these constants are in reality. Further, it can be shown that the permeability of free space is a velocity dependent quantity in the Maxwell equations.

Similar arguments show that all other natural constants are not really inherent constants, but were made by arbitrary selection, for instance, Planck's "h" and the gravitational constant.

Accelerated Neutron Fluxes

Melvin A. Cook long ago reported findings concerning fast neutrons in Uranium/lead ores (Cook 1966, 1968). The neutron flux must have been a *million* times larger than at present. Cook did not find an answer as to where the many neutrons came from to explain his lead ratio models. It can be said with confidence, however, that Cook's ratios *demand* accelerated decay in the past. Cook gave many convincing calculations that can only be explained by an extremely high flux of fast neutrons in the past in these ores. These abnormally high neutron fluences (fluence is the integration over time of the total neutron flux) are found mainly in uranium ores. Interestingly, xenon, gadolinium, krypton, etc. may have also been affected according to Kuroda's isotope models (1982). This provides evidence that the fast neutrons were produced by much faster decay rates (of U-235 and U-238 for instance) in the past. A further fact to be considered is that faster decay rates in the past would have to decelerate in such a manner that equilibrium between mother and daughter could be achieved in a short time span, i.e. within the approximate 4500 years since the Flood. Today's values for half-lives are 4.468 billion years and 245 thousand years for U-238 and U-234. The past, faster decay rates had to remain in such a mutual relation (U-238/U-234) that U-234 decay had enough time (4500 years) to establish radioactive equilibrium between these nuclides by the present date, in closed mineral systems. That is, the present day isotope ratio of U-234 to U-238 is about 1 to 20,000, and the half-life ratio of U-234 to U-238 would have to vary in such a way that this final abundance ratio would result. It is not easy to construct such a mechanism for reducing the decay rate in this way. But I think that the problem can finally be solved. Perhaps a smooth fading of a varying vacuum energy or some similar possibility should be investigated.

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DIVIDING THE EARTH*

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Abstract

A new theory of continental separation is introduced in which it is advocated that rapid division of a proto-continent occurred by the impact of a giant meteorite east of what is now called Tanzania.

Introduction

If we pass by a car whose front end is crushed against a bridge abutment, with skid marks behind the wheels, we assume we are observing the result of a high-speed collision. If someone were to say that the car had slowly inched its way into the abutment over a period of months, and continued to move forward imperceptibly even now, we would probably laugh. Yet this way of thinking is foundational to current continental drift theories. There are good reasons to believe that the continents suffered the same fate as our crashed car. In this article I will present the case for rapid continental separation and mountain building as a result of a giant meteorite impact, and will propose a specific location for the impact.***

Meteorite impact theories that postulate global climate changes, mass extinctions, and even some localized acceleration of continental drift (Hartnady, 1986, p. 426; Northrup, 1987, pp. 126-127), are in vogue. However, I take the idea one or two levels of magnitude higher.

Forces of Continental Movement

The difference, of course, between cars and continents in motion is that we are used to seeing cars moving at high speeds, whereas continents appear to be stationary, and indeed were long thought to be unmoved since their origin, though subject to reformational forces over time (Skinner, 1986, p. 406). Even when evidence for plate motion became generally accepted, it was made to fit the gradualistic concepts of uniformitarianism. But creationists have no stake in invoking gradual change over hundreds of millions of years the way evolutionists and other uniformitarian geologists do. Special creation, a catastrophic Flood, a catastrophic division of the surface of the Earth—all are acceptable intellectually within the time frame of Genesis, provided the evidence is there. What evidence is there for an impact?

Globally, lateral compression appears to have been critical to the raising of mountain ranges. Whether they are Andean-type or collisional mountain ranges (Keary and Vine, 1990, p. 180), and whatever maybe the complicating factors in the process (Artushkov,

et al., 1980, pp. 44-45; Keary and Vine, 1990, pp. 186-188; Miyashiro, et al., 1982, p. 95), at this stage in our understanding of orogeny it seems clear that

evidence of vertical motions is abundant in the geological record, but it cannot explain certain features—especially the existence of mountain ranges, for which lateral forces seem to be required. Geological mapping in ranges such as the Alps reveals evidence of large-scale lateral compression. Once-flat strata can be seen to be folded and thrust sideways. Vertical motions alone cannot build mountains (Skinner, 1986, p. 406).

Assuming that the lateral compression resulted from the movement of the land masses against an unyielding ocean floor or against other land masses, lateral compression would occur along the leading edge of the moving land masses, the front end of our crash car.

If the compressed side of a land mass was the leading edge during movement, then we should be able to trace its path of travel back from the trailing edge. On the trailing side of the land masses, the direction of movement is shown by the position of mid-ocean ridges and the lines of transform faults. Between each land mass and its point of origin should be an oceanic rift perpendicular to the direction the land mass moved. An experiment conducted by Oldenburg and Brune of the University of California at La Jolla in the early 1970's produced the patterns seen at and on either side of the mid-ocean ridges on the ocean floor. A fan cooled a pan of molten paraffin as a paddle embedded in the middle of the paraffin was drawn toward one edge of the pan. The paraffin formed the ridge and transform fault pattern characteristic of mid-ocean rifts (Sullivan, 1974, p. 115). Note that the rift zone is where the oceanic crust has been *pulled* apart, presumably by the moving land masses. Material welling up in the rift valley did not *push* the oceanic floor apart. In each case it is apparent that North and South America, Antarctica, Australia, and India travelled in essentially straight lines to the positions they occupy today.

Since we can determine the direction of movement, Figure 1, we can trace the land masses back to their pre-separation positions. Note that the direction arrows emanate from a single point in the vicinity of the Aldabra Islands. It is at this point, the only point from which all the moving continents fled, that we find a very large crater-like feature.

Dr. William F. Haxby of the Lamont-Doherty Geological Observatory has produced extraordinary maps of the ocean floor by using data recorded by the SEASAT altimeter, which measured variations in ocean surface levels (Canby, 1983, pp. 282-283). Haxby's maps turn out to be more revealing than standard ship-gathered bathymetric maps because they "see

*Editor's Note: This article is a follow-up to the 1987 Minisymposium on Orogeny that took place in Volume 24, Numbers 1-3 of CRSQ.

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***Readers interested in this topic may wish to consult other CRSQ articles on the subject: Unfred, D. W. 1984. Asteroidal impacts and the Flood-Judgment CRSQ 21:82-87; 1986. Flood and post-Flood geodynamics—an expanded earth model. CRSQ 22:171-179; Parks, W. S. 1990. The role of meteorites in a creationist cosmology. CRSQ 26:144-146. (More references on this topic are given in the latter article.)

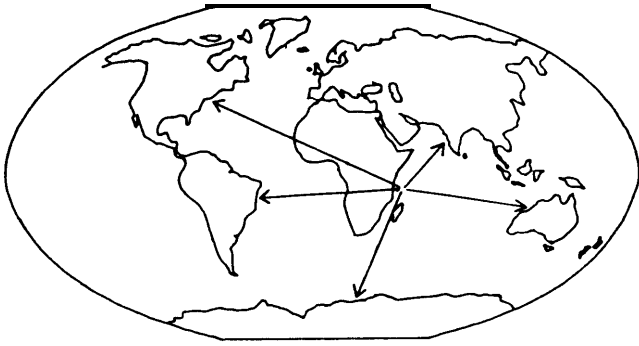


Figure 1. Arrows indicate the directions the continents moved.

through" less dense sediments covering the ocean floor (which have less gravitational influence) that tend to obscure many features (Bartusiak, 1984, pp. 80-85). Figure 2 is a sketch of the crater as shown on one of Haxby's maps. It is roughly 200 miles in diameter, with a cone rising near the center. The east-southeast-south rim of the crater is conspicuously raised, and from it three prominent splash arms extend. Beyond these arms, and concentric with the crater is an island arc, which is touched by the northern tip of Madagascar. *There is nothing remotely similar anywhere else on the ocean floor.* Anyone interested can see it for themselves in a photograph of such a map (Canby, 1983, pp. 282-283). Figure 3 is a reconstruction of the protocontinent before separation, with an X marking the point where the giant meteorite subsequently hit.

