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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

Editor's Comments

As the twentieth century draws to a close the struggle between theism and atheism continues. The bloody 1900s reflect the retreat of Western Civilization from biblical principles and the slow, but visible decay of Christian culture throughout Europe and the Americas. Involved in the spiritual warfare is the creationism vs. evolutionism battle for the minds of men. True science is on the side of creationism, but you would never know it listening to the rhetoric of atheists and their media allies. Likewise theistic evolutionists spend more time blasting creationism than they do defending biblical truths. These hybrid Christians must love the praise of men more than the praise of God.

Decades ago I had a discussion with a Christian who was a scientist in a national laboratory. Initially he quizzed me on my belief in the Word of God, Did I believe the Bible from cover to cover, etc.? He would not enter into any discussion of creationism with a man who did not believe the Bible. I then eagerly looked forward to exchanging creationist viewpoints with a like-minded person. The conversation went along smoothly until we ventured into the area of the age of the earth. Then "the bottom fell out." The scientist proclaimed that he would not believe in a young earth because he did not wish his scientific colleagues to think that he was a dummy! Peer pressure was too much for him. The discussion ended abruptly.

I am sure many of you know Christians who attack creationists, particularly young-earth creationists, because they wish to be thought of as scholarly by their unbelieving friends in the scientific arena. Unfortunately the issue is not a young earth or old earth, but belief in a Creator Who governs the affairs of man! No matter what you believe otherwise, if you accept biblical injunction, you are an enemy of the world's "intellectuals". So Christians accomplish nothing by siding with the enemies of God.

In an interview with a reporter from *Insight* magazine 15 (38):37-39, Phillip Johnson, a Christian law professor and well-known critic of naturalism "hits the nail on the head" (p. 39):

Question: Why is the intellectual world so attracted to naturalism and agnosticism? Johnson's answer: It follows along on my own experience of the intellectual arrogance that comes naturally to an academic winner, an academic gold-medal winner such as myself. Scientific naturalism is a thing that's attractive to that sort of people because it says that the secular intellectuals are the people to whom the world should look for all wisdom.

The secular intellectuals become the priesthood. Their cultural story dominates. It feeds their sense that they have a wisdom the masses don't have. Naturalism is their vehicle to replace the [religious] clergy with the scientific and intellectual professionals, the priesthood being the people who tell society its creation story, and in this case the creation story being the naturalistic one.

All creationists are bent on replacing the naturalistic priesthood and that is their chief "sin." The world's priesthood will not have the Lord rule over them! If a Christian believes the creation story taught by the naturalistic priesthood, he by default becomes an opponent of and often he hates true creationists.

The issue is not scholarship or its lack thereof. Creationists who think they can please naturalists by being "scholarly" or criticizing creationist writings as mainly garbage miss the point. When the supernatural is invoked, the entire effort is garbage as far as the priesthood of the world is concerned. Those in our ranks who think that they appear scholarly to the world's intellectuals when they unjustly criticize our work cast their influence, innocently or not, on the side of naturalism. They become enemies of the cause they claim to support.

Let us continue to do battle for the principles in which we believe. It is our privilege to serve you and the Creator. In spite of our religious foes—the priesthood of this world—we will keep on our pathway of scientific creationism. Enjoy Christmas and have a successful new year.

Emmett L. Williams

Learning About God

Nature in her laws tells of God, but the message is not too clear. It tells us nothing of the love and grace of God. Conscience, in our inmost being does tell us of God, but the message is fragmentary. The only place we can find a dear, unmistakable message is in the Bible.

Billy Graham

Precambrian Plant Fossils and the Hakatai Shale Controversy

Carl R. Froede, Jr.*

Abstract

Within the global uniformitarian stratigraphic timescale, plant fossils have been found in Precambrian strata dated to approximately 3.5 billion years in age. Evolutionists have not successfully explained when or how life formed to produce these ancient and wide-spread plant fossils. Young-earth creationists have also investigated Precambrian plant fossils, focusing primarily on Precambrian rocks found in the Grand Canyon. Controversy has developed around the plant fossil content of the 1.25 billion year old Hakatai Shale. Several studies suggest that modern and ancient fossilized plant material might be present within the shale. Other Precambrian stratigraphic units in the Grand Canyon contain plant fossils. Precambrian strata

of much greater age than the Hakatai Shale are known to contain plant fossils. However, some young-earth creationists have rejected the presence of plant fossils in the Hakatai Shale, or in abundance in any other Precambrian strata. This position is not required by either uniformitarian or creationist frameworks and it ignores documented evidence of Precambrian plant material. The author proposes that Precambrian plant fossils exist, and reflect the effects of the global Flood on Antediluvian sediment and plant material. However, only the additional study of plant fossils within the various Precambrian outcrops at each locale can determine their specific position within the young-earth Flood model stratigraphic column.

Introduction

Many creationists have generally followed the framework of the global uniformitarian timescale in attempting to define geologic history within a biblical time frame. Weaknesses in this approach, however have led several young-earth creationists to propose other Scriptural methods of understanding strata (Froede, 1995, 1998; Froede and Reed, in press; Reed and Froede, 1997; Reed, Froede, and Bennett, 1996; Walker, 1994). This foundational change in defining Earth's history offers a different solution to many seemingly complex issues. One of these is the presence of plant fossils within Precambrian strata. These fossils have been a perplexing problem for some creationists, but one which can be resolved within a new biblical framework.

Uniformitarians continue to collect evidence of fossilized plant life further and further down their global stratigraphic column. Creationists can and should assist in this search, but for different reasons. The presence of Precambrian fossils has created controversy for uniformitarians and creationists. One specific stratigraphic unit,

the Hakatai Shale of the Grand Canyon, has been a focus of investigation and controversy among creationists. Why is identifying plant fossils within this shale layer considered a problem by some, and what bearing does it have on the creationist approach to understanding earth history? Some background about these supposed ancient plant fossils is necessary.

Precambrian Plant Fossils

Uniformitarian geologists divide the Precambrian into two Eons: the Proterozoic, and the underlying Archean (Figure 1). Proterozoic strata have yielded plant fossils which have been investigated for more than one hundred years (Hofmann, 1971; Link et al., 1993; McMenamin and McMenamin, 1990). For some uniformitarians, life did not exist when the underlying Archean strata were deposited because the atmosphere was not believed to have contained sufficient oxygen to allow aerobic life to have formed or developed (Cloud, 1968; 1976; 1983; Knoll, 1992). This concept has recently been challenged with physical evidence of aerobic plant fossils in Archean rocks. At present, uniformitarians have reported plant

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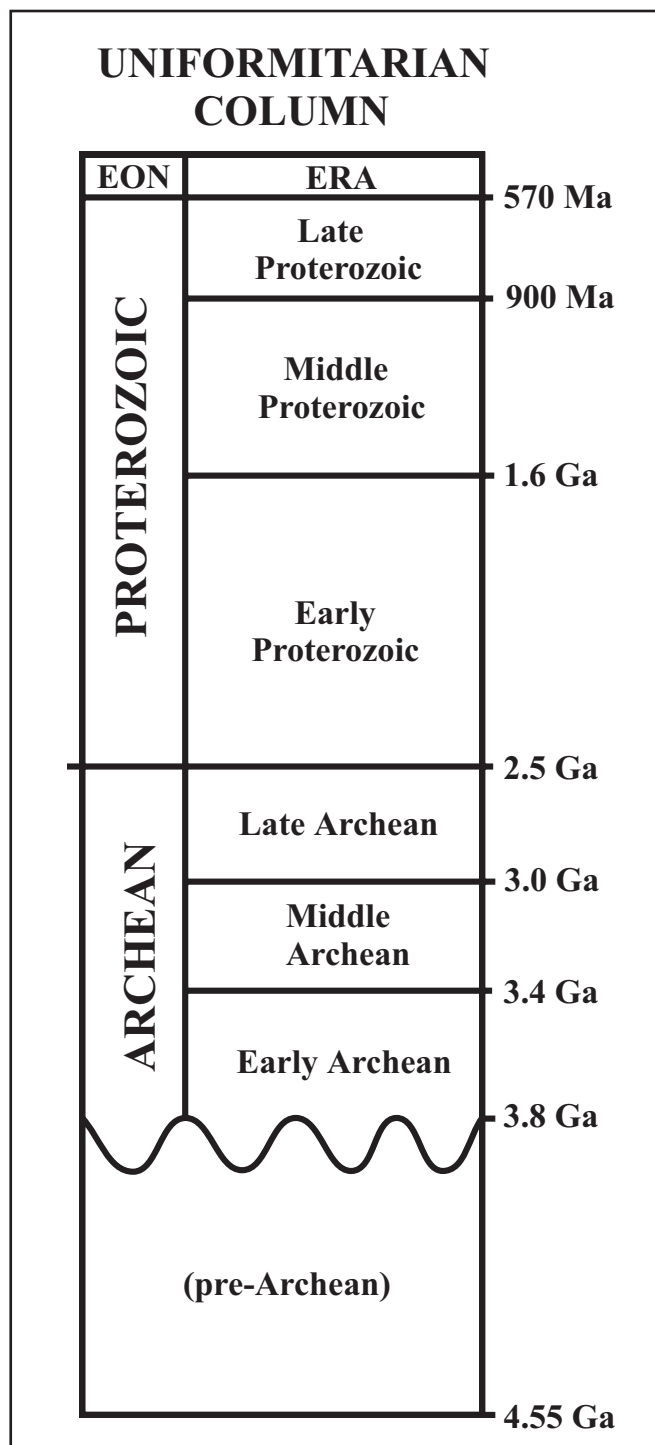


Figure 1. The Precambrian stratigraphic column (modified from Harrison and Peterman, 1982). The lowest and oldest strata have been held out as generally being devoid of fossils—until recently. Uniformitarians continue to find plant fossils in these ancient strata. Presently, plant fossils have been found in Archean rocks dated to approximately 3.5 billion years old. Hence, even by their own evolutionary model, life has been on earth for a very long time, and no one knows how or where it originated.

fossils in 3.4 to 3.5 billion year old (commonly abbreviated Ga) Archean strata in Australia and South Africa (Margulis, 1988; McNamara and Long, 1998; Read and Watson, 1975; Schopf and Walter, 1983; Schopf, 1994; Strother, 1989; Walter, 1983). According to Schopf (1994, p. 193), evidence of plant life in the Early Archean consists of:

...(1) megascopic microbially produced stromatolites; (2) microscopic cellularly preserved microorganisms; and (3) particulate carbonaceous matter (kerogen), identifiable on the basis of its carbon isotopic composition as a product of biological activity.

The discovery of these Archean fossils has created a problem for the paleontological community. Fossils of this age contradict models of the origin of life on this planet¹(Schopf, 1999). Whatever the requirements that evolution might dictate, plant fossils clearly exist within these ancient rocks.

These fossils force uniformitarians to deal with the sudden appearance of life in Earth's supposed very distant past. These plant fossils have been found in Precambrian rocks across the globe (Cooper, Jago, MacKinnon, Shergold, and Vidal, 1982; Glaessner, 1979; Hofmann and Schopf, 1983; Iltchenko, 1972). Within the evolutionary model this suggests that plant life was flourishing very early in Earth's history, and that it must have evolved and expanded rapidly (Schopf, 1982, 1999). No credible explanation of these discoveries has been provided to explain the presence of these fossils through evolution and dispersion.

The organic remains of Precambrian plant fossils are found within ancient sedimentary and metasedimentary² rocks and strata found on the continents. However, extracting the organic remains of these plant fossils remains a complicated and exacting science, and contamination is believed to be a serious problem (Schopf, 1999; Schopf and Walter, 1983).

¹This article will not cover the evolutionary explanation for the origin of life or how theistic evolutionists might interpret these Precambrian fossils. Rather, this article will focus on the supposed extreme age of these plant fossils as they occur within the global uniformitarian stratigraphic column, and their relevance to the young-earth Flood model.

²Note that some Precambrian fossils are found within very low-grade metamorphic rocks which were originally sedimentary deposits that experienced burial and subsequent alteration. Their alteration, however, did not completely destroy all evidences of the plant material within the strata.

Precambrian Plant Fossils and the Hakatai Shale

How do young-earth creationists explain the Precambrian strata that contain plant fossils? Unfortunately, not much has been written about these plant fossils by creationists. The Hakatai Shale, found within the Grand Canyon, has received the most intensive investigation to date. Several varieties of plant fossils have been identified and reported within the Hakatai Shale (Burdick, 1966, 1972, 1974a); however, challenges have been raised causing some to question their relevance within a biblical framework (Rusch, 1968, 1982). Further confusion has resulted from some creationists incorporating a compressed version of the global uniformitarian column in their creationist model³ (Austin, 1994; Austin and Wise, 1994, and in preparation; Baumgardner, 1990; Snelling, Scheven, Garner, Ernst, Austin, Garton, Scheven, Wise, and Tyler, 1996). One creation scientist has proposed that Precambrian plant fossils might have been created during the creation week to fit them within his model (Wise, 1992). Counter to this uniformitarian-column-based approach, other young-earth creationists have proposed that Precambrian strata containing plant fossils formed during the global Flood, and have no link to the uniformitarian stratigraphic column (Froede, Howe, Reed, and Meyer, 1998; Hunter, 1992; Snelling, 1991; Woodmorappe, 1983).

The most interesting and controversial creationist Precambrian plant fossil study was conducted by Clifford Burdick (Burdick, 1966, 1972, 1974a). He examined the Hakatai Shale strata within the Grand Canyon and reported finding a wide variety of pollen and spores. Following this study, other scientists confirmed Burdick's work (Chadwick, DeBord, and Fisk, 1973). In a later effort to buttress his position, Burdick documented other areas across the planet where Precambrian and Cambrian pollen were reported (Burdick 1974b, 1975, 1982). A subsequent investigation of the Hakatai Shale (Chadwick, 1982), however, found no evidence of any plant fossils, and proposed that contamination was the cause of the earlier findings of pollen and spores. This raised doubts about Burdick's work.

The controversy surrounding Burdick's work centered around his finding *both* modern and ancient fossilized forms of plant spores and pollen in the Hakatai Shale. Evolutionists would not have had any problems with Burdick's work if only ancient fossilized forms were found. Finding modern forms of spores and pollens cre-

ated a serious age issue with this shale layer. In the creationist community Burdick's work creates controversy for those who define the Flood/pre-Flood boundary as the contact between the Precambrian and Cambrian. They should not find plant fossils in rocks which they define as having formed early in the Creation Week (before plants were created). For both these groups Burdick's findings created different problems for different reasons.

To resolve this lingering controversy over the presence or absence of pollen grains and spores within the Hakatai Shale, members of the Creation Research Society (CRS) collected and analyzed their own samples in an effort to confirm or refute Burdick's earlier findings (Howe, 1986; Howe, Williams, Matzko, and Lammerts, 1986, 1988; Lammerts and Howe, 1987). Their results supported Burdick's findings of *modern* spores and pollen within the Hakatai Shale. Of course this confirmation remains counter to the evolutionary model (Chaloner, 1967; Cloud, 1968), and is *very* controversial. The uniformitarian model does not predict or allow for the presence of modern pollen and spores within the Hakatai Shale as it is too old to contain these "advanced" types of plant fossils. The incorrect sequence contradicts the global uniformitarian column, which may explain why certain creationists remain skeptical of the conclusions of this latest confirmatory study. For whatever reason, some creationists have also rejected the possibility of modern or ancient pollen, spore, or any other plant material within the Hakatai Shale (Austin, 1994, pp. 63, 137; Austin and Wise, 1994, pp. 38–39).

Recently, questions were raised regarding the validity and methodology of the CRS confirmation study from an Internet post forwarded to the Quarterly Editor. Answers to the post's issues were provided explaining why earlier studies failed to identify the modern and/or ancient plant pollen and spores within the Hakatai Shale (Williams, 1997). The results of this latest study supports the belief that pollen and spores occur within the Hakatai Shale and that they were deposited contemporaneously with the strata.