Meteorite Collision

What appears to have happened? A giant meteorite slammed into the protocontinent at a point considerably off-center. I propose that the giant meteorite, unlike smaller, non-penetrating meteorites that form craters by blowing material out and up (Shoemaker, 1960, p. 425), vaporized everything at ground zero and penetrated the crust, leaving behind a 200 mile-wide hole. The subsequent subterranean explosion can be compared to the impact of a high velocity projectile, which makes a small hole upon entry, but soon begins to compress the material in front of it. The region of

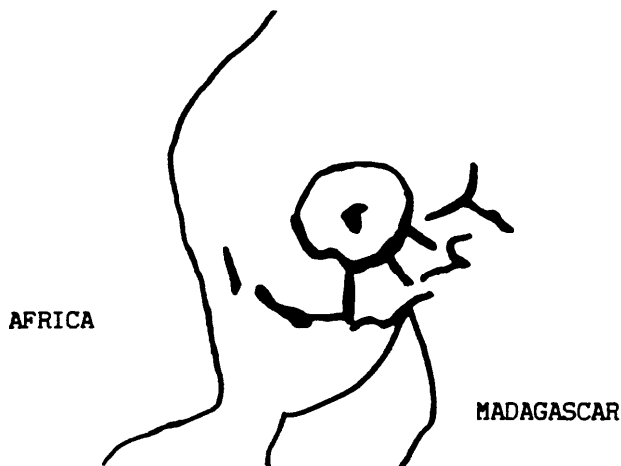


Figure 2. Sketch of the impact area made from Haxby's SEASAT map showing crater, raised rim, splash arms, and island arc.

compression moves away as a stress wave of spherical form. This results in cavitation, Figure 4, which can be temporary or permanent, depending on the material being penetrated. Cavitation takes place mainly after the passage of the projectile, and accounts for the explosive nature of high velocity penetrations (Farrar and Leeming, 1983, p. 163).

This explosion deep in the crust unleashed a series of events which must be tracked individually. Relating the motion of the continents following the impact is like describing what happens to each fragment of glass when a rock crashes through a window. It is best done visually with a motion picture or series of snapshots. But the following brief verbal descriptions can convey the general idea.

The narrow strip of land east of the impact (Australia, India) blew away unimpeded. To the west, where the bulk of the protocontinent lay, it was a different story. Just as a line of adjacent billiard balls transmits a blow on the first ball in line through the central balls to the outermost ball, causing it to move away, Africa and Madagascar transmitted the force to the Americas and Antarctica, respectively. But as it did, East Africa buckled to form the East African rift system, with a double rift and considerable vulcanism directly opposite the impact site, in the vicinity of Lake Victoria. The Horn of Africa was forced westward about 250 miles, raising land (including Djibouti) and mountains in Ethiopia.

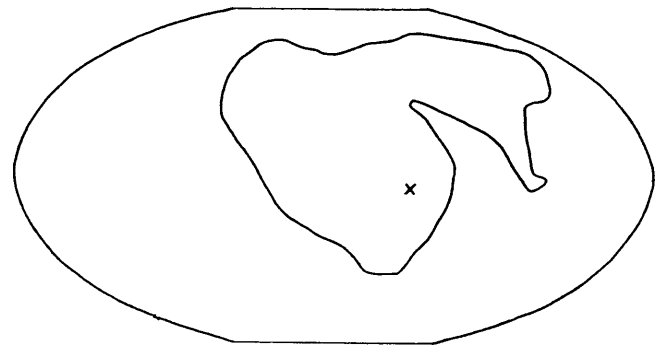


Figure 3. Author's reconstruction of the protocontinent. The "X" marks the impact point.

Australia was flung eastward from the impact site. It collided with a peninsula extending below Asia and splintered it into islands while raising low mountains in Australia's center. Rolling away, Australia finally ground to a halt, raising mountains on its eastern edge.

India was thrown out with great force, but rammed into Asia after having travelled only a short distance. The remaining momentum, and hence the mountain building, was obviously tremendous. As India punched inward, China was made to pivot clockwise on a point near northern Burma. Land was compressed into vast mountain chains. The collision forced the rest of Asia to move north, pivoting on Turkey (forcing Europe south, as on a seesaw and raising the Urals), leaving Japan behind, dragging the Kamchatka peninsula, and, in a "crack the whip" motion, spinning Alaska eastward until it collided with North America which was moving westward. Note that the secondary collision effects are small relative to the movement of the continents hit directly by the initial shock of the meteorite impact.

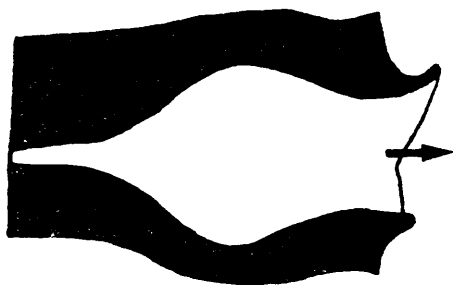


Figure 4. Cavity produced by a high-velocity steel sphere in a soap block. Tracing from a photograph (Farrar and Leeming, 1983, p. 185).

North America moved smoothly westward, the push raising the Appalachian Mountains, then began shedding pieces from its northern and southern regions, then ground to a halt, forming vast mountain chains along its leading edge and fractures in the crust ahead of it. Simultaneously it collided with Alaska which was spinning off of Asia. Europe was drawn out as North America separated, then forced down again toward Africa by the turning of EurAsia.

South America moved away from Africa in unison with North America and Antarctica, the push raising low mountains in the eastern region. Antarctica rotated slightly counterclockwise as it moved, South America clockwise. Again the continents ground to a halt, forming mountains on their leading edges.

Crustal Deformation

That the crustal deformation was the result of an impulse event rather than steady motion over a long period of time is suggested by a combination of observations:

1) The continental journeys had a beginning, middle, and end. Great distances were crossed quite smoothly. Moving land masses appear to have experienced dramatically increased friction as they neared the end of their runs. As the braking began along the edges, "skid marks" in the form of gouged trenches and island trails were laid. These include the Kuril Islands and Trench, the Aleutian Islands and Trench, the Sunda Island and Java Trench, the Diamantina Fracture Zone, islands of the West Indies and the Puerto Rico and Cayman Trenches, and the Scotia Ridge and South Sandwich Trench.

2) As they moved, some land masses unfolded (southern South America, Antarctica, Central America), collided and changed direction (Australia), and rotated, at least slightly (Alaska, North and South America, Antarctica, India, Australia), displaying the effects of tugging by neighboring attached land masses, glancing collision, and an imbalance of force applied to one side of a land mass' center of gravity, respectively.

3) Land masses were crushed only partially. If our car had hit the bridge abutment at, say, 1000 mph rather than at typical road speed, or was slowly and steadily being forced against it over a long period of time, the entire car would be crushed like an accordion, not just the front end. In every case, the land masses sustained limited damage regardless of the distance traveled. This suggests that force was applied in a limited amount over a limited period of time; that is, an impulse force.

Time of Impact

When did all this occur?

It is clear that the vast, marine Paleozoic series was deposited by the Noahic Flood *before* the uplift of these great mountains [of North and South America and the Alps]. Broken remnants of those marine deposits are lifted and tilted, shattered and even left as pendant formations high in these mountains. The mountain uplift which produced all of the world's great mountains is a post-Noahic Flood phenomenon (Northrup, 1988, p. 105).

This would mean that, in addition to having a much lower landscape to cover with the Flood waters, when the Ark landed, Ararat was not yet in the middle of mountains that stretch for hundreds of miles in all directions. Surely these mountains would have posed a serious obstacle to many of the creatures exiting the Ark. It is tempting to further narrow the estimate of when the impact occurred by placing it in the days of Peleg, based on Genesis 10:25, hundreds of years after the Noahic Flood.

Today we are left with the hardened remains of a very fluid event. Zones where rapid upwelling and subduction occurred are now weak points in the crust and foci for earthquakes as the geoid is jostled by the gravitational pull of its neighbors and other forces. A stream runs in the bottom of the Grand Canyon, but that does not mean the stream cut the canyon. Our crashed car creaks and shakes as it is buffeted by the wind, but the crash itself has long since occurred. Very slight shifting of plates has been detected, and there are earthquakes and volcanic eruptions, but that is not the process of continental separation.

Summary and Necessary Questions

This article is intended only to introduce a new theory. At the same time that it demonstrates what may have happened, it raises many questions that must be dealt with in future discussions. Among these are what was the nature of the underlying strata that allowed the continents to move, and how did it change? What would have been the effects on Earth's rate of rotation, wobble, magnetic field, and climate? At what speeds did the land masses actually move? Just how big was the meteorite? Did the famous iridium deposition at the Cretaceous-Tertiary boundary come from this impact? If it did, it presents the interesting possibility that the layers above that boundary, and a mass extinction (on a lesser scale than the Noahic Flood), may have been the result of cataclysmic wave action and flooding caused by the rapidly moving land masses.

Combining mass and speed, meteorites are the artillery of outer space. They have scarred and perhaps tilted or shattered moons and planets in our solar system. It is not unreasonable to consider that a giant meteorite reshaped the surface of the Earth into what we see today.

Acknowledgment

The author is sincerely grateful to Dr. George F. Howe for his interest in and support of this work through his provision of source material, helpful remarks, and editorial assistance, and for reopening his Mini-Symposium on Orogeny.

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BOOK REVIEWS

Origins: What Is At Stake? by Wilbert H. Rusch, Sr. 1991. Creation Research Society Books, Kansas City, MO. 73 pages. \$8.95.

Reviewed by George F. Howe*

In the introduction of *Origins: What Is At Stake?* (OWIAS) Joanne Rusch (the author's daughter, who is a systems architect and a mother) asserts that macroevolutionism is just a theory and that creationism deserves a place in education and in the home. In his own preface the author, one of the founders of CRS, tells that in OWIAS he deals with theology as well as science so that the book will have greater value to Christians who study origins.

In one major section, pp. 6-19, Rusch selects 10 terms and phrases commonly encountered in origins discussions. For each of these he provides clear definition and quotations which support and amplify the definitions.

In a chapter which bears part of the book's title (*What Is At Stake?*, pp. 20-28) the author explores six aspects of Biblical theology and affirms that each one is undercut if an individual rejects or mutates Biblical creationism: 1) the doctrine of God; 2) the doctrine of the Holy Scriptures; 3) the concept of miracles; 4) the nature of man; 5) the doctrine of original sin, and 6) the historicity of the Genesis Flood. Rusch declares that all of these are placed in question "If a modern liberal approach to the Scriptures . . . is taken . . ." (p. 20). He proposes that if creationism is replaced by theistic macroevolutionism, the entire basis of Christian faith is at stake.

Pages 20-32 of OWIAS contain a lucid discussion of three geological "oddities" that Rusch, a geologist, views as serious problems confronting macroevolutionists and all other uniformitarians: cyclothems, polystrate tree trunk fossils, and amber deposits containing fossil insect remains as well as plant parts. This section includes some quotations from the man who studied these massive amber deposits in exquisite detail: Herbert Nilsson.

In a unit entitled "Philip H. Gosse and Navels" (pp. 42-45) the author reasons that many diverse natural phenomena would have manifested "apparent age" immediately after creation. Here Rusch explains why he believes it is folly for any individual who accepts redemption by Christ to turn around and reject creation.

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By way of "Some Concluding Thoughts" (pp. 52-54), the author notes that

... the question of origins is really a philosophical question outside the domain of science . . . and that . . . the high school level student receives a biased, utterly one-sided view of this whole question . . . (p. 54).

He reiterates the hope that Christians will not accommodate the doctrines of the Church to macroevolution.

As in his previous book *The Argument*, available from CRS Books, at the end of OWIAS Rusch treats his readers to an updated array of appendices covering the taxonomic hierarchy, the geological column, creation references in Scripture, an annotated reading list, and a battery of colorful quotations. There is also a descriptive history of the Creation Research Society and the author's view of debates. The last two pages are an index.

As a teaching tool, OWIAS will certainly be a useful companion volume to *The Argument*. It should be read by all Christians who have abandoned creationism or are thinking of doing so, perhaps many of these will reject macroevolutionism after scrutinizing Rusch's reasonings and warnings. OWIAS should also be studied by faithful creationists so they will realize how fully their origins view rests not on science alone but also on the "holy ground" of an absolutely inerrant Bible, as proposed by Bill Rusch. The breadth of topics covered, the winsome writing style, the balanced mix of science and Scripture, and the modest price make *Origins: What Is At Stake?* an ideal book to own and to use as a gift.

"Vestigial Organs" Are Fully Functional (A History and Evaluation of the Vestigial Organ Origins Concept) by Jerry Bergman and George Howe. 1990. Creation Research Society Monograph Series: No. 4. Creation Research Society Books, Kansas City, MO. 95 pages. Paperback, \$10.95.

Reviewed by John R. Meyer*

The expedition of Lewis and Clark in 1804-1806 would seem to have little to do with the creation/evolution controversy and the problem of vestigial organs. Yet, an incident during that epic exploration serves to illustrate one of the problems in attempting

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to support evolutionary theory with the vestigial organ argument. On about August 19, 1804 Sergeant Charles Floyd, a member of the expedition, was buried on a grassy knoll near where the Sioux River enters the Missouri. Of the more than 40 adventurers on the two-year expedition into unknown rugged Indian country, Floyd was the only casualty. The cause of death was not Indian or grizzly bear attack, starvation or drowning. It was appendicitis.

Before the advent of modern surgical techniques and antibiotics, appendicitis was a life threatening affair and a ruptured appendix meant almost certain death due to peritonitis. A very significant number of people previously died in this manner. If the appendix is, in fact, a vestigial organ, a useless derelict from a previous evolutionary ancestry, the selective pressure against such a troublesome atavistic organ should be enormous as the case of Sergeant Floyd illustrates. Such supposedly defective and dangerous structures should have been eliminated long ago from the human genome. That is, unless the human species is of very recent origin, or the appendix is a useful organ, or both.

For nearly 150 years the argument for evolution based on vestigial organs has been used as a cudgel in an attempt to verbally beat special creationists into conformity with one form or another of evolutionary philosophy. It is still a popular argument in evolutionary polemics often found in high school and college texts and advanced treatises on evolution. The time has come for a detailed and scholarly refutation of the vestigial organ argument. The book, *"Vestigial Organs" Are Fully Functional* meets this need admirably. The authors are experienced writers and have assembled by far the best refutation to date of the vestigial organ scenario.

The authors first address the subject by a discussion which demonstrates the importance which evolutionists attach to this subject and the decisive blow which they feel it deals to special creation. For example they note that "historically, vestigial organs were considered one of the most important evidences demanding mega-evolution" (p. 1). The authors note the important role which this philosophy played in Darwin's thought and point out that in 1895 Wiedersheim claimed 185 rudimentary structures in man alone. A number of examples of contemporary appeals to the vestigial organ scenario are provided to demonstrate the current extensive reliance of evolutionists on this line of supposed evidence.

The authors review a number of evolutionary explanations for the supposed existence of vestigial organs. These include the argument of dysteleology (bad design), loss mutations, negative allometry, panmixia, reversal of selection, and the "law" of material compensation. These are all shown to be impotent explanations. Apparently the real reason so much was made of vestigial organs was that they were thought to be an embarrassment to creationists and thus the arguments were highly prized.

In reality, a creationist would have no problem fitting vestigial organs into the creationist model *if they could be found*. Bergman and Howe note that:

There is nothing in the design model, however, which would conflict with the presence of some vestigial organs. The existence of a vestigial organ

would support the belief that some highly functional structure had undergone changes by which it became less functional or even useless. These data would be accommodated easily in the design model as evidence that degenerative changes have occurred since the time of creation. The presence of vestigial organs would support only de-evolution: they would not refute design (p. 8).

In this reviewer's experience of more than 30 years of studying, teaching, and research on mammalian systems I have never once encountered a single cell, tissue, organ or organ system that in any way could reasonably be defined as vestigial. In physiology one looks for and expects, function. The carotid body, which I studied for eight years, was until nearly 1940 thought to be a vestigial organ. For nearly a half century, research on this organ was delayed because of evolutionary presuppositions. It is now known to function as the only peripheral sensor of circulatory oxygen tension. Located at the bifurcation of the internal and external carotid artery and exhibiting the highest blood flow per gram of tissue of any organ in the body, it is ideally situated and designed to fulfill its function. It is rarely needed in a normal healthy human but provides significant drive to the respiratory control center of the brain for persons whose peripheral blood oxygen is at dangerously low level, as for example in chronic obstructive lung disease. This "vestigial organ," rather than being an atavistic throwback to some sub-human ancestor where it previously enhanced survival of the fittest has now been demonstrated to be an integral part of the respiratory control system which is called upon by the sick and elderly to help insure survival of the "least fit."