Hakatai Shale Comparisons with Other Fossiliferous Precambrian Strata

Uniformitarians view the Hakatai Shale as being deposited during the Proterozoic. It is age dated at approximately 1.25 Ga. Comparison of this Precambrian section to those of similar age found across other sections of the globe suggests that it is *not* out of the question to expect or find fossilized plant materials within the Hakatai Shale (Figure 2). Modern pollen and spores, however, are not expected in strata of this extreme age. In fact it is somewhat surprising that ancient fossilized plant material has

³These models place a Flood/pre-Flood boundary at the base of the Paleozoic, strongly implying the absence of fossils in older rocks formed during the creation Week—see Froede and Reed, 1999.

not been identified at an earlier date by uniformitarians for this stratigraphic unit (although it should be noted that Elston [1989, p. 264] hinted at the possibility of stromatolites being present within the Hakatai Shale, and Horodyski [in Link et al., 1993, p. 561] referenced a wide variety of fossils within various Precambrian strata of the Grand Canyon). However, the confirmation of ancient fossilized plant material per se in the Hakatai Shale would not contradict the uniformitarian model, as far older Precambrian strata have been found to contain plant fossils (Figure 2).

Implications For the Young-Earth Flood Model

The Precambrian Hakatai Shale has been examined four times for the presence of plant fossils. Ancient and modern forms were found in three of those investigations. However, some creationists still reject the presence of any fossilized plant material within the Hakatai Shale as it disagrees with their model (see Austin, 1994, p. 58, Figure 4.1; Austin and Wise, 1994, p. 40, Figure 1). According to Austin and Wise, the majority of the Precambrian strata represent Creation Week deposits and should not contain plant fossils since they formed before plants were created. They suggest that plant fossils would only occur in abundance within Flood deposits (i.e., above their Precambrian / Cambrian–pre-Flood / Flood boundary). By implication their model would need to explain the evidence of plant fossils within Precambrian strata from areas both in and outside of the Grand Canyon (see Appendix). This point is important because Austin and Wise have stated that they support the general framework of the global uniformitarian timescale while denying the old age of the earth (Austin 1994, p. 58, Figure 4.1; Austin and Wise, 1994, p. 40, Figure 1; Snelling et al., 1996). In order to defend their pre-Flood/Flood boundary being globally chronostratigraphically equivalent to that of the Precam-

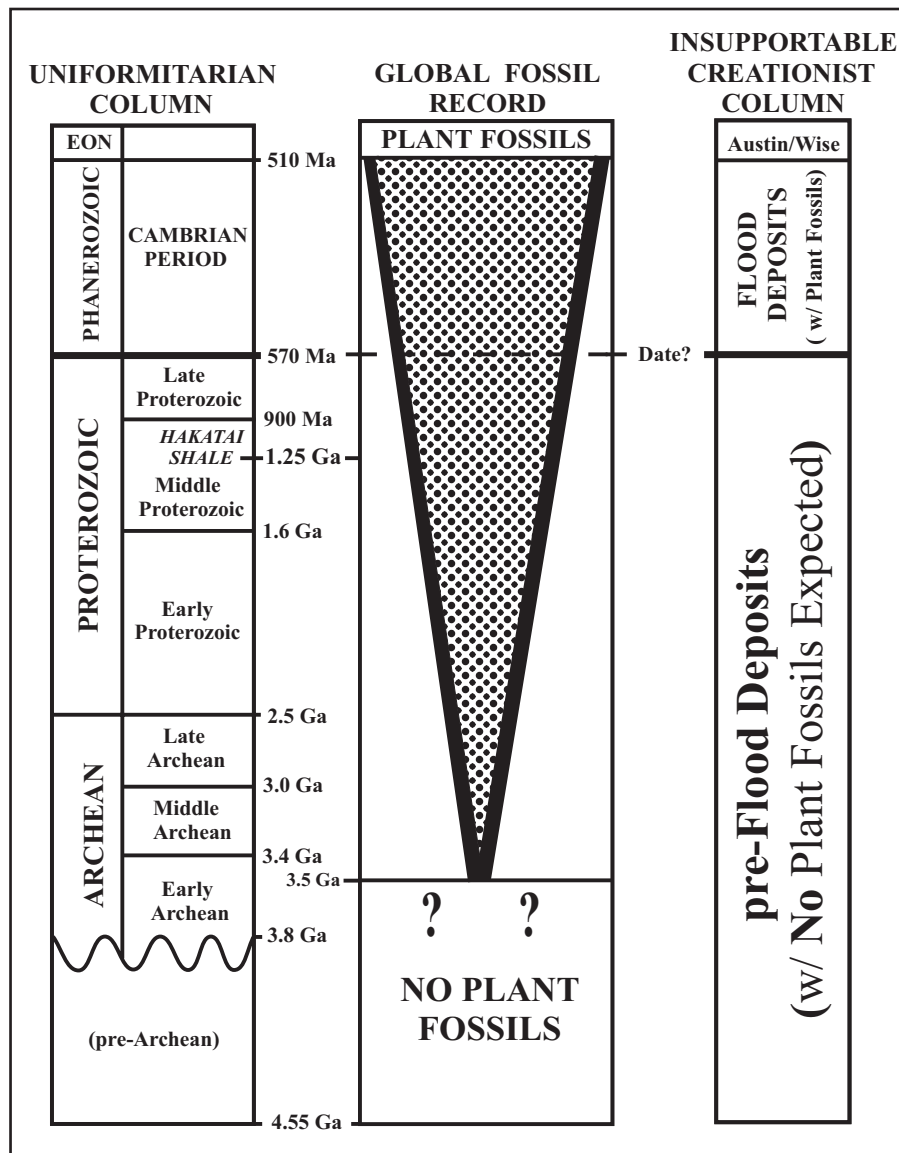


Figure 2. Within the global uniformitarian stratigraphic column the Precambrian/Cambrian boundary is located at 570 million years ago. One group of creationists has proposed that this boundary marks the end of the Antediluvian deposits and the beginning of the Flood deposits, and they use the lack of fossils and/or the transition to more advanced life forms to define this boundary (Austin, 1994; Austin and Wise, 1994; Baumgardner 1990; Wise, 1992). However, evidence of fossilized plants extend much deeper within the global uniformitarian stratigraphic column (modified from Schopf, 1994, Figure 1, and Schopf and Walter, 1983, Figure 1). Notice that the occurrence of plant fossils extends to 3.5 billion years ago—the lowest point where they have been identified and dated by uniformitarians. Fossilized plant material within the Precambrian is in violation of the Austin/Wise model.

brian/Cambrian boundary they should undertake palynological studies to prove that fossilized plants do not exist within any Precambrian strata. Their model of the stratigraphic column in the Grand Canyon remains questionable if they continue to deny the presence of Precambrian plant fossils.

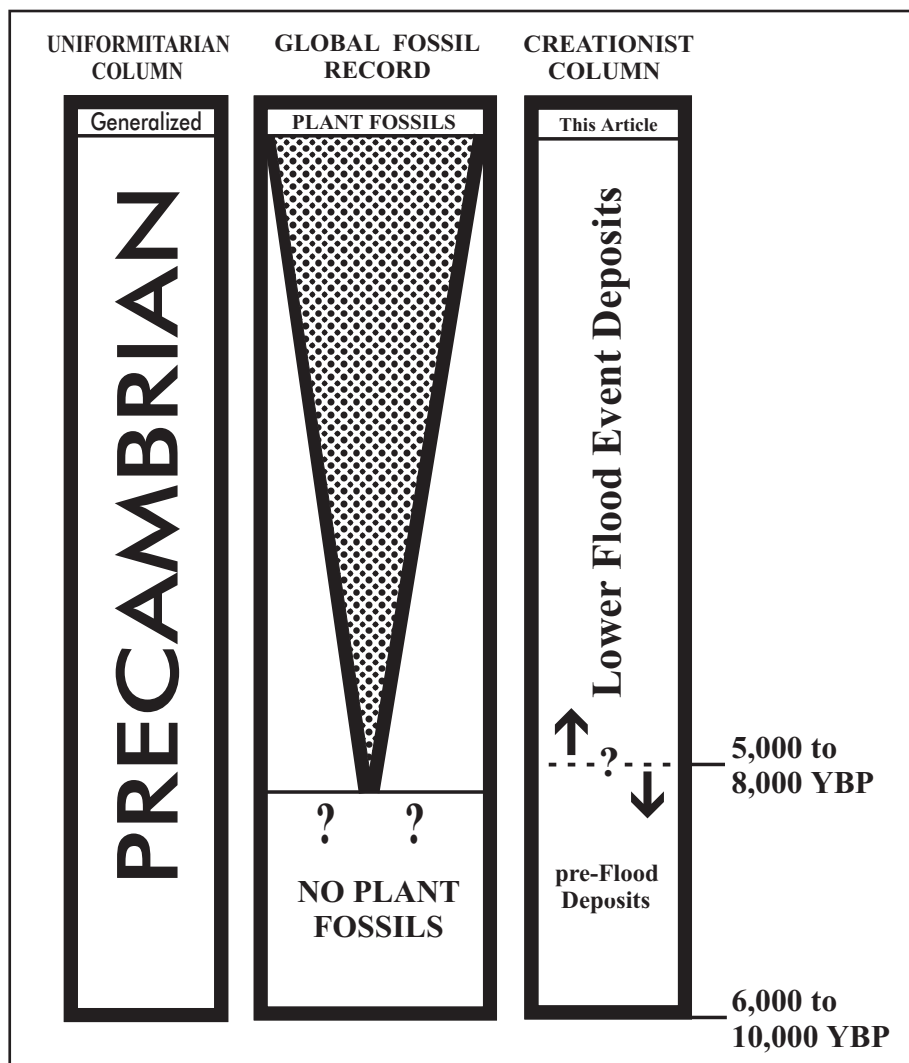


Figure 3. Recently, several creationists have advanced a different interpretation which proposes that Precambrian plant fossils represent Flood deposits (Froede, Howe, Reed, and Meyer, 1998; Snelling, 1991; Woodmorappe, 1983). These plant fossils have nothing to do with evolution or time, rather they reflect Antediluvian sediments and organic material buried in the global Flood. The exact location of the pre-Flood/Flood boundary would be determined at the specific outcrop based on changing energy levels and not on paleontology.

The identification of plant fossils within Precambrian shales has been documented. In fact, several uniformitarian geologists have commented that:

...in the light of results summarized here [for the Grand Canyon] together with important discoveries recently reported from other Precambrian shales, it seems reasonable to conclude that shaley facies represent a promising, but as yet largely untapped, source of new evidence on the diversity, evolution, and biostratigraphic usefulness of the Precambrian biota (Bloeser, Schopf, Horodyski, and Breed, 1977, p. 679).

I urge creationists to undertake studies to find fossilized plant materials in all Precambrian strata in an effort to help delineate the impact which the Flood had on the Earth's stratigraphic record.

Conclusion

A variety of Precambrian plant fossils have been documented in rocks as ancient as the Archean (Figure 2). Presently, any specifics about the kind of plants from which these fossilized remains were derived cannot be ascertained. Each new discovery of ancient fossilized plant material pushes back the timing of evolution of life on this planet. This creates difficulties for evolutionary models of life's origin and early history. Young-earth creationists hopefully will keep abreast of this interesting and relevant work. In addition to highlighting weaknesses in the evolutionary model, it helps us to define and refine our own framework of Flood-dominated stratigraphy.

It is important to note that proving the existence of generic plant material in the Hakatai Shale within the Grand Canyon will *not* affect the uniformitarian model of Earth history; it would only add a new location where Proterozoic plant material has been found. It is the evolutionary stage of Burdick's discovery that contradicts the global uniformitarian column. With time new "older" Archean outcrops containing plant fossils may be

found. The problem which uniformitarian geologists and paleontologists must address remains that of explaining life's point of origin and rapid dispersion across the planet.

The Austin/Wise stratigraphic model for the Grand Canyon appears questionable as it denies the known presence of Precambrian plant life found both within the canyon and globally. Further clarification is required in order to reconcile these conflicts in their model. The presence of plant fossils within the Hakatai Shale, documented on three occasions, also casts doubt on their approach to defining the strata within the Grand Canyon.

Hopefully these issues will be addressed in the near future.

Young-earth creationists should consider the paleontological potential of all sedimentary and metasedimentary Precambrian strata. Finding fossilized plant life within these “ancient” rock layers might be expected within the young-earth Flood model. Several creationists have proposed that some Precambrian strata were deposited during the global Flood of Genesis (Figure 3).

Creationists should take an active part in paleontological studies locating “ancient” Precambrian fossils across the earth. By doing so we accomplish two objectives: 1) We extend the depth of strata likely affected by the Flood, and 2) we push evolutionists to explain how life arose “fully-formed” across the earth so rapidly, and so very long ago. We need to aggressively pursue paleontological studies if we wish to demonstrate the weaknesses of evolution and uniformitarian geology in explaining the stratigraphic record. This is what the global uniformitarian stratigraphic column is based on (evolutionary biology/paleontology and *not* radiometric dating!) and this is where we need to focus our efforts (Froede, 1994, 1997). Precambrian plant fossils provide excellent evidence of Flood deposition within the young-earth Flood model.

Appendix

The controversy over the paleontology and stratigraphy of the Hakatai Shale (or any other Precambrian strata) raises a larger question than the mere presence or absence of fossilized plant material in the Precambrian. Rather, the core issue is whether or not young-earth creationists should use the global uniformitarian column to define biblical history. Austin and Wise follow the general framework of the global uniformitarian column (Austin, 1994, p. 58, Figure 4.1; Austin and Wise, 1994, p. 40, Figure 1; Snelling et al., 1996, p. 333, Figure 1). They have also proposed that the pre-Flood/Flood boundary should occur at the uniformitarian Precambrian/Cambrian boundary (Figure 2). This is based on their definition of the Paleontological Discontinuity criteria:

The slow deposition in the pre-Flood world would have made fossilization of plant, animal and fungal remains unlikely. Also, it is very likely that the initial erosion of the Flood destroyed or reworked virtually all of the fossils which were present in pre-Flood sediments. Consequently, below the pre-Flood/Flood boundary, sediments capable of preserving fossils might, at best, contain only traces

of the most abundant and easily fossilized life forms—bacterial, algal, and protist fossils—and *probably in very low abundance*. Plant, animal and fungal fossils might be expected to be found in high abundance only above the pre-Flood/Flood boundary. (Austin and Wise, 1994, p. 40) (*Italics mine*)

This statement is inconsistent, however, when dealing with the evidence of plant fossils in the uniformitarian Precambrian strata, and runs counter to what Schopf (1994, p. 194) has stated about the presence of plant fossils found within the Precambrian, Proterozoic Eon:

Stromatolites are virtually ubiquitous in Proterozoic carbonate terranes, represented by hundreds of taxonomic occurrences reported from a large number of Proterozoic basins. ...literally hundreds of microfossiliferous formations and nearly 3,000 occurrences of bona fide microfossils have been discovered in Proterozoic-age strata...

These creationists appear to have overlooked the record of plant fossils taken directly from the Precambrian strata within the Grand Canyon! They do not believe that plant fossils are abundant within the Precambrian strata of the Grand Canyon, and yet uniformitarians have documented them in several places and in abundance (see Bloeser, Schopf, Horodyski, and Breed, 1977; Elston, 1989; Elston and McKee, 1982; Ford, 1990; Horodyski, 1993; Knauth, 1994; Link et al., 1993; Nations and Stump, 1996; Schopf, Ford, and Breed, 1973). Since the Austin/Wise stratigraphic model for the Grand Canyon is inconsistent with the physical evidence, perhaps they should reexamine the role of the global uniformitarian column in their model. The global uniformitarian stratigraphic column is not required within the young-earth Flood model (Froede and Reed, 1999). I recommend that the use of the global uniformitarian column to define Flood geology in the Grand Canyon (or anywhere else) be rejected.

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References

- CRSQ: *Creation Research Society Quarterly*
CENTJ: *Creation Ex Nihilo Technical Journal*
- Austin, S.A. (editor). 1994. *Grand Canyon: Monument to catastrophe*. Institute for Creation Research, Santee, CA.
- Austin, S. A. and K.P. Wise. 1994. The Pre-Flood/Flood boundary: As defined in Grand Canyon, Arizona and eastern Mojave Desert, California. In Walsh, R.E. (editor). Technical symposium sessions. *Proceedings of the Third International Conference on Creationism*. Creation Science Fellowship, Pittsburgh, PA. pp. 37–47.
- . In preparation. *Defining the pre-Flood/Flood boundary within strata of the Southwestern United States*. ICR Technical Monograph. Institute for Creation Research, Santee, CA.
- Baumgardner, J. R. 1990. The imperative of non-stationary natural law in relation to Noah's Flood. *CRSQ* 27: 98–100.
- Bloeser, B., J. W. Schopf, R. J. Horodyski, and W. J. Breed. 1977. Chitinozoans from the Late Precambrian Chuar Group of the Grand Canyon, Arizona. *Science* 195:676–679.
- Burdick, C. L. 1966. Microflora of the Grand Canyon. *CRSQ* 3:38–50.
- . 1972. Progress report on Grand Canyon palynology. *CRSQ* 9:25–30.
- . 1974a. *Canyon of canyons*. Bible-Science Association, Caldwell, Idaho.
- . 1974b. More Precambrian pollen. *CRSQ* 11: 122–123, 126.
- . 1975. Cambrian and other pollen in the literature. *CRSQ* 12:175–177.
- . 1982. Reply to Rusch. *CRSQ* 19:144.
- Chadwick, A.V. 1982. Precambrian pollen in the Grand Canyon; A reexamination. *Origins* 8:7–12.
- Chadwick, A. V., P. DeBord, and H. Fisk. 1973. Grand Canyon palynology – A reply. *CRSQ* 9:238.
- Chaloner, W. G. 1967. Spores and land-plant evolution. *Review of Palaeobotany and Palynology* 1:83–93.
- Cloud, P. 1968. Pre-metazoan evolution and the origins of the metazoa. In *Evolution and environment*. Yale University Press, New Haven, CT. pp. 1–72.
- . 1976. Beginnings of biospheric evolution and their biogeochemical consequences. *Paleobiology* 2: 351–387.
- . 1983. Aspects of Proterozoic biogeology. In Medaris, L. G., Jr., C. W. Byers, D. M. Mickelson, W. C. Shanks (editors). *Proterozoic geology: Selected papers from an international Proterozoic symposium*. Geological Society of America Memoir 161. Boulder, CO. pp. 245–251.
- Cooper, R. A., J. B. Jago, D. I. MacKinnon, J. H. Shergold, and G. Vidal. 1982. Late Precambrian and Cambrian fossils from northern Victoria Land and their stratigraphic implications. In Craddock, C. (editor). *Antarctic geoscience*. International Union of Geol. Sciences. Univ. of Wisconsin Press, Madison. pp. 629–633.
- Elston, D. P. 1989. Grand Canyon Supergroup, northern Arizona: Stratigraphic summary and preliminary paleomagnetic correlations with parts of other North American Proterozoic successions. In Jenney, J. P. and S. J. Reynolds (editors). *Geologic evolution of Arizona*. Arizona Geological Society, Tucson, AZ. pp. 259–272.
- Elston, D. P. and E. H. McKee. 1982. Age and correlation of the late Proterozoic Grand Canyon disturbance, northern Arizona. *Geological Society of America Bulletin* 93:681–699.
- Ford, T. D. 1990. Grand Canyon Supergroup: Nankoweaup Formation, Chuar Group, and the Sixtymile Formation. In Beus, S. S. and M. Morales (editors). *Grand Canyon geology*. Oxford University Press, New York. pp. 49–70.
- Froede, C. R., Jr. 1994. Fossil wood of Big Bend National Park. *CRSQ* 30:187–189.
- . 1995. A proposal for a creationist geological timescale. *CRSQ* 32:90–94.
- . 1997. The global stratigraphic record. *CENTJ* 11(1):40–43.
- . 1998. *Field studies in catastrophic geology*. Creation Research Society Books, St. Joseph, Mo.
- Froede, C. R., Jr., G. F. Howe, J. K. Reed, and J. R. Meyer. 1998. A preliminary report on the Precambrian Pikes Peak Iron Formation, Yavapai County, Arizona. *CRSQ* 35:15–22.
- Froede, C. R., Jr. and J. K. Reed. 1999. Assessing creationist stratigraphy with field evidence. *CRSQ* 36:51–60.
- Glaessner, M. F. 1979. Precambrian. In Robison, R. A. and C. Teichert (editors). *Treatise on invertebrate paleontology*, Part A: Introduction. Geological Society of America, Boulder, CO. pp. A79–A118.
- Harrison, J. E. and Z. E. Peterman. 1982. Precambrian time scale. In Dutro, J. T., Jr., R. V. Dietrich, and R. M. Foote (compilers). 1989. *American Geological Institute data sheets*. Third edition. Alexandria, VA. p. 1.3
- Hofmann, H. J. 1971. *Precambrian fossils, pseudofossils, and problematica in Canada*. Geological Survey of Canada Bulletin 189. Ottawa.
- Hofmann, H. J. and J. W. Schopf. 1983. Early Proterozoic microfossils. In Schopf, J. W. (editor). *Earth's earliest biosphere: Its origin and evolution*. Princeton University Press, Princeton, NJ. pp. 321–360.
- Horodyski, R. J. 1993. Paleontology of Proterozoic shales and mudstones: Examples from the Belt Supergroup, Chuar Group and Pahrump Group, western USA. *Precambrian Research* 61:241–278.

- Howe, G. F. 1986. Creation Research Society studies on Precambrian pollen. *CRSQ* 23:99–104.
- Howe, G. F., E. L. Williams, G. T. Matzko, and W. E. Lammerts. 1986. Pollen research update. *CRSQ* 22: 181–182.
- . 1988. Creation Research Society studies on Precambrian pollen—Part III: A pollen analysis of Hakatai Shale and other Grand Canyon rocks. *CRSQ* 24:173–182.
- Hunter, M. J. 1992. Archean rock strata: Flood deposits—the first 40 days. In *Proceedings of the 1992 Twin-cities Creation Conference*. Twin-Cities Creation-Science Association. Northwestern College, Roseville, MN. pp. 153–161.
- Iltchenko, L. N. 1972. Late Precambrian acritarchs of Antarctica. In Adie, R. J. (editor). *Antarctic geology and geophysics*. International Union of Geological Sciences. Scandinavian University Books, Oslo, Norway. pp. 599–602.
- Knauth, L. P. 1994. Life on land in the Precambrian—The Arizona connection. In Boaz, D., M. Dornan, and S. Bolander (editors). *Fossils of Arizona Symposium*. Mesa Southwest Museum, Mesa, AZ. pp. 23–32.
- Knoll, A. H. 1992. Biological and biogeochemical precludes to the Ediacaran radiation. In Lipps, J. H. and P. W. Signor (editors). *Origin and early evolution of the metazoa*. Plenum Press, New York. pp. 53–84.
- Lammerts, W. E. and G. F. Howe. 1987. Creation Research Society studies on Precambrian pollen—Part II: Experiments on atmospheric pollen contamination of microscope slides. *CRSQ* 23:151–153.
- Link, P. K., N. Christie-Blick, W. J. Devlin, D. P. Elston, R. J. Horodyski, M. Levy, J. M. G. Miller, R. C. Pearson, A. Prave, J. H. Stewart, D. Winston, L. A. Wright, and C. T. Wrucke. 1993. Middle and Late Proterozoic stratified rocks of the western U.S. cordillera, Colorado plateau, and basin and range province. In Reed, J. C., Jr., M. E. Houston, R. S. Houston, P. K. Link, D. W. Rankin, P. K. Sims, and W. R. Van Schmus (editors). *Precambrian: Conterminous U. S.* The geology of North America, Vol. C-2. Geological Society of America, Boulder, CO. pp. 558–565.
- Margulis, L. 1988. The ancient microcosm of planet earth. In Osterbrock, D. E. and P. H. Raven (editors). *Origins and extinctions*. Yale University Press, New Haven, CT. pp. 83–107.
- McMenamin, M. A. S. and D. L. S. McMenamin. 1990. *The emergence of animals: The Cambrian breakthrough*. Columbia University Press, New York.
- McNamara, K. and J. Long. 1998. *The evolution revolution*. Wiley Press. New York.
- Nations, D. and E. Stump. 1996. *Geology of Arizona*. Second edition. Kendall/Hunt, Dubuque, IA.
- Read, H. H. and J. Watson. 1975. *Introduction to geology, Volume 2: Earth history, Part I: Early stages of Earth history*. John Wiley and Sons, New York.
- Reed, J. K. and C. R. Froede Jr. 1997. A biblical Christian framework for Earth history research Part III—Constraining geologic models. *CRSQ* 33:285–292.
- Reed, J. K., C. R. Froede Jr., and C.B. Bennett. 1996. The role of geologic energy in interpreting the stratigraphic record. *CRSQ* 33:97–101.
- Rusch, W. H., Sr. 1968. The revelation of palynology. *CRSQ* 5:103–105.
- . 1982. The present position of Pre-Cambrian pollen. *CRSQ* 19:143–144.
- Schopf, J. W. 1982. The evolution of the earliest cells. In *The fossil record and evolution: Readings from Scientific American*. W. H. Freeman, San Francisco, CA. pp. 46–62.
- . 1994. The oldest known records of life: Early Archean stromatolites, microfossils, and organic matter. In Bengtson, S. (editor). *Early life on earth*. Columbia University Press, New York. pp. 193–206.
- . 1999. *Cradle of life: The discovery of earth's earliest fossils*. Princeton University Press, Princeton, NJ.
- Schopf, J. W., T. D. Ford, and W. J. Breed. 1973. Microorganisms from the Late Precambrian of the Grand Canyon, Arizona. *Science* 179:1319–1321.
- Schopf, J. W. and M. R. Walter. 1983. Archean microfossils: New evidence of ancient microbes. In Schopf, J. W. (editor). *Earth's earliest biosphere: Its origin and evolution*. Princeton University Press, Princeton, NJ. pp. 214–239.
- Snelling, A. A. 1991. Creationist geology: Where do the Precambrian strata fit? *CENTJ* 5:154–175.
- Snelling, A. A., J. Scheven, P. Garner, M. Ernst, S. A. Austin, M. Garton, E. Scheven, K. P. Wise, and D. Tyler. 1996. The geological record. *CENTJ* (3):333–334.
- Strother, P. K. 1989. Pre-metazoan life. In Allen, K. and D. Briggs (editors). *Evolution and the fossil record*. Smithsonian Institution Press, Washington, D.C. pp. 51–72.
- Walker, T. 1994. A biblical geologic model. In Walsh, R.E. (editor). *Technical symposium sessions. Proceedings of the Third International Conference on Creationism*. Creation Science Fellowship, Pittsburgh, PA. pp. 581–592.
- Walter, M. R. 1983. Archean stromatolites: Evidence of the Earth's earliest benthos. In Schopf, J. W. (editor). *Earth's earliest biosphere: Its origin and evolution*. Princeton University Press, Princeton, NJ. pp. 187–213.
- Williams, E. L. 1997. Precambrian pollen—A response. *CRSQ* 33:239–242.
- Wise, K. W. 1992. Some thoughts on the Precambrian fossil record. *CENTJ* 6:67–71.
- Woodmorappe, J. 1983. A diluvial treatise on the stratigraphic separation of fossils. *CRSQ* 20:133–185.

Photo Essay

Willow Mountain: An Intrusive Columnar Rhyolite

Willow Mountain presents a challenge to the uniformitarian concept of igneous rock formation. It is located approximately three miles north of Study Butte, Texas (north of the western portion of Big Bend National Park), and is located within the Christmas Mountains. Rising 1000 feet above the surrounding topography, the columnar jointing of the mountain is easily observed from Texas Highway 118, and with the correct angle of sunlight it is a beautiful and perplexing sight (Figure 1). While basalt commonly occurs in a columnar form, a massive outcropping of rhyolite in this form is unique.

Willow Mountain is identified as a quartz syenite and is believed to be associated with widespread intrusive volcanic activity which occurred across this section of west

Texas during the late Eocene to early Oligocene (42 to 34 Ma) [Barker, Henry, and Price, 1986; Carman and Cameron, 1986; Henry and McDowell, 1986]. The composition of the volcanic rocks intruded during this purported span of many millions of years range from rhyolitic to ultramafic.

Most interesting to us is that intrusive types of volcanics, commonly referred to in the geologic literature as *granites* and *diorites*, are usually referred to in this section of west Texas by their extrusive counterparts, i.e., *rhyolites* and *basalts*, respectively. This is because these intrusive volcanic rocks have the same crystal form as their extruded equivalent. This would suggest that while they were emplaced below the earth's former sur-



Figure 1. Willow Mountain's western face (as seen from Texas Highway 118), rises 1000 feet above the surrounding surface and exposes approximately three-quarters of a mile of columnar quartz syenite. Although it is identified as an intrusive volcanic rock (i.e., a micro-granite), its crystal form is identical to that of a rhyolite (an extrusive quartz-rich volcanic rock). The rapid means by which this intrusive rock formed and cooled in the subsurface suggests that it occurred during the Flood. At some later period Floodwater eroded away the thin overburden exposing it largely as it exists today.

face *they cooled very rapidly*. No uniformitarian explanation has been proposed to address how intrusive volcanic rocks have the same crystal form as their extrusive equivalent.

We suggest that “intrusives” like the Willow Mountain rhyolite (actually it has been referred to as a “micro-granite,” due to its extremely small crystal grain size) reflect conditions associated with the Flood. We propose that these molten rocks were intruded into overlying water-saturated marine sediments while Floodwater still covered this area. These igneous rocks rapidly cooled. The movement of Floodwater eroded away the thin overburden and exposed these extrusive-like “intrusive” volcanics at the Earth’s surface. Later, the withdrawal of Floodwater served to expose these rhyolites and basalts to subaerial conditions. The wet weather conditions associated with the single post-Flood ice age (Oard, 1990), contributed additional erosion, albeit minor in comparison to that experienced by the earlier period of raging Floodwater. Today these “intrusives” stand hundreds of feet high above the surrounding area, and provide evidence of what were high-energy conditions associated with the global Flood of Genesis.

Acknowledgements

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References

- Carman, M. F. and M. Cameron. 1986. Petrology of shallow intrusive rocks near Study Butte, Texas. In Pausé, P. H. and R. G. Spears (editors), *Geology of the Big Bend Area and Solitario Dome, Texas*. West Texas Geological Society Field Trip Guidebook. Midland, TX. pp. 153-158.
- Barker, D. S., C. D. Henry, and J. G. Price. 1986. Day 3 - Alpine to Big Bend National Park to Marathon. In Price, J. G., C. D. Henry, D. F. Parker, and D. S. Barker (editors), *Igneous geology of Trans-Pecos Texas*. Guidebook 23. Texas Bureau of Economic Geology. Austin. pp. 82-83.
- Froede, Jr., C. R. 1998. Defining geological time using the stratigraphic record. In *Field studies in catastrophic geology*. Creation Research Society Books. St. Joseph, MO. pp. 1-5.
- Henry, C. D., and F. W. McDowell. 1986. Geochronology of magmatism in the Tertiary volcanic field, Trans-Pecos Texas. In Price, J. G., C. D. Henry, D. F. Parker, and D. S. Barker (editors), *Igneous geology of Trans-Pecos Texas*. Guidebook 23. Texas Bureau of Economic Geology. Austin. pp. 99-122.
- Oard, M. J. 1990. *An ice age caused by the Genesis Flood*. Institute for Creation Research. El Cajon, CA.
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Craniodental variability in the domestic dog (*Canis familiaris*) and its Implications for the Variability in Primates

Celedonio Garcia-Pozuelo-Ramos*

Abstract

The domestic dog (*Canis familiaris*) constitutes a species that has attained considerable variability in historic times. The crania and dentition of a sample of the domestic dog *Canis familiaris* have been statistically analyzed with methods that have been employed to determine variability in other species. The results point to a degree of variation in the dog crania and dentition that may be a useful tool for creationists in determining the boundaries of the holobaramins (created kinds).