The second part of the book deals with functions of specific organs still believed to be useless vestiges. This list included the coccyx, human hair, tonsils and adenoids, appendix, pineal gland, nictitating membrane of the eye, Darwin's point on the ear, male nipples, spurs on snakes, hip bones of whales, horse splint bones, and blind cave fish. Of particular interest is the authors' discussion of the supposed tail on human embryos and the birth of an infant with a supposed tail. The latter was reported in the prestigious *New England Journal of Medicine* (Ledley, F. D. 1982) and produced great interest. Bergman and Howe report, however, that the appendage was 1.5 cm to the right of the midline and contained no boney structures. The highly touted "human tail" was in reality nothing more than a dermal (skin) appendage resulting from an abnormal developmental process. Such dermal flaps are rare but may appear on many different parts of the body. This one happened to be positioned such that it only very superficially resembled a tail. There was thus not the slightest evidence that it was genetically induced and to give it attributes of a vestigial organ was clearly inexcusable.

The book closes with the following conclusion:

Since virtually all of the so-called vestigial organs are shown to have functions, macroevolutionists can no longer credibly claim that evolution is the only origins model that will accommodate these scientific data. Individuals who are not fully indoctrinated with evolutionary philosophy will be

able to see that all body organs function harmoniously. Dispelling the concept of vestigial organs allows the Creator's work in biology to be viewed scientifically as neither evolutionary, defective, nor capricious, but as evidence for His handiwork and design (p. 85).

This book is highly recommended. It should be considered as essential reading for anyone who has a serious interest in the biological aspects of origins. It is well written and will make an ideal book to give to a committed evolutionist regardless of academic level. The 12-page bibliography makes the work highly significant as a starting place for more detailed studies into the history and philosophy of the last 150 years of biological science. This work deserves the widest possible circulation.

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Darwin on Trial by Phillip E. Johnson. 1991. Regnery Gateway. Washington, D.C. 195 pages. \$19.95.

Reviewed by Wayne Frair*

Berkeley law professor P. E. Johnson demonstrates how Darwinists generally define evolution as a "fact"—Johnson prefers the term "hypothesis"—but do not subject their concept to critical evaluation. Johnson identifies himself in chapter one as a theist and Christian, but he is negatively wary of creation-science and Biblical fundamentalism. Effectively Johnson is most strongly opposed to the divorce of "science" and "theism" as commonly reflected in naturalistic evolutionary teaching. "Make no mistake about it," he says, "in the Darwinist view, which is the official view of mainstream science, God has nothing to do with evolution" (p. 114).

Evolutionists are viewed as vigilantes demanding unconditional surrender to a mechanistic understanding of the universe. As evidence that evolutionists have their own atheistic metaphysical system he cites recent events in California and the strong negative reaction of the evolutionary establishment to an American Scientific Affiliation booklet mainly because it raises questions about naturalistic (chance) understandings of origins.

Johnson has a comprehensive grasp of the main issues involving science and religion, and he effectively covers the main evolutionary considerations—natural selection, mutations, fossils, molecules, and abiogenesis along with some legal matters. Observational data from nature generally are to be understood as not supportive of large scale evolution (macroevolution). For example, he says, "... the outstanding characteristic of the fossil record is the absence of evidence for evolution" (p. 50).

There are some footnotes at the bottom of pages and following about 150 pages of text are 34 pages of "Research Notes" containing further comments and references (books usually without publishers). Then there follows a seven-page index of subjects and personages. Literature referred to in the book generally

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is by authorities respected within the evolution community, thus adding to the potential impact of the publication upon scientists.

I have not found major deficiencies in the work, but there are some minor matters deserving mention. For example in chapter seven dealing with "The Molecular Evidences" it says that this evidence never has been evaluated without Darwinist bias. This is only partially true because the late Dr. Alan Boyden who was my Ph.D. advisor and a leader in this field from the 1930's into the 1960's took a dim view of extrapolating from microevolution to macroevolution (Boyden, 1973). My own research in this field always has been done using a creationist perspective (Frair, 1991).

In the fossil chapter Johnson repeats the common misconception that the famous nineteenth century French scientist, Cuvier, believed there were "periods of creation" following catastrophes as observed in the geological record. Indeed Cuvier held to fixity (immutability) of species, but he thought that recolonization after catastrophes occurred as a result of organisms coming from other regions. Even though Cuvier did not promote the view that there were *creations* after the catastrophes, some of his students did.

On the whole Johnson's is a powerful work. Johnson has been influenced by Michael Denton's book *Evolution: A Theory in Crisis* (Denton, 1986). I feel very strongly that both Denton's book and now Johnson's *Darwin on Trial* should be required reading for all serious students of origins.

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Frair, Wayne. 1991. Original kinds and turtle phylogeny. *CRSQ* 28(1):21-24.

The Big Bang Never Happened by Eric J. Lerner. 1991. Random House. New York. 466 pages. \$21.95.

Reviewed by Danny R. Faulkner*

This popular-level book has a very catchy title, one that is sure to pique the interest of anyone familiar with the Big Bang cosmology. This is especially true of special creationists, who largely dismiss the Big Bang, primarily because of the vast age that the model requires for the universe, as well as the lack of involvement of a personal deity. Such a title holds much promise, but this book will fail to satisfy most readers. True, the first chapter is devoted to inadequacies of the Big Bang model especially when compared with observations, but all of this is already documented and is well known to those presently opposing the model.

Over half the book is about sociology: the author traces the history of civilization and attempts to establish a correlation between economic practices (slavery versus free labor, free trade, etc.) and the scientific philosophy and the prevalent cosmology of various societies. There is much here for just about everyone to disagree with, and at points the analysis is a bit sloppy. For instance, at one point Lerner states that

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the standard of living of the world and even in the industrial countries has declined across the board since 1973. Besides his implication that this is because of the preeminence of the Big Bang cosmology today, one has to question the methods and definitions used to arrive at the conclusion about the declining living standards. Many would disagree that the standard of living of this country has declined over the past decade. His main theme is that periods of time dominated by limited, finite cosmologies have led to economic, technological, and philosophical stagnation, while times in which infinite cosmologies are popular have been marked by progress.

Most of the rest of the book expounds an alternate cosmology, one that was first proposed by the famous plasma physicist Hannes Alfvén. Astronomers generally assume that the dominant force in the universe is gravity, while relegating electric and magnetic forces to very minor roles. Lerner notes that plasma effects are demonstrably important in the laboratory and in the solar system, but that plasma physics is largely ignored by extragalactic astronomers and cosmologists. He goes so far as to compare this to the medieval idea that the physical laws on earth are fundamentally different from those in the cosmos. This is a legitimate point, and the author offers a plasma physics explanation for spiral galaxy structure and the power source for active galactic nuclei and quasars, which does not require massive black holes. It is assumed that space is filled with a plasma and that the universe is laced with electric and magnetic fields that are sufficient to give rise to very widespread and, at first, feeble current densities. Ultimately the pinch effect in the plasma will greatly increase these current densities to produce some of the vortex structure seen in the universe and supply the tremendous power often required of objects such as quasars. The author complains that these ideas have been ignored by the astronomy establishment to date, and hopes that his book will at least cause some discussion of these unconventional ideas.

Creationists might at first be attracted to the plasma cosmology, but will be quickly repelled by the universe proposed. For instance, this cosmology is infinite in both space and time: it is explained that the present observed expansion of the universe is not caused by a past singularity, but by a large local fluctuation that was powered by a compression, followed by an expansion resulting perhaps from matter-antimatter annihilation. This of course avoids the problem with the first law of thermodynamics that a singularity presents, but an infinite universe suffers from a violation of the second law of thermodynamics. It is argued, quite unconvincingly, that the second law is of only limited validity. This is not a new idea in that some ancient infinite cosmologies assumed that from time to time order arose out of chaos, just as evolutionists do today. The author assumes that on many scales the entropy chips are somehow "cached in," giving rise to order, but this appears to commit the sin of the medieval cosmology criticized by Lerner: the assumption that terrestrial and celestial laws are fundamentally different. This is a matter of faith and is evidenced by the author's frequently stated belief that cosmic evolution, biological evolution, as well as the evolution and improvement of man and society are inevitable facts of the universe.

Dictionary of Science and Creationism by Ronald L. Ecker. 1990. Prometheus Books. Buffalo, NY. Cloth. \$32.95.

Reviewed by Jerry Bergman*

Ecker has produced a readable, well organized, basic introduction to the evolution versus the creation world views. Intended primarily for nonscientists, it is one of the few science books that motivated me to complete in a single sitting (and I even learned a few things to boot). Since many non-fiction books are used primarily for reference, the "dictionary" format is very useful, and not surprising considering that the author is a librarian. This format uses a topic sequence, while most other books are presented chronologically or in some other logical way. If other authors followed this format, books would be far more assessable. Indexes are designed to help a person find information of interest, but their use is often very time consuming. About the only disadvantage of this "dictionary" format is that a concept is often defined in several sections so that each topic covered is understandable as a unit.

A major concern is "why would a librarian, evidently with no training in science, write a book on creationism?" This work is actually not a dictionary of *science and creationism*, but rather is a dictionary of *anti-creationism*. The author argues vigorously against both the creation world view and most of the common arguments that creationists use to support their position. Indeed, he often argues polemically in a way that is reminiscent, not of science, but theology. Since most scientists and science students need no convincing—they already believe the molecules-to-man evolution world view—this book will serve primarily to reinforce a belief which is common to all of the sciences. This work illustrates extremely well just how weak the case is for evolutionism; all of his major arguments have been effectively refuted by recent research.

While reviewing this book, it soon became apparent that it conformed to a hypothesis of mine about those who write books against creationism: many have personal vendettas against Christianity. Some have had negative experiences with some church that not only caused them to leave, but also motivated them to actively oppose religion in general, especially the creationist world view. Ecker includes a large number of discussion of biblical topics, and also hints that he was raised in a conservative church which espoused special creationism. Interestingly, Ecker dedicates his book to his parents, Roy and Lucille Ecker, whom he labels "two special creationists" (dedication page). This, of course, does not argue against the validity of his conclusions, but it does help to understand the writer's motivations and background, which in turn helps us to assess his work. Ecker throughout the book criticizes not just religion, but conservative Christianity, noting that his criticisms are specifically against the "fundamentalists," a term he never defines. He says virtually nothing negative about other religious groups, even claiming that "I want to stress that this book is not 'against' the concept of the creator," but the concept of the creator that the "fundamentalists" paint."

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Ecker relies heavily upon books and articles written by the leading anti-creationists, often quoting uncritically from them. And as is often true of polemical works, he grossly overstates his case. For example, his discussion of *Archaeopteryx* implies the conclusion that *Archaeopteryx* as a clear transitional form between birds and reptiles enjoys scientific unanimity. The fact is, much debate still exists in the scientific community on the whole status of *Archaeopteryx*. A review of its status in *Nature* by Michael Benton of the Dept. of Zoology, and University Museum, Oxford, concludes that there is "no consensus on *Archaeopteryx*" (Benton, 1983, p. 99). Some of the questions that scientists are still debating include, "can the bird fly, is it ancestral to birds, did it originate from dinosaurs or from some earlier stock and, indeed, is it even a bird?" Benton quotes a recent study on the brain case of *Archaeopteryx* that concludes that the "details of the braincase and associated bones at the back of the skull seem to suggest that *Archaeopteryx* is not the ancestral bird . . ." (Benton, 1983, p. 99). He concludes that the relationship of *Archaeopteryx* and the origin of the birds is very controversial, and notes in a recent review that Thulborn and Hamley identified seven hypotheses concerning the affinities of *Archaeopteryx* (Benton, 1983, p. 99).

Likewise, in section after section, Ecker incorrectly implies that the facts are in, the case is closed, and there is no need to look any more, when in fact this is decidedly not the case. In science, in contrast to the courts, a case is *never* closed. Those of us who teach basic science methodology must repeatedly stress that the *only* viable methodology is science agnosticism, not evolutionism. This does not mean that we cannot relate the best evidence and present current conclusions as highly reliable (indeed, many are) but that we should repeatedly stress that true believerism has been a major historical impediment to scientific progress. The law of gravity may be one of the most firmly established laws in science, but we nonetheless should not be discouraged from examining empirically the law further so as to try to learn more about its ramifications or even the specific situations in which the law may not hold.

Even something as basic as the hypothesis that the earth is spherical can and should be questioned. Quite often further research does not overturn a theory, but modifies it. The initial questioning, though, is imperative for this to take place. Someone had to first ask the question: "Are we *sure* that the earth is spherical?" When more accurate re-measurements were completed, we found that it is not a perfect spheroid, but the equator diameter is 54 miles greater than the pole to pole diameter, and our globe also has many other comparatively small, but significant deviations from a spheroid. If there is anything that we have learned from the history of science, it is that the tentative position about every science view is the *only* one that works in the long run.

Ecker (p. 170) himself states that "in science we are thus dealing with 'different levels of probability' . . . never with certainty. Nothing is ever proved to be true, things are 'at best highly probable'." Yet, Ecker ignores his own advice and constantly openly states,

or at least implies, that most all of the arguments that he relates to prove evolution, many of which are actually highly controversial in science, are fact. Even though many conclusions are highly probable, *all* science conclusions should be stated as conditional. It is true that scientists have beliefs about world views, race, and gravity, but science must recognize these as beliefs and work under the primacy of the agnostic position.

Ecker does admit on a few topics such as abiogenesis that much controversy now exists. This section sounds more like it was written by a creationist; he even concludes that "creationists are absolutely right" (p. 14) and "moreover, creationists are right when they say that" (p. 15). He also admits disagreement by scientists on the topics of extraterrestrial life (p. 124), mammal evolution (p. 128), the origin of the solar system (p. 183), the interpretation of Australopithecines (pp. 33-34), and geomagnetic theories (p. 104). Although Ecker is certain that molecules-to-man atheistic evolution occurred, he is not so certain about many aspects of modern cosmology. He calls the big bang theory "hypothetical" (p. 31) and even concludes that the universe is "apparently" expanding (p. 31).

To discuss in the required depth the scientific controversy surrounding the conclusions that the author covers would take far more pages than the 263 in this book. If one must decide between brevity to the point that a distorted picture results and not saying anything at all, the latter may be preferable. Writing a dictionary on such an enormous topic requires at least several thousand pages. The *introductory* texts that I use in my biochemistry and biology courses are usually over 1,000 pages.

The primary group that he attacks is the Institute for Creation Research, especially Duane Gish and Henry Morris. Ecker dichotomizes the controversy enormously, ignoring all of the numerous other creation groups. He also incorrectly assumes that most of those involved in the creation movement are fundamentalists, specifically involved in denominations such as Baptist (p. 58). He even claims that most mainline Protestants are not creationists, indicating very superficial research in this area (p. 37). As Nelkin (1977) points out, the creation movement is widely diverse, and many of the founders and the leaders of some of the larger creation groups, such as the Creation Research Society, are Lutherans, Presbyterians, Seventh Day Adventists and other mainline denominations. Lutherans have figured prominently in both the Creation Research Society and other groups, and none of these groups are "Baptist fundamentalists" (p. 115).

Ecker seems oblivious to the fact that many Jews, Moslems, and Roman Catholics are also creationists. Well-known Catholic creationists include Dr. Roberto Fondi, professor of paleontology at the University of Siena, microbiologist and geneticist Dr. Guisepe Sermonti, geneticist Macie J. Giertych, quantum chemist Dr. Edward Boudreaux, and Guy Berthault. He also ignores the Jewish Creationists such as Robert R. Perlman, Morris Goldman, Carl N. Kahr and others.

Rather than a single united creationist front existing, far more accurate is Nelkin's 1982 (p. 79) statement

that "religious groups concerned with doctrinal purity are characterized by schisms. Creationists are no exception . . ." Ecker does admit that some prominent scientists are "creationists" although these statements cause even more confusion because of his use of the word creationists. He notes, for example, that Theodosius Dobzhansky, "describes himself as a creationist and an evolutionist." And he consistently refers to Dobzhansky as a "Christian geneticist," (pp. 26, 206, 208) or "a Christian," (p. 43) and "a Christian believer," (p. 82).

In many cases the author is simply wrong. For example, he incorrectly states that the story of Adam and Eve is considered "literally true only by fundamentalists who insist on a doctrine of biblical inerrancy" (p. 19). Actually, where he shines is in his discussion about theology, not science. Many who purchase his book assume that it is about *only* the scientific problems with the creationist world-view, and since the book is intended for public schools, it may have been far better to focus *totally* upon science. His many long scriptural discussions and interpretations may spark theological disputes, but this is a topic that those in state supported higher education find uncomfortable dealing with in science classes. One thus might experience legal problems using this book in public schools because of its heavy theological content.

Although the author states in the preface that "this book is not 'against' the concept of a creator," in the 209 pages of text, he argues almost exclusively for atheistic evolution. As many scientists have stressed today, the scientific community needs to be more open about its presuppositions and conclusions and, especially, where modern science evidence has led us. Ecker makes a strong case for atheism, arguing that all past attempts "to prove God's existence by logical reason" have now been "found wanting." Accordingly, he also argues against theistic evolution, quoting Dawkins who calls evolution a "blind, unconscious, automatic process" with "no purpose in mind" (p. 140). Ecker concludes that "the idea that evolution is somehow *teleological* or purposeful, or that it involves some inner drive towards perfection (a concept called *orthogenesis*), was popular in the late nineteenth century, but is not taken seriously by any competent biologist of the late twentieth" (p. 88). Ecker reminds us that the scientific community is in a high level of agreement on this conclusion. He notes that even scientists such as Robert Jastrow "who calls himself an agnostic" because he interprets Planck's time (the first instant of the big bang) in a possible religious sense are "accused of duplicitously pandering to theists" (pp. 202-203).