The results obtained from dog crania do not support the division of *Homo erectus* into two, or

more, different species, but are compatible with the hypothesis that they are all part of one species.

Variability in the cranium and dentition of this living monobaramin (*Canis familiaris*) suggest that *H. erectus*, archaic *H. sapiens* fossils of diverse origin, and *H. sapiens sapiens* should be lumped into one kind (holobaramin¹).

The degree of morphological variability in domestic dogs is an important tool for assessing the variability of extinct kinds, and the limits of morphological variability within living beings.

Introduction

The domestic dog has been used by creationists as an example of a creature showing great variation in a short time. This study quantifies the variability of cranial and dental traits of *Canis familiaris*. Although the data obtained are limited, I will utilize them to study the limits of holobaramins¹ of primates, with special attention to the holobaramin that includes human beings—both current and fossil. In this report it is largely cranial traits that have been examined, although some dental measurements have been utilized as well.

The variability has been analyzed by the coefficient of variation, with the range expressed as a percentage of the average, and the index of the minimum and maximum values. Whenever possible, an F-test was used to compare standard deviations.

Using this method the results support a degree of variation in *Canis familiaris* that is equivalent to (or greater than) the variation found in the mix of various near spe-

cies of genus *Canis*. When the data from several *H. erectus* fossils from both Asiatic and African regions are mixed, their cranial variability is less than that which we find in the domestic dog, and this variability does not generally exceed, the variability (CV) which is considered the usual maximum for a single mammal species. Using the same methodology and standards, a mix of the data of *H. erectus*, archaic *H. sapiens*, and *H. sapiens sapiens* specimens shows that all these species should be lumped into one holobaramin. This work is the continuation and complement of my previously published article (García-Pozuelo-Ramos 1998).

¹In this paper I frequently use the words *holobaramin* and *monobaramin*. They are defined according to ReMine (1990): a holobaramin is "A complete set of organisms related by common descent. A group containing all and only those organisms related by common descent." A monobaramin is "A group containing only organisms related by common descent, but not necessarily all of them."

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Materials and Methods

My data include measurements taken from my own set of dog crania and data from authors cited in the text. The dimensions measured were chosen because of their relevance and ease of handling, and are described in Table I and Figure 1. The data for *H. erectus*, archaic *H. sapiens*, and *H. sapiens sapiens* come from several sources. The fossils studied are given in Table II with the number of teeth or skulls analyzed for each case. The craniometric points are as listed in Figure 2.

I used the coefficient of variation, CV^2 . The range is expressed as a percentage of the average— $R\%$; and the index between the maximum and minimum value is $I_{\max/\min}$. These statistical tools are frequently used in paleontology to determine if different species were included in one fossil sample (e.g. Gingerich, 1974; Cope and Lacy, 1992; Martin and Andrews, 1993; Teaford, Walker, and Mugaisi, 1993; Thomson, 1996). For an additional discussion on these statistical tools, see García-Pozuelo-Ramos (1998).

The criteria used in this study to determine whether the variability in the domestic dog exceeds the variability of the species taxon are based on the work of Martin and Andrews (1993) as well as Thomson (1996), who use mixes of species similar to the one being studied; and Simpson, Roe, and Lewontin (1960) who gave a value of 10 for the CV as the maximum value of variability belonging to a single species. I use a CV limit of 10 as well as the intrinsic variation (the variance or standard deviation of the logarithm of the measurements as in Lewontin, 1966) because it is invariant under a multiplicative change. This compares the variability among different beings like canids and primates in a more effective manner. The intrinsic variation allows a demonstration of similarities even when there is a reduced number of data, as it is usually the case

Table I. Description of the skull measurements taken from the domestic dog sample. The lettered distances here are shown in Figure 1.

- (a'): Condylbasal length.
- (b'): Maximum skull width across the zygomatic arches.
- (c'): Skull breadth across the mastoid process.
- (d'): Postorbital process width.
- (e'): Interorbital breadth.
- (f'): Minimum width of cranium at postorbital constriction.
- (g'): Cranial vault width to parietal-temporal suture.
- (i'): Face length.
- (j'): Length of auditory bulla from the carotid channel to the farthest back area.
- (k'): Basicranial axis length.
- (l'): Alar caudal foramen to alar rostral foramen arch length.

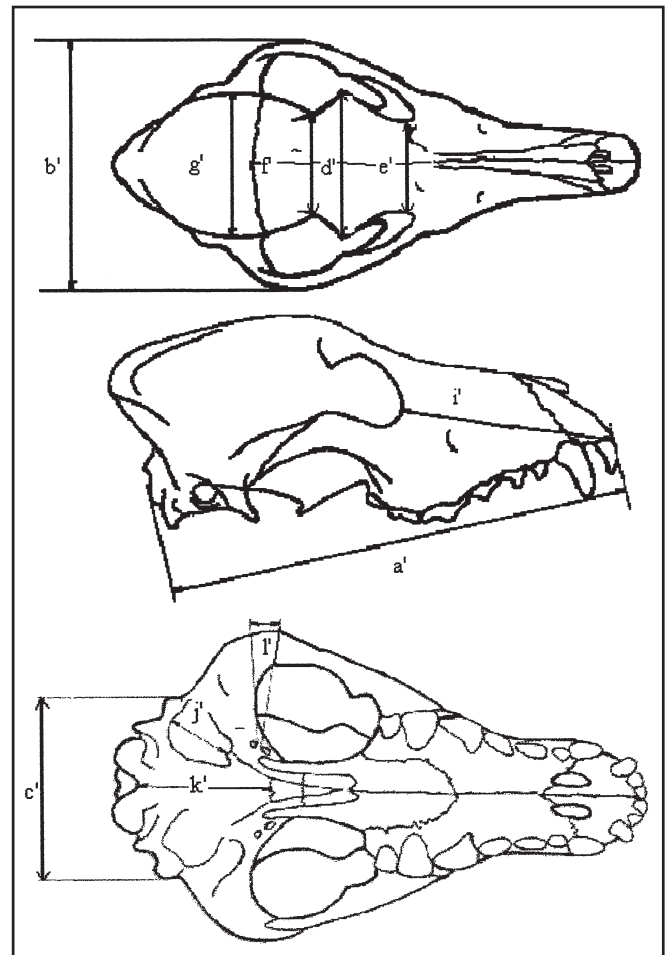


Figure 1. Cranial measurements taken on domestic dog skulls. The lettered measurements shown here are named in Table I.

with fossils (Lewontin, 1966). An additional advantage of the intrinsic variation over the CV is that all the usual statistical tests can be performed (Lewontin, 1966). When it has been possible, I have carried out the F-test in order to compare the significance of the differences between different intrinsic variations of humans and dogs. The utilization of F-test to determine the significance of the differences in intrinsic variation of several samples has been demonstrated by Uchida (1996). No matter which method is used, however, one can never say with absolute certainty that a particular sample is composed of just one species (Martin and Andrews, 1993). The data can demon-

²CV is the standard deviation expressed in percent to the arithmetic mean of the given population. The Coefficient of Variation is used to compare the variation of a measurement (for example, the length of legs) in different populations or species, independently of the magnitude of their measurement (for example, to compare the length of the legs of elephants with the length of legs of horses).

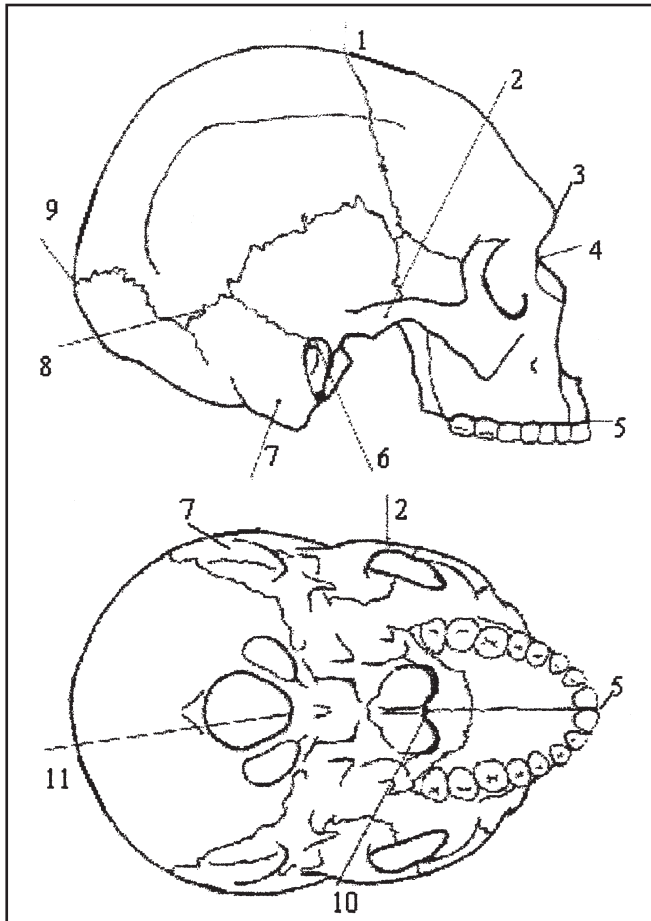


Figure 2. Cranial landmarks on skulls of *Homo sapiens*. (1) Bregma. (2) Zygomatic arch. (3) Glabella. (4) Nasion. (5) Prosthion. (6) Auricular. (7) Mastoidal process. (8) Asterion. (9) Lambda. (10) Staphylion. (11) Basion.

strate the presence of more than one species with some degree of certainty.

Results and Discussion

Comparison of the coefficient of variation between measurements from skulls of different canids shows that the CV values for the domestic dog (*Canis familiaris*) generously exceed the CV values of different species and mixes of canis, called Mix1 and and Mix2 (Table III and Figure 3). The width of the neurocranium (g'), however, is an exception in that this width is similar in the dog and the other canid species analyzed. The g' value for domestic dog is less than 10 and is less than the g' value for Mix1 and Mix2 (Table III and Figure 3).

Morey (1992) has studied a sample of 65 dogs from several different archeological sites. I have compared the sample of dogs studied by Morey (1992) with my sample of 43 domestic dogs in three measurements — a' (length of cranium), g' (cranium width), and i' (length of face).

Table II. List of teeth and skulls utilized in mix of *H. sapiens sapiens*, archaic *H. sapiens* and *H. erectus*. The numbers in parentheses following each type of specimen refer to origin of data.

Teeth

Homo sapiens sapiens: KS 81001 B,C,D,E,H (1); KP 79501 (1); Krm 13400, 14696, 16424 (2); 262587, 304095, 320916, 339064 (3).

Archaic *Homo sapiens*: Xujiayao (1); Changyang (1); PA 74, 874, 875 (1); Ehringsdorf (3); Le Moustier (3); Spy 1, 2 (3); La Quina H5 (3); Krapina (3); L.H.18 (4); Dmanisi (5); Thomas Quarry 1 (5); Mauer (5).

Homo erectus: Chenjiawo (1); PA 637, 836, 838, 839 (1); *H. erectus pekinensis* (1); KNM-ER 820, 922, 3733 (6); KNM-WT 15000 (6); Sangiran 4, 5, 17 (6); Tighenif 1, 2, 3 (6); Trinil 4 (6).

Skulls

Homo sapiens sapiens: Liujiang (1); Zhoukoudian 101, 102, 103 (1); Cohuna (7); Kow Swamp 1, 5, 14 (7) Cos-sack (8); 792 (9); 279540 (10); 23, 1303, 1417, 1420, 219263 (11); 228017 (12); 7539-10, 242869, 283619, 378403 (13); 3780, 3786, 3811, 3829, 3839, 4040, 4042, 4071, 4080 (14).

Archaic *Homo sapiens*: Dali (1); Jinniushan (1); Rhodesia (3); Neander (3); Spy 1, 2 (3); Gibraltar (3); Monte Circeo (3); Petralona (3); Cr 4, 5, 6 (15); Nduutu (16); Steinheim (16); La Ferrassie 1 (17); La Chapelle aux Saints (17); La Quina (17); Le Moustier (17); Danakil (18).

Homo erectus: Gongwangling (1); Hexian (1); *H. erectus pekinensis* II, III, V, X, XI, XII (1); KNM-ER 3733, 3883 (6); OH 9(6); Sangiran 2, 4, 10, 12, 17 (6); Trinil 2 (6).

References

- (1) Wu, and Poirier (1995).
- (2) Rightmire, and Deacon (1991).
- (3) Hrdlicka (1930).
- (4) Day et al. (1980).
- (5) Gabunia, and Vekua (1995).
- (6) Wood (1991).
- (7) Thorne, and Wolpoff (1981).
- (8) Freedman, and Lofgren (1979).
- (9) Burkitt, and Hunte (1922).
- (10) Hrdlicka (1924).
- (11) Hrdlicka (1928).
- (12) Hrdlicka (1927).
- (13) Hrdlicka (1944).
- (14) Shapiro (1929).
- (15) Arsuaga et al. (1997).
- (16) Clarke (1990).
- (17) Heim (1974).
- (18) Abate (1998).

The three measurements show a greater CV value in my sample, especially in the length of the cranium (a'), and the length of the face (i') (Table III and Figure 4). These data suggest that within historical times the morphological diversification of the domestic dog has increased.

In the order Primates, the mix of seven species of guenons (genus *Cercopithecus*) manifests a variability CV below 10 except in basion-prosthion length (16 of Ta-

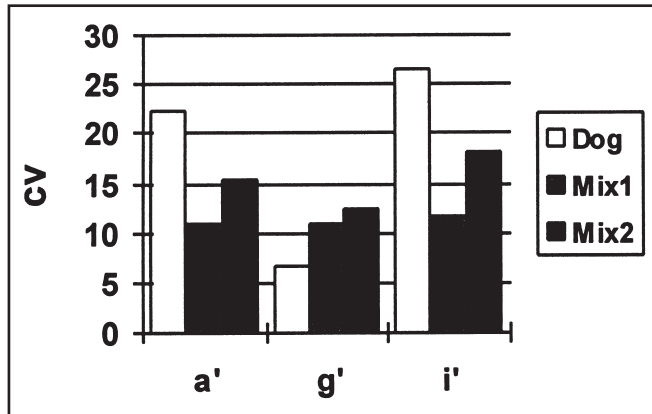


Figure 3. Comparison of the coefficient of variation between cranial dimensions of domestic dog and Mix1 (*C. lupus* and *C. latrans*), and Mix2 *C. lupus*, *C. latrans*, and *C. aureus*). The lettered items are listed in Table I and illustrated in Figure 1.

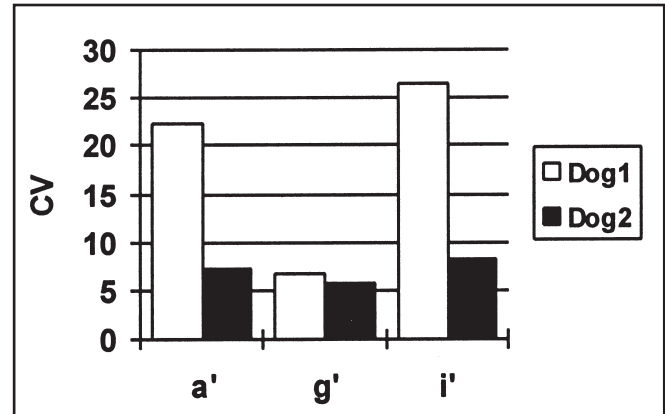


Figure 4. Comparison of the coefficient of variation between cranial dimensions of domestic dog, Dog1: author's collection, and Dog2: archaeological collection after Morey (1992). The lettered items are listed in Table I and illustrated in Figure 1.

ble IV) and staphylion-basion length (26 of Table IV). The three measurements that have been possible to compare between the *Cercopithecus* mix and *Canis familiaris* (postorbital constriction—6 of Table IV and f' of Table VI; interior biorbital breadth—19 of Table IV and e' of Table VI; and bizygomatic breadth—20 of Table IV and b' of Table III) show the greater variability in the domestic dog. Hence, *Cercopithecus* represents one morphologically coherent group, just as has been suggested by some authors (Hartwig-Scherer, 1993; García-Pozuelo-Ramos, 1997; Robinson and Cavanaugh, 1998).

In the case of the mix of data of three pongids—*Gorilla gorilla* (the gorilla), *Pan troglodytes* (the chimpanzee), and *Pongo pygmaeus* (the orangutan)—the postorbital constriction is less variable than in the dog. The

Table III. Comparison of the coefficient of variation between measurements from skull of different canids and mixes.

Canids	a'	b'	c'	e'	g'	i'
Dog1	22.2(43)	15.8(40)	18.8(41)	20.5(41)	6.8(42)	26.5(43)
Dog2 (1)*	7.3	-	-	-	5.6	8.2
Canis lupus(1)*	5.2	-	-	-	3.8	5.5
Canis latrans(1)*	4.4	-	-	-	3.9	5.5
Canis aureus(1)*	7.0	-	-	-	4.9	8.2
Mix1(1)*	10.9	-	-	-	10.8	11.6
Mix2(1)*	15.3	-	-	-	12.4	18.0
Vulpes vulpes(2)*	4.6	5.2	6.0	8.0	-	-
Lycaon pictus(3)*	-	-	-	-	6.1	3.4

The numbers in parentheses behind the CV values for Dog1 correspond to the number of specimens used in this study. The numbers in parentheses with an asterisk (standing after each category) correspond to the references for the original data in which (1)* is Morey, 1992; (2)* is Huson, and Page, 1979; and (3)* is Girman et al., 1993. Mix1 included *C. lupus* (the gray wolf), and *C. latrans* (the coyote). Mix2 contained *C. lupus*, *C. latrans*, and *C. aureus* (the golden jackal). Dog1 is the author's collection of dog skulls, and Dog2 is the archaeological collection of dog skulls in Morey (1992). Key letters in Table IX.

Table IV. Coefficient of variation, index between the maximum and minimum value and range, expressed as a percentage of average in measurements from skull in mix of *Cercopithecus* genus (guenons).

Mix of <i>Cercopithecus</i>	3	6	7	8	10	16	19	20	26	40
CV	8.5	4.1	7.1	8.5	6.3	12.1	6.8	9.7	13.4	7.3
Imax/min	1.7	1.2	1.4	1.6	1.4	1.6	1.4	1.5	1.7	1.4
R%	60.7	20.0	29.4	46.7	32.0	47.5	30.8	41.5	54.9	34.4

3: Basion-nasion length. 6: Postorbital constriction. 7: Biauricular breadth. 8: Anterior basicranial breadth. 10: Basion-bregma chord. 16: Basion-prosthion length. 19: Interior biorbital breadth. 20: Bizygomatic breadth. 26: Staphylion-basion length. 40: Maxilar breadth. This mix included *C. aethiops*, *C. ascanius*, *C. cephus*, *C. l'hoesti*, *C. mitis*, *C. mona*, and *C. neglectus*. Key numbers, and data after Verheyen (1962).

Table V. Coefficient of variation in measurements from skull of pongids.

Pongids	1	2	3	5	13	20
<i>G. gorilla</i> (the gorilla) (61)	6.7	6.6	6.5	6.2	8.9	11.0
<i>P. troglodytes</i> (the chimpanzee) (60)	3.5	3.4	5.0	5.0	7.4	5.7
<i>P. pygmaeus</i> (the orangutan) (53)	5.6	7.5	6.3	6.6	10.2	13.9
Mix of the three (174)	10.1	6.9	10.2	7.0	9.2	15.4

1: Maximum length. 2: Maximum breadth. 3: Basion-bregma length. 5: Post-orbital constriction. 13: Palatal breadth. 20: Bizygomatic breadth. Key numbers and data after O'Higgins, Moore, Johnson, and McAndrew (1990). The numbers in parentheses after each category at the left are the number of specimens analyzed.

variability of maximum breadth and bizygomatic breadth (2 and 20 in Table V) in a mix of pongids is similar to the variability of cranial vault width and bizygomatic breadth (g' and b' in Table III) in domestic dog (Dog1 in Table III). We cannot compare the palatal breadth of the mix of pongids with my sample of dogs, but their CV is less than 10. Only one of the six measurements (the basion-bregma length) in great apes has a CV value slightly greater than 10 (Tables III, V, VI, and Figure 2). These results support the idea suggested by some authors that all the pongids belong to the same holobaramin (García-Pozuelo-Ramos, 1997).

The mix of *H. erectus* I have studied exposes a CV in cranial traits below 10, except in the biasterionic breadth (Table VII and Figure 2). Hence, the cranial variability in *H. erectus* specimens is smaller than what is considered the limit of the species. The CV of dental measurements leads to the same conclusion (García-Pozuelo-Ramos, 1998). Kramer (1993) has also found that the variability of certain cranial measurements of *H. erectus* does not justify the division of this taxon into several species, as was proposed by other researchers (e.g. Jacob, 1976; Alexeev, 1986; Wood, 1992).

When we compare the CV for cranial variability in modern man with values for a mix of *H. erectus*, archaic *H. sapiens*, and *H. sapiens sapiens* (modern man), the mix is more variable (Tables VIII and IX). In the case of the basion-bregma length (Figure 2), the CV values in

the mix of *Homo* is greater than in the mix of pongids (Tables V and IX).

Dental variability (CV, $I^{\max}/_{\min}$, and R%) in mix of *Homo* is lower than such variability in the domestic dog (Table IX, García-Pozuelo-Ramos, 1998). The F-test analysis demonstrates that differences between the intrinsic variability of dental measurements in the mix of *Homo* and domestic dog are significant (see Table X).

The cranial measurements that can be compared between the dog and the mix of *Homo* are few in this study. The

variability (CV, $I^{\max}/_{\min}$, and R%) of the cranial greatest length is greater in the domestic dog than in the mix of *Homo* (Tables III and IX). The F-test analysis shows that the difference between intrinsic variability in *Homo* and *Canis familiaris* is significant for cranial greatest length (Table X). Four of the seven cranial measurements analyzed in the mix of *Homo* have a CV value of less than 10. Three of these cases are greater than CV value 10, and one of these is biasterionic breadth (Figure 2). There is no measurement of biasterionic breadth for the domestic dog in this study. However, I have compared it with cranial vault width (g' of Table I). In the dog the CV value is less than that of the mix of *Homo*. That difference is significant according to the F-test (Table X). According to these data the cranio-dental variability of the mix of *Homo* would be, at most, similar to such variability in *Canis familiaris*, when these data are taken together.

Dental variability is greater in *Canis familiaris* than in the mix of *Homo* (Table IX, and García-Pozuelo-Ramos, 1998) but it is more difficult to compare the variability between these two. In the mix of *Homo* four out of seven measurements are not greater than CV of value 10. In the case of the dog, fourteen measurements of the cranium generously exceed CV of 10. Only one, g' (cranial vault width to parietal-temporal suture, Table I and Figure 1), has a CV value less than 10 which was also less than that seen in canids mix1 and mix2 and it was close to the CV of other species of canids (Table III).

Table VI. Coefficient of variation, index between the maximum and minimum value and range, expressed as a percentage of average in measurements from skull of dog.

Dog1	d'	f'	h'	j'	k'	l'	m'	n'	o'
CV	20.1(41)	10.6(42)	21.1(39)	17.3(43)	19.7(41)	25.9(43)	22.6(40)	29.0(39)	25.6(40)
$I^{\max}/_{\min}$	2.2	1.7	2.4	1.8	2.0	3.1	2.1	3.3	2.4
R%	78.0	57.3	82.8	56.5	65.3	109.4	73.5	109.3	83.2

The numbers in parentheses correspond to the number of specimens measurements for each lettered data item. This table is complementary to Table III. The lettered measurements are described in Table I and illustrated in Figure 1.

Table VII. Coefficient of variation in measurements from skull of *H. erectus*.

	8	9	12	14	25	31
CV	7.5(13)	4.0(13)	4.3(13)	10.2(14)	8.7(14)	8.0(11)

8: Minimum frontal breadth. 9: Maximum parietal breadth. 12: Supramastoid breadth. 14: Biasterionic breadth. 25: Bregma-lambda length. 31: Lambda-asterion length. The numbers in parentheses correspond to the number of specimens used in this study. Key numbers and data after Wood (1991).

Table VIII. Coefficient of variation in cranial dimensions of *Homo sapiens sapiens*.

	AUB	BNL	XCB	ZYB	WCB	ASB	BPL	DKB	BBH
CV	4.4	4.3	3.8	4.8	5.4	4.5	5.3	9.7	4.2

AUB: Biauricular breadth. BNL: Basion-nasion length. XCB: Maximum cranial breadth. ZYB: Bizygomatic breadth. WCB: Minimum cranial breadth. ASB: Biasterionic breadth. BPL: Basion - prosthion length. DKB: Interorbital breadth. BBH: Basion-bregma length. Key letters, and data after Howells (1989).

Table IX. Coefficient of variation, index between the maximum and minimum value and range, expressed as a percentage of the average in measurements from skull in mix of *Homo* genus.

	1	2	3	4	5	6	7
CV	8.8(19)	7.8(19)	8.4(28)	8.1(29)	10.1(30)	10.7(30)	6.7(58)
$I_{\max/\min}$	1.3	1.3	1.4	1.4	1.6	1.6	1.4
R%	29.8	23.6	34.1	31.0	45.1	47.9	30.1
	8	9	10	11	12	13	
CV	11.5(23)	6.0(18)	13.7(15)	9.4(47)	9.2(12)	11.8(14)	
$I_{\max/\min}$	1.5	1.3	1.6	1.5	1.3	1.5	
R%	40.4	26.3	48.3	39.0	27.5	40.1	

1: M¹length. 2: M¹width. 3: M₁length. 4: M₁width. 5: M₂length. 6: M₂width. 7: Cranial greatest length (glabella ad maximum). 8: Basion-bregma length. 9: Basion-nasion length. 10: Bregma-lambda chord. 11: Minimum frontal breadth. 12: Biauricular breadth. 13: Biasterionic breadth. The mix is composed of *Homo erectus*, archaic *H. sapiens*, and *Homo sapiens sapiens*. The list of skulls studied is found in Table VI. The numbers in parentheses correspond to the specimens used in this study.

The variability of the basicranial axis length, k' (Table VI and Figure 1) measured from the midventral side of the foramen magnum to the basisphenoid-presphenoid suture has special significance because of the stability of the base of the cranium (Enlow, 1992). The variability of this feature (CV) is much higher than 10. It appears that not only dogs, but all canids belong to one holobaramin (Crompton, 1993). Hence, I believe that the mix of *Homo* may constitute a single holobaramin.

Under stressful conditions of domestication, the fox (*Vulpes vulpes*) increases its variability. A great part of this enhanced variability is in the same direction as that

of the dog (Belyaev and Borodin, 1982). In approximately 20 years time, the wild fox altered its behavior becoming a domestic animal. It changed a few aspects of its morphology, there were hormonal changes, and it even underwent changes of the karyotype (Belyaev, 1979). Parsons (1986) has suggested that the explosions of variability concentrate in periods of environmental stress. Cases of environmental stress could have been frequent in nature on a worldwide scale after the Fall and again as a result of the Flood. But what is it that unleashes a process of variation under conditions of stress? Crossing-over, (i.e., genetic recombination) is more frequent and mutations are more common. Mobile genetic elements increase their mobility, passing from one place to another in the genome which produces alterations of genetic function (Belyaev and Borodin, 1982; Parsons, 1986). Molecular details of these processes have been seen in recent investigations. Heat-shock proteins are produced under high temperatures stress conditions. One of these proteins (Hsp90) under normal conditions involving no stress, masked certain genetic determinants in *Drosophila*. These genetic determinants were noted under stress conditions as Hsp90 changed its function and take on stress-protective functions (Rutherford and Lindquist, 1998). These genetic determinants produced morphological variants which were heritable. To demonstrate that stress played an important role in

the diversification of baramins after the Fall and after the Flood would be more difficult. Currently, however, there is a theoretical possibility of checking this. Under environmental stress, a fluctuating asymmetry is produced, that is, an alteration of the organismal morphological symmetry produced by a developmental instability (Parsons, 1992). Study of fluctuating asymmetry can reveal whether or not stress was a cause for the increase in variability in living beings after the Fall and after the Flood. The great number of fossil specimens required to make this research possible, however, would present a problem.

Conclusion

Study of the cranial metric variability in a sample of *Canis familiaris* (domestic dog) makes four things clear. (1) Metric variability in the skull of *Canis familiaris* corresponds to the variability expected in a combination of more than one species of wild dogs. (2) Cranial metric variability of archaeological specimens of *Canis familiaris* is smaller than that found in living *Canis familiaris*. This demonstrates an increase of the variability of this species in historical times. (3) Cranial metric variability of *H. erectus* skulls of diverse origin confirms the interpretation that they all belong to a single species. (4) Cranial and dental metric variability in a sample of domestic dogs is close to one represented by a population composed of a mixture of data representing *H. erectus*, fossil *H. sapiens*, and *H. sapiens sapiens*. This information suggests that *H. erectus*, fossil *H. sapiens*, and *H. sapiens sapiens* should be lumped into one holobaramin.

Although more research on other hominids is necessary, these data support the creation idea that human beings were produced by the Creator as a separate holobaramin, distinct from and unrelated to other primate or pongid holobaramins.

References

- Abbate, E., A. Albianelli, A. Azaroli, M. Benvenuti, B. Testafamariam, P. Bruni, N. Cipriani, R. J. Clarke, G. Ficarelli, R. Macchiarelli, G. Napoleone, M. Papini, L. Rook, M. Sagri, T. Tecle, D. Torre, and I. Villa. 1998. A one-million-year-old *Homo* cranium from the Danakil (Afar) Depression of Eritrea. *Nature* 393:458–460.
- Alexeev, V. P. 1986. *The origin of the human race*. Progres Publishers, Moscow.
- Arsuaga, J. L., I. Martínez, A. Gracia, and C. Lorenzo. 1997. The Sima de los Huesos crania (Sierra de Atapuerca, Spain). A comparative study. *Journal of Human Evolution* 33:219–281.
- Belyaev, D. K. 1979. Destabilizing selection as a factor in domestication. *Journal of Heredity* 70:301–308.
- Belyaev, D. K., and P. Borodin. 1982. The influence of stress on variation and its role in Evolution. *Biologisches Zentralblatt* 100:705–714.
- Burkitt, A. N., and J. I. Hunte. 1922. The description of a neanderthaloid Australian skull. *Journal of Anatomy* 57:31–56.

Table X. F-tests for dogs and for the genus *Homo*.

	M1L	M1W	M1L	M2L	SL	SW
M1L	3.88/1.42 +					
M1W		4.85/1.19 +				
M1L			4.15/1.36 +			
M2L				6.51/1.94 +		
SL					10.42/0.85 +	
SW						0.88/2.56 +

SL: skull length. SW: skull width. The number to the left of the slash corresponds to intrinsic variation $\times 10^3$, for dogs. The number to the right corresponds to the intrinsic variation $\times 10^3$ for the *Homo* mix described in the caption of Table IX. The plus sign (+) indicates a statistically significant difference between the standard deviations of the two samples ($P < 0.05$).