It is ironic that books such as this which argue strongly for atheism are widely used in public schools, but the other side is typically censored from most science classes and libraries.

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Inner Earth: A Search for Anomalies by William R. Corliss. 1991. The Sourcebook Project. Glen Arm, MD. 224 pages. \$18.95.

Reviewed by Don B. DeYoung*

William R. Corliss has cataloged unexplained phenomena in nature for 20 years. During the 1970's he produced 10 looseleaf "sourcebooks" of unusual science findings in astronomy, archaeology, etc. Next came a series of six handbooks with thorough literature documentation. Presently, Corliss is publishing hardcover catalogs on various topics which will eventually number 25 volumes. He plans to provide a systematic data base for 30,000 articles of special interest. Corliss calls his entire, ambitious literature search *The Sourcebook Project*. A bimonthly newsletter of current anomaly reports, *Science Frontiers*, now numbering 77 issues, is also sent to subscribers.

This eleventh catalog on the *Inner Earth* continues the Corliss tradition of presenting unusual science data in a concise and fascinating manner, complete with original drawings. Article excerpts discuss seismic signals, magnetic variations, and heat flow. Subjects include deep-focus earthquakes, exotic terrains, mid-plate volcanism, and compass anomalies. Corliss concludes that "Hundreds of kilometers below the surface lurk huge pieces of foundered continental crust and bizarre structures of unknown origin" (advertising flyer). Several *CRS Quarterly* articles are summarized by permission, especially John Woodmorappe's geologic column work and Thomas Barnes' magnetic field studies. The Corliss books are popular in university libraries, so they will surely be useful in publicizing our creationist material. Any of the materials by William Corliss are recommended, including *Inner Earth*. In a parallel way to creation science, Corliss has the mission of airing unconventional science ideas.

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The Practical Paleontologist by Steve Parker. (Raymond L. Bernor, Editor.) Simon and Schuster. New York. 160 pages. \$14.95.

Reviewed by Clifford L. Lillo*

The book cover describes this work as "a step-by-step guide to finding, studying, and interpreting fossils—from searching for sites to extracting, cleaning, and restoring finds." Not written from the creationist perspective, it nevertheless provides helpful information for discovering fossils and gaining useful data from them.

In the first paragraph of the Introduction the author makes clear his view on origins, saying, "Without the efforts of enthusiastic amateurs . . . we would know less about . . . the origin of life itself—and where our own species came from" (p. 8). On the same page he states, "Life, spawned and nurtured by these irreversible events, has itself become a shaping force over the past 3.9 billion years (p. 8).

The creationist who is eager to get started need not be dissuaded by such bias and can use the author's information to gather fossils and refute the author's own claims.

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He begins with a history of paleontology, going back to Xenophanes, Pythagoras, and Herodotus, stating that these ancient philosophers believed that, since fossils of sea creatures were found inland, the sea had once covered the land. Then, instead of stating that the Bible supports this viewpoint because of the Flood of Noah, Parker claims,

So from the fourth century, the Church taught that fossils had been placed in the ground by the Devil, to tempt people into questioning the truth of the Bible (p. 14).

Notable in this book is the avoidance of anything which might cause the reader to think that fossils were the result of a universal Flood. The author says,

So it follows that fossils are most likely to be preserved where the conditions for decomposition are poorest; where moisture, oxygen or warmth are excluded, or where there are lethal toxins or extreme heat or pressure. The bottom of the sea is a good bet, as animals and plant remains sink into a stagnant ooze. (p. 32).

In a picture on the same page, four stages of fossilization are shown, the first stage being, "The animal dies and falls to the sea or lake bed" (p. 32). A less biased author might have said, "The animal, whether living or dead, is suddenly covered over by a layer of mud."

In case a reader skims over such statements, Parker devotes 37 pages or nearly a quarter of the book to a section called "The Evolution of Life."

Disregarding the bias of the author, the reader will find valuable advice on how to recognize a fossil, where to look, the proper clothes to wear, getting permission to search, what tools and equipment are required, how to do grid mapping, and how to extract the fossil. Both creationists and evolutionists can profit from this book.

Science Matters: Achieving Scientific Literacy by Robert M. Hazen and James Trefil. 1990. Doubleday. New York. 294 pages. Hardcover. \$19.95.

Reviewed by A. Jang*

Robert Hazen and James Trefil are, respectively, Professor of Earth Science and Professor of Physics at George Mason University. They wrote this book to promote scientific literacy and greater citizenship in dealing with the scientific issues that affect people's lives. They feel that everyone needs background knowledge to understand how scientific and technological developments occur and what their consequences are likely to be in order to "take part in the national debate about them" (p. xii).

The authors report that fewer than 7% of American adults and only 22% of college graduates can be classed as scientifically literate. Even working scientists are often illiterate outside their own field of professional expertise. For example, only three out of a group of 24 physicists and geologists were able to explain the difference between DNA and RNA (p. xiii).

The fact of the matter is that the education of professional scientists is just as narrowly focused as the education of any other group of profes-

sionals, and scientists are just as likely to be ignorant of scientific matters as anyone else. You should keep this in mind the next time a Nobel laureate speaks *ex cathedra* on issues outside his or her own field of specialization (p. xiii).

Perhaps this quote should also be kept in mind the next time a group of Nobel laureates signs an Amicus Curiae Brief supporting the "fact" of evolution!

The authors state that the solution to scientific literacy must begin with the simple recognition that "IF YOU EXPECT SOMEONE TO KNOW SOMETHING, YOU HAVE TO TELL HIM OR HER WHAT IT IS" [their capitalizations] (p. xvi). And who does the telling? "So scientists must define what parts of our craft are essential for the scientifically literate citizen" (p. xvii). This posture, which seems contrary to what is encouraged in good science education (the teaching of critical thinking and learning by inquiry), is maintained throughout the book which in effect becomes an "answer" book.

The book is organized around 18 central concepts which are introduced in the first five chapters and later expanded. These "laws" are claimed to be "absolutely essential" to explain everything in the world. "understanding this core of knowledge, then, is what science is all about" (p. xviii).

The authors' predilection for the physical sciences may explain the uneven attention given to certain topics. The first chapter deals with the question of how scientists know what they know. The next 13 chapters discuss basic concepts in the physical sciences (e.g., Electricity and Magnetism, The World of the Quantum, Chemical Bonding, Atomic Architecture, Particle Physics, Relativity, etc.). Only the last four chapters deal with the life sciences, and even these are largely discussed from a physico-chemical perspective. The lack of a section on health and medical issues is surprising since this is probably an area of greater concern to the average layman than most of the subjects covered in the book.

And, alas, there is the chapter on evolution! It begins with the pigeon-holing of creationists (i.e., "this is what Creationists believe . . ."). The comment is made that "Creationists subordinate observational evidence to doctrine based on their interpretation of sacred texts" (p. 243). This stereotype fails to account for the many creationists who were skeptical of evolutionism prior to having any religious moorings. The authors also fail to point out that the problem lies *not* in the observational evidence, but in the metaphysical baggage that *both* creationists and evolutionists sometimes bring to bear on interpreting the observational evidence.

Evolution is claimed to be as much a fact of science as the fact of gravity (p. 245). This is, of course, a gross exaggeration since faith in any theory to account for a singularity or any other claims in the area of origin science can never be asserted with the degree of certainty that is possible in the area of operational/empirical science. The former can never be directly proved whereas the latter is directly testable.

In a brief discussion of the origin of life from non-life, the book assumes that the original atmosphere was a reducing atmosphere (pp. 245-246), an unproven assumption that flies in the face of geochemical evidences to the contrary (Thaxton, Bradley, and Olsen,

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1984). The unsupported statement is made that the fossil record offers "the most dramatic evidence for evolution." The authors assert that fossils "prove" that macroevolution has been occurring for almost four billion years (p. 252). If the purpose of this book is to help John Q. Public become scientifically literate, then there is nothing to commend it here since no fossil evidence is given. The reader is offered nothing but the authors' unsupported conclusions. There is not even mention of any of the alleged transitional forms such as *Archaeopteryx*. Compared to the coverage given to the physical sciences in the earlier chapters, the superficial treatments in some of these latter sections were disappointing.

Punctuated equilibrium and gradualism are placed on equal footing, with the claim that the fossil record is not good enough to adjudicate between them (p. 255). It is pointed out, however, that although "the fossils . . . are at best a spotty historical record of earth's life" (p. 252), earth had undergone numerous catastrophes (pp. 256-257) and the fossil record argues

against Darwin's view that species had gradually evolved at a relatively constant rate (p. 256).

Reading this book was like reading an almanac. While it was interesting in some places, it was quite dry elsewhere. "Frontiers," an interesting section found at the end of each chapter, places each set of information in the context of contemporary research and exciting future applications.

The book has 26 illustrations (mostly line drawings), a list of additional readings, and an index. Surprisingly, for a book designed to present an overview of science for the layman, there is no glossary. Despite its weaknesses (uneven subject treatment, authoritarian tone, and the lack of footnoting and documentation), this book is recommended as a reference source for understanding what the prevailing views are in science.

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LETTERS TO THE EDITOR

International Conference on Science and Belief

International Conference on Science and Belief, August 11-15, 1992: Pascal Centre, Redeemer College, Ancaster, ON Canada L9G 3N6: This five-day conference is planned for scholars with a professional interest in the relationship between science and belief. The first half of the conference will focus on general metaphysical beliefs while the second half will emphasize Christian beliefs.

Variation

These comments are prompted by Frank L. Marsh's excellent article "Biological Variation," (1991) and by Wayne Frair's challenge in "Original Kinds and Turtle Phylogeny" (1991). The case for the hybridization of the two *Spartina* species to make a third one appears to be well founded. However, it raises a question. I would like to hear Dr. Marsh's views, speculative though they would have to be, on the origin of the two **parent** species. Although Dr. Frair wrote about turtles, he put forth essentially the same challenge. What in a Biblical, creationist framework is truly the origin of *species*?

One could easily "solve" the origin problem by asserting that God created the two *Spartina* species separately, and that each was therefore a created "kind." This answer may well be the correct one, and there are probably creationists who hold this view. However, some creationists regard the boundaries of the baramins as being much broader than the species, and would think of the two *Spartina* species as the offspring of a single ancestral form. If the latter view is correct, there arises the question: By what genetic mechanism(s) did a species with 28 chromosome pairs and a species with 35 chromosome pairs arise from a single ancestral form?

Discussions of this sort become even more important when the animal kingdom is considered, especially dry-land animals. They have direct bearing on the

number of animals in the ark and on the geographic distribution of animals in today's world. As an illustration, consider one aspect the familiar "kangaroo problem." Kangaroos and wallabies, found only in Australia, are very similar animals, classified (although inconsistently) into two distinct genera. Evolutionists seize on this example, and on all the Australian marsupials, for that matter, as proof of trans-generic evolution. Creationists have to give a "creationist" explanation. We must, at least, decide whether we can accept kangaroos and wallabies as a single created kind, descended from a single pair in the ark, or whether we must consider each of their species as a single created kind, each represented by a pair in the ark.

I am reminded of a bit of creationist history. How long has it been since any creationist writer wrote of the sterility of the mule as a proof of "after-its-kind" creation? Horse and donkey are different kinds, our writers used to tell us. Yes, they are similar in appearance, sufficiently so to allow both to be classified in the genus *Equus* and to allow limited hybridization, but obviously they are different kinds, as evidenced by the sterility of their hybrid. Therefore they prove that reproduction occurs only "after its kind"—or so we were told. Our writers never raised or tried to answer questions such as: Why is such hybridization possible at all? Why did God create two separate kinds, yet make them so similar that they could be crossed, albeit with sterility of the offspring? Today, not all of us would assert that all *Equus* species were separately created. We even see the suggestion from Dr. Frair that maybe ". . . turtles belong to a monotypic baramin . . .," although there are 250 living species of them (p. 23).

As a firmly committed creationist and close follower of the creationist movement, I have observed some real changes in creationist thinking in the past 40 years. Perhaps both evolutionists and creationists are getting more realistic about the world as it really is. Some evolutionists recognize the genuine systematic gaps in the fossil record, and respond with theories of

punctuated equilibrium. Some creationists look at the geographic distribution of animals and the large number of species that exist, and think about the number of "kinds" that had to be in the ark, and respond with a broad concept of what constitutes a monotypic baramin.

Perhaps someday we will understand all these mysteries. Meanwhile, I hope those who are skilled in the biological, genetic, and biochemical disciplines will take up Dr. Frair's challenge to think and research on the basis of "kinds."

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Millipedes and Adaptation

Your statement that millipede defense systems are not 100% effective does not present any problem to my line of thinking. After all, if their defense systems were at 100% efficiency, the world would soon be overrun by these creatures!

What really puzzles me is the amazing number of species of millipedes—10,000 at least. Do these show special adaptations to the environments in which they live? I can readily see the need for thousands of these little animals, for after all, they are scavengers and surely this world needs lots of scavengers, both large and small. Maybe you can inform me as to whether the 10 orders and many species reflect special adaptations to unusual environments. If so, this would to some extent explain the great variety of these creatures (Williams, Howe and White, 1990).

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Walter E. Lammerts

Response to Lammerts

Dr. Lammerts was very kind to offer comments on certain portions of the millipede article (Williams, E. L., G. F. Howe and R. R. White. 1991. A desert millipede: evolution or design?—an introduction. *Creation Research Society Quarterly* 28:7-16). His point about the efficiency of the defense mechanism of *O. ornatus* is well taken.

Concerning the possible large number of species of millipedes, a reply may help clarify this discussion. Taxonomists often separate millipedes into different species because of differences in the male copulatory organs (gonopods) even though the female genitalia of related species may be indistinguishable. See Keeton and Gould, 1986, pp. 891-892. An excellent discussion of possible species designation by comparison of male gonopods in the spirostreptid millipedes, *O. ornatus*, *O. flavior*, *O. texicolens* and *O. mimus*, found in the deserts of southwestern United States and Mexico can be noted in Causey (1975). Possibly, related species of millipedes can interbreed. Laboratory breeding

experiments could be conducted between related species to determine if reproduction is possible. In other words, the estimated number of millipede species may be too high because of this taxonomic separation technique.

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An Open Letter to the Journal Creation/Evolution

In 1989 and 1990 *Creation/Evolution (C/E)* published a written debate between creationist Walter T. Brown, Jr., and evolutionist Jim Lippard. This exchange developed out of Lippard's claim that the book *In the Beginning* (Brown, 1989) contained erroneous arguments in support of creation. The debate focused primarily on questions about evidence for design in nature, decay in the speed of light, alleged problems with *Archaeopteryx* and *afarensis* fossils, and measurements indicating a decrease in the sun's diameter. It extended over three issues of *C/E*, and was concluded by giving Lippard the final say and by publishing a large number of letters which were all opposed to Brown.

On November 20, 1990, I wrote and asked *C/E* to publish at least the following letter which pointed out three of Lippard's most obvious errors. Instead of printing my letter, however, *C/E* published more attacks on Dr. Brown's position. Therefore I submit my letter to *CRSQ* as an open letter to *C/E*.

(1) Lippard (1989, p. 24) initially criticized Brown's argument from design to the existence of a designer on the basis that the argument was philosophical. Brown (1989/1990, p. 37) responded, "Lippard's contention—that complex technologies can come from natural processes—has no basis in experience. Which one is more philosophic?" In his final rebuttal (1990, p. 29), Lippard reverses his original position about the validity of philosophical argument by saying, "I also find Brown's disdain for philosophical argument objectionable. Philosophy has an important role to play in the sciences . . . Not only is Lippard inconsistent on this point, but he is incorrect in claiming that Brown showed disdain for philosophical argument. Brown merely observed that, if his own argument was open to criticism on the grounds of its being philosophical, Lippard's was even more so."

(2) In regard to the question of whether a brain produced entirely by a series of random evolutionary events could think valid thoughts, Lippard (1990, p. 30) says:

To Brown's request for an example of "a structure created by random processes [that] can make valid inferences," I substitute the word *random* with *natural* or *evolutionary* and answer: people—five billion of them. This answer begs no question

within the context of Brown's argument, since the argument begins by assuming the truth of evolution.

In essence, then, Lippard's argument in support of evolution begins by assuming the truth of evolution. But I think that, when Brown asked for an example, he rather wanted one in which random processes have been *observed* to produce a structure that can make valid inferences. In this way the evolutionist contention that randomness can create order could be *experimentally* verified and not merely assumed on the basis that evolution is true.