- Clarke, R. J. 1990. The Ndutu cranium and the origin of *Homo sapiens*. *Journal of Human Evolution* 19:699–736.
- Cope, D. A., and M. G. Lacy. 1992. Falsification of a simple species hypothesis using the coefficient of variation: A simulation approach. *American Journal of Physical Anthropology* 89:359–378.
- Crompton, N. E. A. 1993. A review of selected features of the family Canidae with reference to its fundamental taxonomic status. In Scherer, S., editor. *Typen des Lebens*. Pascal Verlag, Berlin.
- Day, M. H., M. D. Leakey, and C. Magori. 1980. A new hominid fossil skull (L.H. 18) from the Ngaloba beds, Laetoli, northern Tanzania. *Nature* 284:55–56.
- Freedman, L., and M. Lofgren. 1979. The Cossack skull and a dihybrid origin of the Australian Aborigines. *Nature* 282:298–300.
- Gabunia, L., and A. Vekua. 1995. A Plio-Pleistocene hominid from Dmanisi, East Georgia, Caucasus. *Nature* 373:509–512.
- García-Pozuelo-Ramos, C. 1997. Taxonomy of primates. *Creation Research Society Quarterly* 34:93–102.
- García-Pozuelo-Ramos, C. 1998. Dental variability in the domestic dog (*Canis familiaris*). Implications for the variability of primates. *Creation Research Society Quarterly* 35:66–75.
- Girman, D. J., P. W. Kat, M. G. Mills, J. R. Ginsberg, M. Borner, V. Wilson, J. H. Fanshawe, C. Fitzgibbon, L. M. Lan, and R. K. Wayne. 1993. Molecular genetic and morphological analyses of the African Wild Dog (*Lycaon pictus*). *Journal of Heredity* 84:450–459.
- Hartwig-Scherer, S. 1993. Hybridisierung und Artbildung beider Meerkatzenartigen (Primates, Cercopithecoidea). In Scherer, S., editor. *Typen des Lebens*. Pascal Verlag, Berlin.
- Heim, J.-L. 1974. Les Hommes Fossiles de la Ferrassie (Dordogne) et le problème de la définition des néandertaliens classiques. *L'Anthropologie* Tome 78, n°2 pp. 321–378.

- Howells, W. W. 1989. *Skull shapes and the map*. Harvard University Press, Cambridge.
- Hrdlicka, A. 1924. Catalogue of human crania in the United States National Museum Collections. *Proceedings of the United States National Museum* 63:1–51.
- Hrdlicka, A. 1927. Catalogue of human crania in the United States National Museum Collections. *Proceedings of the United States National Museum* 69:1–95.
- Hrdlicka, A. 1928. Catalogue of human crania in the United States National Museum Collections. *Proceedings of the United States National Museum* 71:1–140.
- Hrdlicka, A. 1930. Skeletal remains of early man. *Smithsonian Miscellaneous Collections* 83:1–380.
- Hrdlicka, A. 1944. Catalogue of Human Crania in the United States National Museum Collections. *Proceedings of the United States National Museum* 94:1–171.
- Huson, L. W., and R. J. C. Page. 1979. A comparison of fox skulls from Wales and South-East England. *Journal of Zoology* 187:465–470.
- Jacob, T. 1976. Early populations of the Indonesian region. In Kirk, R., and A. Thorne, editors. *The origins of the Australians*. Hedges and Bell, Victoria.
- Kramer, A. 1993. Human taxonomic diversity in the Pleistocene: Does *Homo erectus* represent multiple hominid species? *American Journal of Physical Anthropology* 91:161–171.
- Martin, L. B., and P. Andrews. 1993. Species recognition in Middle Miocene hominoids. In Kimbel, W. H., and L. B. Martin, editors. *Species, species concepts and primate evolution*. Plenum Press, New York.
- Morey, D. F. 1992. Size, shape and development in the evolution of domestic dog. *Journal of Archaeological Science* 19:181–204.
- O'Higgins, P. O., W. J. Moore, D. Jhonson, and T. J. McAndrew. 1990. Patterns of cranial sexual dimorphism in certain groups of extant hominoids. *Journal of Zoology* 222:399–420.
- Parsons, P. A. 1986. Evolutionary rates under environmental stress. *Evolutionary Biology* 21:311–347.
- Parsons, P. A. 1992. Fluctuating asymmetry: a biological monitor of environmental and genomic stress. *Heredity* 68:361–364.
- Rightmire, G., and H. J. Deacon. 1991. Comparative studies of Late Pleistocene human remains from Klasies River Mouth, South Africa. *Journal of Human Evolution* 20:131–156.
- Robinson, B. A., and D. P. Cavanaugh. 1998. A quantitative approach to baraminology with examples from the catarrhine primates. *Creation Research Society Quarterly* 34:196–208.
- Rutherford, S. L., and S. Lindquist. 1998. Hsp90 as a capacitor for morphological evolution. *Nature* 396:336–342.
- Shapiro, H. L. 1929. Contributions to the craniology of Central Europe. *Anthropological Papers of the American Museum of Natural History* 31:1–130.
- Simpson, G. G., A. Roe, and R. C. Lewontin. 1960. *Quantitative zoology*. Harcourt Brace, New York.
- Teaford, M. F., A. Walker, and G. S. Mugaisi. 1993. Species discrimination in Proconsul from Rusinga and Mfangano Islands, Kenya. In Kimbel, W. H., and L. B. Martin, editors. *Species, species concepts and primate evolution*. Plenum Press, New York.
- Thomson, J. L. 1996. The use of computed values of the coefficient of variation in the analysis of australopithecine cranial variability. *Kaupia* 6:111–117.
- Thorne, A. G., and M. H. Wolpoff. 1981. Regional continuity in Australian Pleistocene hominid evolution. *American Journal of Physical Anthropology* 55:337–349.
- Uchida, A. 1996. *Craniodental variation among the great apes*. Harvard University Press, Cambridge.
- Verheyen, W. N. 1962. Contribution a la Craniologie Comparee des Primates. *Musee Royal de L'Afrique Centrale-Tervuren, Belgique Annales Serie 8° Sciences Zoologiques* n°105.
- Wood, B. 1991. *Koobi-Fora Research Project: Hominid cranial remains* vol.4. Oxford University Press, Oxford.
- Wood, B. 1992. Origin and evolution of the genus *Homo*. *Nature* 355:783–790.
- Wu, X., and F. E. Poirier. 1995. *Human evolution in China*. Oxford University Press, Oxford.

Personalities in Creationism: John Woodmorappe

John Woodmorappe was born in the United States to Polish immigrant parents who lost everything in World War II. Thus his family experienced the difficulty of adapting to a new language and culture under trying circumstances. Life has been a challenge to John since he is afflicted with Tourette Syndrome, a misunderstood neurological disorder, that causes him to have spells of torso rocking and finger movement. Since he was a toddler, Woodmorappe has had an insatiable curiosity in scientific matters. At the age of 10 he could identify many different kinds of trees in his neighborhood even pronouncing their Latin names, which caused his young friends to observe that he sounded like a priest. Occasionally an 80-year-old retired botanist would visit him and they would go on walks together to discuss and examine different trees. When he was in junior high, his superior science projects were entered in annual state fairs. Later he attended one of the most academically-demanding high schools in the United States.

Woodmorappe was not raised as a Bible believer, therefore nothing in his background prompted him to question the philosophical conclusions of conventional science. He was quite comfortable while attending a Jesuit school, which was liberal theologically as well as politically, where he was taught that the Genesis account of creation was a myth and that organic evolution was a proven fact of science. He took an advanced biology course in his sophomore year and later studied ecology where he was taught all of the horror stories of radical environmentalists as fact.

Having learned that DDT and other organic chlorocarbons accumulate in the atmosphere without decomposing, Woodmorappe wrote a paper for one of his instructors in which he suggested a solution to the problem. He postulated that possibly scientists could breed bacteria and subject them to radiogenic mutations for several generations in progressively greater concentrations of DDT. Hopefully a strain of bacteria would be developed that would consume DDT when released into the atmosphere. His teacher told John that his proposal probably would not be feasible unless millions of years were available to obtain a suitably mutated strain of bac-



teria. This answer planted the first seed of doubt toward organic evolution in his mind because it showed that the notion of natural selection culminating in unlimited variation is a highly theoretical rather than a factual concept.

A member of Campus Crusade for Christ (CCC) witnessed to John when he was a college freshman. Woodmorappe accepted Christ as his personal Savior and attended meetings of CCC. During one of these sessions, he asked some Bible-science questions and a CCC member loaned him a copy of *The Genesis Flood*. Reading the book challenged John's

intellect and after much more study, he decided to major in both geology and biology in college because of the pivotal role of these two disciplines in the study of origins. Actually geology "is in Woodmorappe's blood" as his grandfather had been a geologist who had owned an oil well in Boryslaw (now in western Ukraine). John has earned a B. A. in biology and a B. A. and M. A. in geology.

In the late 1970s and early 1980s, he wrote a series of articles for the *Quarterly* of which several were collected in an excellent monograph, *Studies in Flood Geology* (now in its second edition). He has written for *Ex Nihilo Technical Journal*, spoken at all of the International Conferences on Creationism and is the author of two other monographs, *Noah's Ark: A Feasibility Study* and *The Mythology of Modern Dating Methods*. John is a dedicated, productive creationist and is one of our most reliable peer reviewers for *Quarterly* articles in his fields. He is in earnest in his field work and research from the creationist perspective and a deadly opponent of evolutionism. Woodmorappe continually exposes the pseudoscholarship of naturalists. His extensive geological field work has taken him to many places in the United States (17 states) and Canada (2 provinces) from Alabama to Alberta and from Montana to New York.

When not involved in his professional and creationist activities, John enjoys swimming, rollerblading, ice skating and bicycling as well as being an inveterate cat lover. It is a pleasure to honor John Woodmorappe in this issue of the *Quarterly*.

Emmett L. Williams

Information Theory, Consequence Operators, and the Origin of Life

Robert A. Herrmann*

Abstract

In this article, the Gitt (1997) concept of information as it is represented by a mental-like sequence of activities is compared with the mental activity represented by consequence operators. It is shown how consequence operators model mathematically these Gitt notions and how a specific ultralogic and four ultrawords yield an identical foundation for Gitt's information theory scenario for the origin of life. Consequence operator theory, as a model for Gitt information theory, is used to establish that, relative to this model and without external modification to the processes, it is not possible, using fixed pragmatic information, to increase or decrease the complexity of a biological entity by selecting from two distinct independently produced biological entities as these entities

are characterized at the apobetic level. This signifies that if random *mutations* are *random* alterations in the characteristics of a biological entity that are, necessarily, not dependent upon the original biological characteristics, then this model would tend to disallow random mutations as a viable source for biological alterations. On the other hand, for fixed pragmatic information, an increase or decrease in complexity by selecting from two distinct apobetic level biological entities is possible if a very special dependency exists between their characteristics. Further, complexity can also be increased by applying the semantic level consequence operator to an increased portion of the information contained within the genetic code in the DNA, information that exists originally.

Introduction

Information theory as introduced by Shannon (Shannon and Weaver, 1964) is often understood to be a statistical approach to the formation of a language from strings of symbols. However, many researchers (Gitt, 1997; Steinbuch, 1968; von Weizsäcker, 1974) state that this approach to information theory does not capture its actual essence. Indeed, relative to the statistical approach Weaver (Gitt, 1997, p. 45) is quoted as writing: "Two messages, one which is heavily loaded with meaning and the other which is pure nonsense, can be exactly equivalent . . . as regards information." Rather than being defined in terms of statistics and combinatorial mathematics, can the actual *mental activity* nature of information be discussed successfully?

Werner Gitt (1997) has presented to the scientific community a collection of "Theorems" that appear to capture the actual mental activity associated information. Gitt uses a five level approach, where the informa-

tion content of the statistical level is extended significantly. This approach is utilized to model the origin of life question as well as to model a series of scriptural statements. Gitt's thesis is that it is mental-like behavior that is the true essence of information theory. Is this Gitt approach equivalent to another approach the foundations of which have been extensively investigated previously?

In a series of articles (Herrmann, 1982, 1984, 1985, 1986a, 1986b, 1988, 1994a), a newly devised method to model mathematically the origin of and the time development for a *natural system* is discussed in a nontechnical yet detailed manner. (Note: Most italicized terms are either specifically defined within the body of this article or in the glossary.) This model shows that it is rational to assume that the most basic behavior that can be associated with the development of a natural system is a behavior that is being mirrored by processes that resemble those associated with an infinitely powerful mental activity. Further, this modeling process, when interpreted linguistically, is shown to correspond to numerous scriptural statements. Hence, this correspondence verifies the scientific rationality of these scriptural statements.

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The Herrmann modeling process is chosen so that it is compatible with all known forms of scientific deduction. Consequently, the results are all relative to the most basic foundation for the origin and development of a natural system and are not concerned with a particular deductive pattern that one might associate with a particular theory. It was assumed that the reader of these past articles could, using the discussed methods, investigate various well-known scientific *inner-logics* that are associated with various theories and, without difficulty, correlate these inner-logics to the *ultralogics* discussed in these articles. Unfortunately, this assumption has not been fully realized. Consequently, within this article, a specific and somewhat complex illustration is given relative to “information theory” as this theory is presented by Gitt (1997) and as Gitt information theory relates to the origin and existence of biological life. This illustration serves as a prototype for all discussions relative to a specific concept that requires some form of logical deduction or similar mental activity, and that is relative to a specific natural system.

A few technical aspects will be recalled; but, the actual mathematical structure with its in-depth construction is rather technical in character and will not be discussed, in detail, within this article. However, partial or full discussions can be found in Herrmann (1993, 1994b, 1999). Although a few formal definitions will be given, in most cases, what is presented here are notions that are intuitively rather than formally defined. As discussed in Herrmann (1994c), it is not difficult to show that all scientific communication can be represented by finite strings of symbols taken from a finite alphabet $\mathcal{A}$. Using modern digitizing techniques and electronics, such finite strings of symbols also include visual and audio impressions. The set of all such nonempty finite strings of symbols is called a language $\mathcal{L}$. (Note: This is not a language as described by Gitt.) Each nonempty finite string of symbols is called a *word* or *readable sentence*. Among the collection of all words, there are specific ones that correspond to meaningful strings of symbols that appear in a *discipline dictionary*. This discipline dictionary corresponds to Gitt’s *language elements*. Further, there are readable sentences that are constructed from members of the discipline dictionary by means of a set of formalized or formalizable rules. (Note: The rules themselves are also readable sentences.) These rules form the *syntax* for a language. For the case of digitized visual and audio impressions, this syntax is the construction of the electronic instrumentation and required software that will translate a specific collection of strings of symbols into the actual electronically presented impressions; i.e. computer or TV screens, and speakers. These syntactically constructed strings of symbols are also members of $\mathcal{L}$ and form what is termed as a *meaningful set of readable sentences* or *mean-*

ingful words, $\mathcal{L}_M$, and various nonempty subsets of $\mathcal{L}_M$ correspond to Gitt’s second level of information (1997, p. 57), the *syntax level*.

Equivalence Classes

Prior to discussing the mathematical entity that gives a rather general model for many types of human mental processes, one technical aspect for such modeling needs to be explored. This aspect was assumed to be self-evident in some of the previous Herrmann articles written on this subject. However, this “self-evidence” will now be further detailed. Different natural languages use different discipline dictionaries as well as different syntactic rules. In formal logic, the same symbols and same syntactic rules yield different strings of symbols that are said to be “logically equivalent.” Throughout various deductive arguments logically equivalent strings of symbols can be substituted, one for another, and the logical argument remains valid. This type of equivalence is defined in a strict and not controversial manner. Types of equivalence are necessary when natural or native language descriptions are used. However, a definition as to the equivalence of different native language strings of symbols is necessarily more intuitive in character.