(3) Lippard stated in his first article (1989, p. 32) that he had not been able (presumably for lack of time) to critique all the evidences presented in Brown's book, so he chose a sample of those evidences, tried to show that they were invalid, and then concluded by a process of inductive reasoning that all the remaining evidences must be invalid as well. His final article (Lippard, 1990, pp. 28-36) continues in this vein by again confining itself to certain topics such as the philosophical argument from design, the speed-of-light decay question, problems with *Archaeopteryx* and *afarensis* fossils, and apparent variation in the sun's diameter.

It might strengthen Lippard's inductive argument against Brown's work if he would describe the sampling method he used in choosing these topics. Was it

purely random, or did he consciously or unconsciously select the points which he perceived as being weakest? Why do these points include ones such as the speed-of-light question which have not been resolved one way or the other? Why have Lippard and other evolutionists avoided attacking Brown's hydroplate theory, which is more powerful than the theory of plate tectonics? Why has Lippard not discussed the almost infinitesimal probability that the simplest life forms could arise by chance or that tremendously complex organic functions such as sexual reproduction could develop out of random mutations? Unfortunately, it seems that Lippard and others have been reduced to a form of nitpicking in which they attack creationists yet avoid honestly addressing those areas in which the evidence clearly favors creation over evolution.

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A brief account of this "turn" away from Divinity is found in Basil Willey's *The English Moralists*. I quote below a passage which describes the declension of humanism to secularism, a deterioration which is parallel to the declension of philosophy in the West to positivism:

During the last three or four centuries humanism may be said to have passed through three well-marked stages, of which the last two are stages of progressive deChristianization. First you have the God-centered humanism of men like Erasmus, Hooker, Donne, Milton or Locke. Next, the man-centered humanism of the eighteenth century, of the Encyclopaedists, of Hume, of the idealistic romantic poets and philosophers. At this stage morality ceases to be dependent upon supernatural sanctions, . . . Man is still left, however, in virtue of his reason and imagination, to retain contact with a transcendental order, and thus to preserve his traditional dignity and his superiority to the purely natural order. Finally you have the positivist stage represented by Comte, Mill, Marx and their followers, in which all possibility of contact with metaphysical reality is denied, man becomes God, and Humanity a religion.

Jordon, M. M. 1991. Book review of John Crowe Ransom's *Secular Faith*. *Southern Partisan* 11(1):41.

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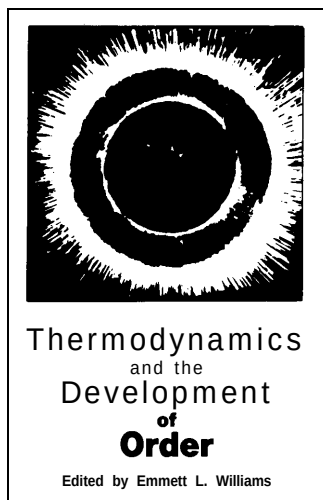
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According to the prevalent scientific speculation of our time, the newer science, you and I are collections of electrical particles, so to speak, held in combination by forces and influences which we do not understand at all. Outwardly we seem to be material flesh and blood—O that this too solid flesh would melt!—but that is illusion: we are such stuff as dreams are made of, positive and negative electrical charges, as is all other matter. And yet within each of us some soundless voice inquires, “Who am I?” This is the ghost in the machine, the immaterial impulse or mind-stuff which animates us. Our identity depends upon this directing power of which we are ignorant totally, and which we can delineate roughly only through images. I quote from Koestler’s little book *The Roots of Coincidence*:

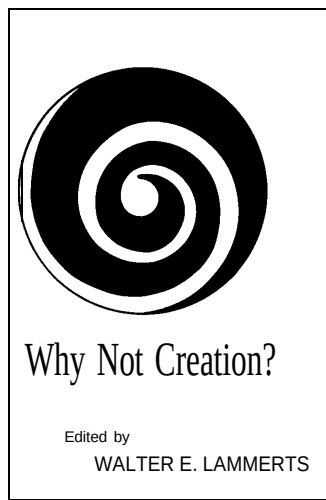
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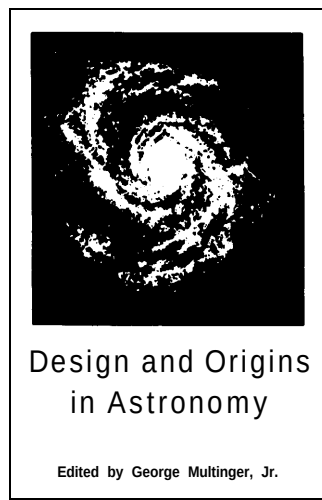
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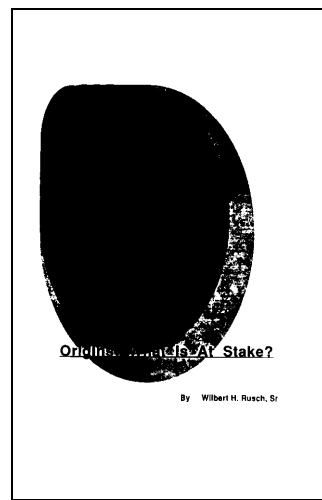
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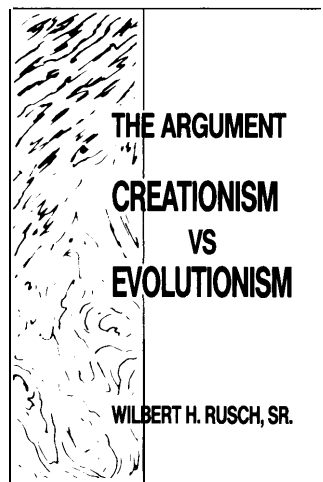
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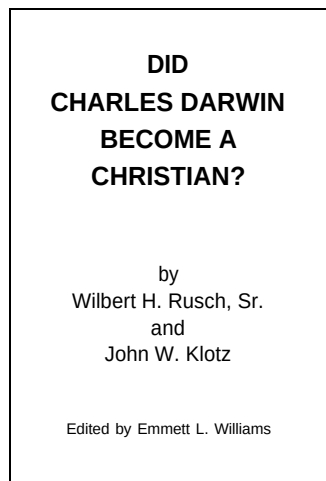
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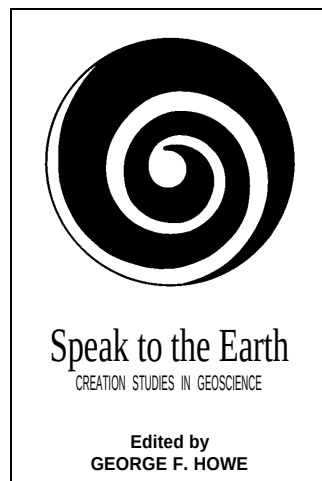
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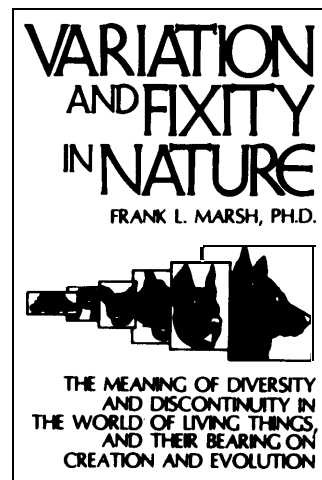
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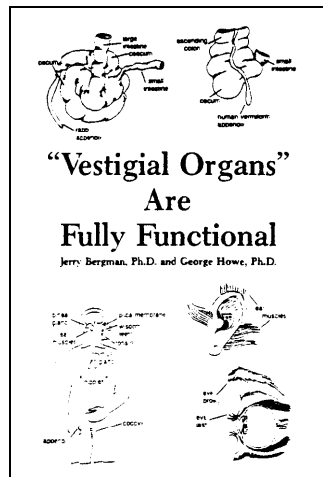
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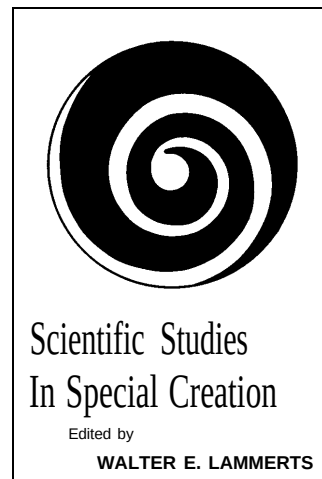
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