First note that to comprehend properly a set of symbol strings that contains more than one string of symbols it is usually required that the strings be presented in a specific order. When necessary, the use of a spacing and punctuation symbols would allow any finite set of such symbol strings to be considered as a set that contains but one string of symbols. However, even under a single symbol string notion, various types of equivalence are required for natural language descriptions. Intuitively, this equivalence is captured within the statement that “two strings of symbols are *saying the same thing* or have the *same relative meaning*.” It is necessary that a form of mental activity and general consensus be considered in order to come to this conclusion. Whatever technique is used for this purpose, such a concept appears to have universal acceptance or else it would not be possible to “translate” efficiently from one native language to another and ever hope to achieve the same intended results being communicated by two different strings of symbols. Of course, the same idea of equivalent symbol strings would hold within a specific meaningful language as well. The equivalence of two different strings of symbols probably depends upon the term “thing” presented above. But, in any case, such an equivalence would need to be accepted by the vast majority. In some cases, “testing” can be used to determine whether different symbol strings yield equivalent mental results; that they are, indeed, “saying the same thing.”

The set of all “equivalent” strings of symbols taken from $\mathcal{L}_M$ and that have been adjudged to be “saying the same thing” is called an *equivalence class*. Distinct equivalence classes are disjoint, that is they have no members in common, and every member of $\mathcal{L}_M$ is contained in some equivalence class. The self-evident notion previously made but not explicitly stated is that the actual set $\mathcal{L}_M$ that determines the domain and codomain for our consequence operators is a set composed of one and only one member, a *representative*, from each of these equivalence classes. In all that follows in this article, the exact same symbol string representation for an equivalence class will be used. This procedure is tacitly assumed.

Consequence Operators

Although our next object of significance is defined on the set of all subsets of $\mathcal{L}$, its application is usually restricted to the set of all subsets of some nonempty $\mathcal{L}_1 \subset \mathcal{L}_M$ (Herrmann, 1993, pp. 1 and 24). Using a weak set-theory, Tarski (1930) models a fundamental essence for mental activity and uses this model to investigate deductive logic. It was discovered in 1970 (Wójcicki, 1970), that a slight generalization of the Tarski ideas leads to significant additional algebraic properties. A *consequence operator* is a function Cn , in the general sense, that is applied to each $A \subset \mathcal{L}_1$ and gives $Cn(A) \subset \mathcal{L}_1$ and which satisfies three axioms. (1) $A \subset Cn(A)$, (2) $Cn(Cn(A)) = Cn(A)$, (3) and if $A, B \subset \mathcal{L}_1$, $A \subset B$, then $Cn(A) \subset Cn(B)$. Each of these axioms will be discussed in order to show how they model the most basic aspects of mental activity.

For axiom (1), suppose that A is a set of meaningful sentences upon which some form of mental activity is performed. The result $Cn(A)$ represents all of those meaningful sentences that are obtained when that mental activity is performed on A . In order to perform the mental activity on A , the members of A must be mentally recognized. This is the first and absolutely necessary form of mental activity needed prior to application of Cn .

To codify this requirement within these axioms, it is required that the mental activity being performed allows $A \subset Cn(A)$. This process is necessary in almost all formal deduction and constitutes the process of stating an hypothesis as part of a deductive pattern. Indeed, if $A = Cn(A)$, then one would conclude that Cn yields no “new” deductive statements from A or, except for the recognition process, no “other meaningful” mental activity relative to $\mathcal{L}_1$ has occurred. It is also clear how to determine which strings of symbols are produced by this “other meaningful” mental activity that is distinct from the recognition requirement. These are those strings of symbols in $Cn(A)$ and not in A , i.e. members of $Cn(A) - A$.

Axiom (2) is called the idempotent axiom; and it is a symbolic representation for the concept that $Cn(A)$ should contain *all* members of $\mathcal{L}_1$ that are obtain from this specific mental activity, and simply applying Cn again will not alter the statement that *all* such members are obtained from the original application of Cn . Indeed, if $Cn(A)$ is a form of human deduction, then $Cn(A)$ is the *theory* obtained from the hypotheses A . The same form of human deduction Cn applied to a theory will not produce any new deductive results. Note that this aspect is dependent upon the Cn being considered. Different consequence operators (mental activities) applied to A can yield significantly different results, however.

Axiom (3) represents what the brain does sequentially prior to any additional mental activity. By way of illustration, suppose that $A, B \subset \mathcal{L}_1$, $A \subset B$, and A, B are sets of written strings of symbols. The mental activity represented by Cn is considered as fixed. From the axiom (2) notion, $Cn(A)$ represents all the symbol strings this mental activity is able to express. Since $A \subset B$, then by this fixed mental activity applied to B , you can still restrict your activity, first, to A and obtain $Cn(A)$. Continued application to $Cn(A)$ will not yield any new results. But, next, you could get new results by applying the mental activity to the set $B - A$ and adjoin these results to $Cn(A)$. This is the exact approach when B is considered as a set of hypotheses to which scientific logic is applied. This type of sequential approach is codified by requiring $Cn(A) \subset Cn(B)$. Whether or not this might reduce the original $Cn(A)$ so that axiom (3) would not hold would depend upon another mental process, not considered as an aspect of this generalized consequence operator, that is performed after the $Cn(A)$ and $Cn(B)$ are obtained.

Although it may seem rather trivial, one of the more significant consequence operators is the *identity* operator, I . As the name indicates, I is defined on $\mathcal{L}$ [resp. $\mathcal{L}_1$] as follows: for each $A \subset \mathcal{L}$ [resp. $\mathcal{L}_1$], $I(A) = A$. This operator can be used to model cases where mental activity yields no “new” results and to construct consequence operators.

The Syntax Level

Relative to the origin and development of life, Gitt begins his information scheme not at this level of information but, rather, at the semantic level. Considering the equivalence class concept, this level corresponds to nonempty subsets of $\mathcal{L}_M$. The mental activity that produces this syntax level from $\mathcal{L}$ or even from the set of all language elements, does not appear to be a consequence operator. Under the most general possibility, suppose Sy is an operator that takes every subset of $\mathcal{L}$ and yields subsets of $\mathcal{L}$, which would be the first requirement for Sy to

be a consequence operator. It seems reasonable to require that this operator should yield $Sy(\mathcal{L}) \subset \mathcal{L}_M$. However, unless $\mathcal{L} = \mathcal{L}_M$, which undoubtedly is not the case, then this reasonable requirement is contradicted by axiom 1. This does not mean that this possibility cannot be mathematically modeled, however.

There are operators that do model mathematically, in a general way, a mental process that would yield this required result and correspond to Sy . One of these is a mathematical finite or general selection operator (Herrmann, 1993, p. 100). The other is the deductive operator (Herrmann, 1993, p. 7). Although these do model, to some extent, certain very general mental activities, they are not consequence operators. Since the application of consequence operator theory to Gitt information theory is the purpose for the investigation presented here, the first application will assume that the sets $\mathcal{L}_1, \mathcal{L}_M$ have been previously obtained by means of mental-like activity modeled by one of these or possibly some other similar mathematical operator.

The Semantic Level

The consequence operators discussed in Herrmann (1982, 1984, 1985, 1986a, 1986b, 1993, 1994a) are of a very special type and apply only to meaningful sets of readable sentences and yield only distinct meaningful results. One obvious aspect of this approach, however, was not required by these special consequence operators, but in a more general setting the idea of "content" (Herrmann, 1994c) was introduced. When restricted to human thought, a syntactically correct string of symbols can invoke a vast array of additional thoughts within the mind of an individual who perceives this symbol string. Due to differing education and training, these additional thoughts and images can differ from one individual to another. The term *content* has been used to express all of the effects a particular string of symbols has upon the mind of an individual who recognizes the string as a meaningful string of symbols. For this discussion, the content is restricted to those effects that can be represented by means of meaningful strings of symbols and is extended to include the general concept of mental activity. Any differences in content can be considered as the outcomes of different consequence operators. On the other hand, two distinct meaningful strings of symbols can produce the exact same content for a fixed consequence operator. Although the idea of content may be somewhat broad in character, the above restriction to effects that are expressible by meaningful strings of symbols corresponds to Gitt's third level of information, the *semantic level*. Hence, consider a fixed "semantics" generating consequence operator Sm de-

fined on $\mathcal{L}_1$. Since Sm is a consequence operator, for a specific $y \in \mathcal{L}_1$, the set of symbol strings $Sm(y) \subset \mathcal{L}_1$ is a complete semantic description obtainable from Sm and the language $\mathcal{L}_1$. This, of course, does not preclude a different semantic description using a different Sm or a different $\mathcal{L}_1$. From the above remarks, it is certainly possible that for two distinct $A, B \subset \mathcal{L}_1$, $Sm(A) = Sm(B)$. Hence, assume that Sm and the next two consequence operators are many-to-one operators; i. e. a specific value might be generated by more than one distinct member of $\mathcal{L}_1$.

Thus far, the term *information* has not been defined. Gitt (1997, p. 124) states that a general definition would be difficult to achieve. However, in accordance with the above, an analytical definition is possible for fixed Sm and $\mathcal{L}_1$. The consequence operator Sm can be viewed as a functional collection Q of ordered pairs. The semantic "information" is actually being displayed by this set Q . Thus *semantic information*, in this sense, is encoded by Sm and its corresponding Q . It is not a numerical measure but rather a set-theoretic concept. Indeed, using different semantic consequence operators Sm_1, Sm_2 one can investigate, as in Herrmann (1987), different strengths of semantic information. However, this additional investigation is not the purpose for this present article and will not be presented in any detail.

The Pragmatic Level

It is certainly possible that the semantic consequence operator is actually the identity operator. In this case, the actual mental activity Sm represents would be minimal. But, in many cases, the semantics includes strings of symbols which would require some sort of *action* to be undertaken; actions that, for a natural system, yield the objects and processes from which a natural system will be constructed. It is at this stage that more mental activity would ensue. The results of such mental activity Gitt calls the fourth level or *pragmatic level* of information.

The results of these actions can also be described in terms of meaningful strings of symbols as previously defined. Denote the corresponding consequence operator by P . Hence, the composition $P(Sm(A))$ yields the descriptive content of these actions. The actual new results of the actions are found in $P(Sm(A)) - Sm(A)$. Of course, Sm and P should be defined, at the least, on subsets of $\mathcal{L}_1$. Suppose that for a particular application of such operators, their axiom 1, 2, 3 behavior only holds for a special set $\mathcal{B}$ of subsets of $\mathcal{L}_1$. This is where the identity consequence operator might be used to extend, if necessary, the Sm and P to the entire set of all subsets of $\mathcal{L}_1$. For example, suppose that $\mathcal{L}_1$ is composed of the 26 alphabet symbols $\{a, b, \dots, z\}$ each of which represents a

meaningful string of symbols. Let $\beta = \{\{a\}, \{a,b\}\} \cup \mathcal{D}$, where $\mathcal{D} = \{A \mid a \in A, A \subset \mathcal{L}_1\}$. Then $\mathcal{Q} = \{(\{a\}, \{a,b\})\} \cup \{(A, A \cup \{a,b\}) \mid A \in \mathcal{D}\}$ satisfies consequence operator axioms 1, 2, and 3. Now if $y \subset \mathcal{L}_1$ and $y \neq B$, for any $B \in \beta$, then adjoin to $\mathcal{Q}$ the (y,y) . It follows that extended $\mathcal{Q}$ represents a consequence operator on $\mathcal{L}_1$. Such consequence operators have a specific application to the concept of adjoining or removing a specific characterization from the description for a biological entity. Once again, the Gitt information associated with this level is encoded by $\mathcal{Q}$.

The Apobetic Level

Once actions have actually been taken as they are encoded by $P(Sm(A))$, that is the pieces of the “puzzle,” so to speak, collectively exist, then to what plan or purpose does the $P(Sm(A))$ correspond? Assuming that such a purpose is representable by characterizing and meaningful strings of symbols from $\mathcal{L}_1$, then to recognize that $P(Sm(A))$ is not just composed of a set of disjoint descriptive statements but that these statements characterize a specific physical entity, plan, or purpose; yet another descriptive collection from $\mathcal{L}_1$ is obtained by means of another level of mental activity. For example, to recognize that $P(Sm(A))$ produces a specific natural system that can be described by a sequence of symbol strings is such a mental activity. For a natural system, intuitively, the mental activity is a *combining together* of the necessary pieces obtained from the pragmatic level in order to produce a complete and identifiable natural system. Gitt calls this fifth level, a teleological information level, the *apobetic level* and it is modeled by a consequence operator T . Relative to a natural system, the result $T(P(Sm(A)))$ is always assumed to be a complete and consistent characterizing subset of $\mathcal{L}_1$. The term *complete* means that $T(P(Sm(A)))$ is maximal with respect to $\mathcal{L}_1$; i.e. $T(P(Sm(A)))$ contains only characterizing statements and if $x \in \mathcal{L}_1 - T(P(Sm(A)))$, then x is not a characteristic of the particular natural system being considered.

Following the application of the Sm, P, T consequence operators, a final mental-like operator, a *realism relation*, such as the one similar to that found in Herrmann (1993, p. 56) needs to be applied. For a given consequence operator Cn , this operator selects from the set of all subsets of $Cn(X)$ those collections of characteristics that can actually characterize an objectively real entity. However, due to axiom 1, this realism relation need only be applied after the application of the last consequence operator in a sequence of such operators, in this case after T , in order to identify the specific characterizing collections. The realism relation represents yet another necessary information level. It is tacitly assumed that this operator is applied.

Thus using the above notation and beginning at the syntactical level Gitt's entire sequence that represents the *internal transfer of information* with respect to a specific $A \subset \mathcal{L}_1$ is captured by the sequence Sm, P, T of consequence operators with the final result described by $T(P(Sm(A)))$. One fact about such a sequence of consequence operators emerges from the theory of consequence operators. In Herrmann (1987, p. 4), the composition considered as a single operator of the Example 2.8 defined C' and Sm consequence operators is not itself a consequence operator. Thus, except under very special circumstances, the composition $(TPSm)$ cannot be considered as a single consequence operator. This implies a significant conclusion that the natural world mental activities modeled by Sm, P, T are usually *ordered* mental activities that are probably not representable by a single consequence operator. Except under very special circumstances, they need to be applied in the specific order indicated.

External Transmission of Information and Gitt's Theorems

There is considerable interest in the external transmission of Gitt information. This can be readily modeled by two sets of meaningful sentences A and A' and two sets of consequence operators defined on $\mathcal{L}_1$, the *sender* operators T, P, Sm and the *recipient* operators T', P', Sm' . A correspondence E between the sender and recipient is necessary and this would amount to another relation, not a consequence operator, such that $E(A) = A', E(Sm(A)) = Sm'(A'), E(P(Sm(A))) = P'(Sm'(A'))$ and $E(T(P(Sm(A)))) = T'(P'(Sm'(A')))$. Of course, it is possible that the sender and recipient are identical entities. In which case, E is but an identity. Further, the E correspondence indicates such things as whether the purpose intended by the sender is achieved by the recipient, for if this is the case, then $E(T(P(Sm(A)))) = T(P(Sm(A)))$. It is self-evident that many other aspects of the external transmission of Gitt information can be characterized by means of E and, further, all of the appropriate general results that have been established about consequence operators would hold for the ones used to model the Gitt concept of information. Recall that this mathematical model begins with the semantic level and not the statistical level that is the domain of information theory as originally envisioned by Shannon and Weaver (1964).

Some of the “Theorems” stated by Gitt (1997) are not inductively deduced by any strong logical argument nor are they obtained from a preponderance of empirical evidence. They are, more probably, axioms for his information theory concepts. However, many other Gitt theorems can be deduced directly from the above simple

mathematical model. The following examples are deductive results that correspond to some of Gitt's (1997) theorems. Theorem 7 (p. 65) states that the allocation of meanings to the set of available symbols is a mental process depending upon convention. This is but the consequence operators Sm and Sm' . Theorem 9 (p. 65) states that if the information is to be understood, the particular code must be known to both the sender and the recipient. This is but the fact that the $\mathcal{A}$ and $\mathcal{L}_1$ are the same for sender and recipient. Theorem 14 (p. 70) states that any entity, to be accepted as information, must entail semantics; it must be meaningful. Again this is Sm and Sm' applied to members of $\mathcal{L}_1$. Theorem 15 (p. 70) states that when its progress along the *chain of transmission events is traced backwards, every piece of information leads to a mental source, the mind of the sender*. Of course, this is but the inverse of E and its relation to the operators T , P , Sm . Theorem 16 (p. 71) states that if a chain of symbols comprises only a statistical sequence of characters, it does not represent information. This result is established since the consequence operators are defined first on the syntactical level since an appropriate logical operator that can be defined on the statistics level and that produces the syntax level is not a consequence operator. Further, Gitt's theorems 17, 19 - 22, 24 are established immediately and without difficulty. Gitt's other theorems can be established if one includes certain of his stated theorems as non-logical physical axioms, where the phrase *physical axiom* is used to differentiate inductive from deductive results.

Is Gitt information as presented within strings of symbols an actual and necessary requirement in order for the material universe to function? Gitt states (p. 29) that "The laws of nature are equally valid for living beings and for inanimate matter." His basic Theorem 1 (p. 47) is that "*The fundamental quantity information is a non-material (mental) entity*. It is not a property of matter, so that purely material processes are fundamentally precluded as sources of information." Then we have Theorem 23 (p. 79) "*There is no known natural law through which matter can give rise to information, neither is a physical process or material phenomenon known that can do this*." There is the claim that all of the stated theorems are obtained by inductive logic using empirical evidence and as such are natural laws. This cannot be the case, however, with theorem 23 since the phrase natural law is part of the theorem statement itself and this theorem would be better classified as a statement within the philosophy of "information science." Further, Theorem 13 states that "Any piece of information has been transmitted by somebody and is meant for somebody. A sender and recipient is always involved whenever and wherever information is concerned." Under Gitt's definition of natu-

ral law, Theorem 13 would need to be applicable to inanimate matter. But it is only applicable to "somebody." It appears likely that, at present, the only *direct* evidence that something like Gitt information is being used and transmitted is evidence relative to certain biological entities that exhibit mental activity and not evidence relative to purely inanimate material objects.

Most certainly one of the foremost advances in human intellectual development is the construction of various types of alphabets and written languages. Although actual neural processes are not being considered, some sort of material processes are taking place when an actual mental process is performed upon a set of symbol strings as an input and a set of such symbol strings is written down as an output. All of modern humankind's actual knowledge of natural law and the scientific descriptions for natural system behavior require a coded or symbolic information theory. The basic definition of the concept termed *natural laws* as these laws are applied today seems to require strings of symbols in order for various *relationships* that appear to exist between discipline dictionary named entities to be represented and comprehended by biological life-forms. There is always the possibility that there are relationships that exist between physical entities that cannot be expressed by any form of humanly comprehensible language.

Thus far, there is no evidence that the actual symbol strings that specify these relationships have been produced within the material world without the aid of a biological life-form. One might conclude that the behavior of a universe as a natural system would continue even if no intelligent life-forms exist. However, it is not the purpose of this article to discuss what might be a satisfactory definition of natural law. But, from the view point of how natural law is expressed today, information theory would only represent a *model* that mirrors certain aspects of natural system behavior that we seem unable to comprehend without its use. Indeed, if the genetic code and information theory is accepted as a reasonable explanation for how life could have come about from fundamental elements and fundamental natural law, then the genetic code and information theory still remains but a model for what could be natural processes that we can only comprehend through application of coding and information theory. This acceptance need not eliminate a search for other specific and fully materialistic processes that would achieve the same goal. On the other hand, nothing in this paper is intended to denigrate information theory or to imply that it is not significant to linguistics, to communication, to mental activity investigations, and as a model for natural system behavior. Those who specialize in information theory have and will continue to contribute significantly to scientific advances.

Nobel Laureate Louis deBroglie wrote:

[T]he structure of the material universe has something in common with the laws that govern the workings of the human mind. (March and Freeman, 1963, p. 143)

This stated and rather obvious fact refers to human comprehension of natural system behavior. In order for us to comprehend and predict natural system behavior, human mental activity is used. General patterns associated with such mental activity would need to mirror the perceived general patterns associated with natural system behavior in order for us to predict by such mental activity specific natural system behavior. Being able to predict natural system behavior is the major application of natural law. Thus every reasonable prediction made and that is verified yields evidence that patterns of mental activity mirror patterns associated with natural system behavior whether the system be animate or inanimate. However, this still only implies that, in general, patterns associated with “information” are, at present, but models that can be an aid to comprehension and prediction.

An Application of Information as an Analog Model

First, one needs to define a mental process as modeled by consequence operators, say, as a *non-material process*. Relative to the actual physical world Yockey (1981, p. 26) reminds us that “Nothing which even vaguely resembles a code [alphabet] exists in the physico-chemical world.” Assuming that the material universe of fundamental elements and natural laws has no actual symbolic code as a basic constituent, then, as with the case of ultralogics, it is, at the least, *rational to assume* that the processes and concepts associated with an information theory *analog model* is a required condition for our universe to exist and function. Although we may only be able to comprehend certain physical processes by means of information theory as an analog model this does not alter the statement that its application to the non-mental material world is an assumption that may never be fully established.

As stated previously, the Sm, P, T sequence of Gitt information consequence operators, from the natural world viewpoint, most probably are applied sequentially and taken as a composition they do not, in general, correspond to a single consequence operator. Each of these operators is a restriction to the natural world of three ultralogics $*Sm, *P, *T$, which are direct extensions of Sm, P, T to the nonstandard physical world as it is described in the Herrmann references. However, the sequential application of these three ultralogics must still hold if it holds for Sm, P, T . But, as will be shown, this is not the case if a special ultralogic and ultrawords

(Herrmann, 1994a,b) are applied, where this ultralogic and ultrawords behave as an underlying control. In Gitt (1997, fig. 26, p. 137) relative to a scriptural interpretation, the A corresponds to a portion of the information contained in the genetic code in the DNA; $Sm(A)$ is a description for the reading of the code, the meaning of the information in A , the rules, the instructions; $P(Sm(A))$ is a description for the actual protein synthesis in living cells, the construction of entire organisms, the realization of all biological functions; and the $T(P(Sm(A)))$ is a description that would define a particular life-form by means of a complete description of its characteristics or as an integrated time ordered sequence of descriptions. (Note: The actual statements given in Gitt’s figure 26 have been slightly extended.) From the viewpoint of models, these particular consequence operators and their corresponding ultralogics answer affirmatively the following question posed by one of the worlds foremost scientists. Hermann Weyl is credited with writing:

Is it conceivable that immaterial factors having the nature of images, ideas, “building plans” also intervene in the evolution of the world as a whole?

Unfortunately, there is a fundamental error displayed in Gitt’s figure 26 (p. 137). The figure indicates that the source (the Creator) of the information necessary for the generation of “life” is not within the scientific boundary. This, of course, is contradicted by a scriptural interpretation for the ultralogic and ultraword notion. Not only are $*Sm, *P, *T$ ultralogics that yield the appropriate results, but using Theorems 7.3.1 and 7.3.4 for developmental paradigms, or as they are applied to general paradigms (Herrmann, 1993, p. 92) in the appropriate cases, for any $A \subset \mathcal{L}_1$ there exist four ultrawords w_{Sm}, w_P, w_T, w' and the single ultralogic $*S$ such that, when $*S$ is restricted to natural world symbol strings $\mathcal{L}_1$, we have (1) $*S(w_{Sm}) = Sm(A)$, (2) $*S(w_P) = P(Sm(A))$, (3) $*S(w_T) = T(P(Sm(A)))$, and $w_{Sm}, w_P, w_T \in *S(w')$. This illustrates the behavior of the ultralogic $*S$ as being fundamental in character, and how it exercises an additional control over the results of all other ultralogics that are extensions of specific natural world inner-logics such as Sm, P, T . In each case, these ultralogics behave, at the least, in the same manner as a consequence operator would behave; but, they can be classified in many ways as infinitely more powerful than natural world or standard consequence operators. Hence, there is a scientific description for the behavior of the Creator source and the natural world results generated by this source cannot be differentiated, by natural means, from the Sm, P, T . The scriptural statements that Gitt uses to identify the “sender” as the Creator are the exact type of statements mentioned in Herrmann (1984) where ultralogics and ultrawords are used as a model for God’s creative and sustaining processes. This application should help to clarify the relation between in-

formation theory as presented by Gitt and previous work in the area of ultralogics and ultrawords.

Our final illustrations will indicate how Gitt information as encoded within consequence operators might apply to other aspects of genetic coding. Suppose that “complexity” is measured by the T description for the characteristics associated with a biological entity. Suppose that you are given $P(Sm(A))$ and two distinct consequence operators T_i, T_0 . Then stating that $T_0(P(Sm(A)))$ is *as or more complex* than $T_i(P(Sm(A)))$ means that (I) $T_i(P(Sm(A))) \subset T_0(P(Sm(A)))$. Further, one could also write that $T_i(P(Sm(A)))$ is *as or less complex* than $T_0(P(Sm(A)))$. Notice that complexity in this case is a direct relative measure of T_i compared with another T_0 . There are consequence operators that satisfy (I) for any $B \subset \mathcal{L}_1$. However, in general, can complexity be increased or decreased, at the T information level, by requiring the characterizing description to be obtained by choosing from two independent distinct characterizing descriptions $T_1(P(Sm(A))), T_2(P(Sm(A)))$? Suppose T_1, T_2 are two distinct apobetic consequence operators applied to the same $P(Sm(A))$, but the results are distinctly different, one from another, at least with respect to one characterizing statement. The previous question is equivalent to the next question. Can it be assumed that (II) $T_0(X) = T_1(X) \cup T_2(X)$ defines a single apobetic consequence operator T_0 on nonempty $\mathcal{L}_1 \subset \mathcal{L}_M$ where $P(Sm(A)) \subset \mathcal{L}_1$ and the T_1, T_2 are independent? The term *independent* means that there is no relationship, accept for a set-theoretic identity relationship, between the T_1, T_2 that is expressible in terms of the set-theoretic operators used to obtain the theory of consequence operators. For example, suppose that such a consequence operator T_0 exists. Then a characteristic $X \in T_0(P(Sm(A)))$ is either a member of $T_1(P(Sm(A)))$ or a member of $T_2(P(Sm(A)))$ and a characteristic Y in $T_1(P(Sm(A)))$ or in $T_2(P(Sm(A)))$ is a characteristic in $T_0(P(Sm(A)))$ and no other characteristics exist in $T_0(P(Sm(A)))$. This implies that T_0 is a result that is as or more complex than the result obtained from T_1 or from T_2 or from both. Further, $T_0(P(Sm(A)))$ determines no other characteristics. Notice that if (II) holds, then (I) holds for each $i = 1, 2$.

In the appendix (with expanded proof) is a result that shows that (II) does not define a consequence operator if selection from two independent sets of characteristics is required. In particular, it is shown that if T_0 is a consequence operator defined on $\mathcal{L}_1$, then for each $X \subset \mathcal{L}_1$, $T_1(T_2(X)) = T_2(T_1(X))$; i.e. the composition of T_1, T_2 is a consequence operator and composition is a commutative process. This commutative requirement is a very special relationship that must exist between T_1 and T_2 and shows that no such consequence operator exists if independence is required. On the other hand, if (III) $T_1(T_2(X)) =$

$T_2(T_1(X))$ for each $X \subset \mathcal{L}_1$, then the composition T_1T_2 is a consequence operator and (IV) $T_1(X) \cup T_2(X) \subset T_1(T_2(X))$ for each $X \subset \mathcal{L}_1$. Thus far, other than T_0 being a consequence operator, it has not been determined whether (III) is sufficient in order to replace in (IV) $\subset$ with $=$. If (III) is not sufficient for this purpose, then this is a rather interesting result since the required consequence operator composed of the composition of T_1, T_2 that is needed to yield the right hand side of (II), at the least, would also be capable of yielding $T_1(X) \cup T_2(X)$ possibility adjoined with other characteristics neither in $T_1(X)$ nor in $T_2(X)$. The following simple example shows that T_0 as defined need not be a consequence operator. Let $\mathcal{L}_1 = \{a, b, c\}$. In binary pair form, let $T_1 = \{(\emptyset, \{a\}), (\{b\}, \{a, b, c\}), (\{a, b\}, \{a, b, c\}), (\{b, c\}, \{a, b, c\}), (\{a, b, c\}, \{a, b, c\}), (\{a\}, \{a\}), (\{c\}, \{a, c\}), (\{a, c\}, \{a, c\})\}$ and $T_2 = \{(\emptyset, \{b\}), (\{a\}, \{a, b\}), (\{b\}, \{b\}), (\{c\}, \{b, c\}), (\{a, b\}, \{a, b\}), (\{a, c\}, \{a, b, c\}), (\{b, c\}, \{b, c\}), (\{a, b, c\}, \{a, b, c\})\}$. The relations T_1, T_2 represent consequence operators. But, $T_0(\emptyset) = \{a, b\}$ and $T_0(\{a, b\}) = \{a, b, c\}$. Hence, axiom (2) does not hold. Also notice that $T_1(T_2(\emptyset)) = T_1(\{b\}) = \{a, b, c\}$, but $T_2(T_1(\emptyset)) = T_2(\{a\}) = \{a, b\}$. On the other hand, for the above $\mathcal{L}_1$, if $T_1(\{a\}) = \{a, b\}$ and $T_2(\{a\}) = \{a, c\}$ and T_1, T_2 are extended as defined in the above section “The Pragmatic Level,” then T_0 is a consequence operator.

There are other rather obvious ways to increase [resp. decrease] complexity. For example, relative to (I), there are consequence operators T_1, T_2 such that (V) for each $B \subset \mathcal{L}_1$, $T_2(B) \subset T_1(B)$. If $B = P(Sm(A))$, then this clearly yields the same or an increase [resp. decrease] in complexity. But, Theorem 2 in the appendix shows that if (V) holds, then we again have the same dependency statement that $T_1T_2 = T_2T_1$. On the other hand, a more direct way to give a possible increase in complexity is to let $A, B \subset \mathcal{L}_1$, $A \subset B$ and A and B are considered portions of the information in the genetic code in DNA. Then $T(P(Sm(A))) \subset T(P(Sm(B)))$. For biological entities, this can be interpreted as predicting, what is rather obvious, that a possible greater complexity can be obtained from a fixed T by applying Sm to an increased portion of the information contained within the genetic code in the DNA, information that exists originally. However, in this case, to have a possible increase in complexity it is necessary that $P(Sm(A)) \neq P(Sm(B))$. Recall that, as in all previous cases, it is always assumed that $T(P(Sm(A)))$ and $T(P(Sm(B)))$ are complete and consistent descriptions. Note that the technical results in this section also apply to the P and Sm operators. Scripturally, the special relationship between these consequence operators, with their encoded information, that is required to increase or decrease complexity gives further meaning to such statements as Hebrews 1:3.

In the above applications, it is assumed that consequence operators yield an ideal model for Gitt information theory. This model would need to be modified if modifications to the Gitt information or the information processes occurred. However, using Gitt's Theorem 1 (Gitt, 1997, p. 47), it is rational to assume that such modifications could only be produced through applications of additional mental activity. It is self-evident, that if consequence operators are used as a mathematical model for Gitt's concept of information and such an information scheme is accepted by the scientific community, then such results as presented here would most certainly require a rejection of the basic mechanisms that evolutionist claim yield a diversity of life-forms.

Conclusions

In this paper, there is developed a reasonable relation between consequence operators and information theory as presented by Gitt (1997). Although certain aspects of Gitt's theory may not be formulated in an acceptable manner, when re-formated, many of the theorems used for Gitt's theory are shown to be but deductive conclusions obtainable from the theory of consequence operators. It has also been shown that, relative to a scriptural interpretation of this Gitt information scheme, the source of life producing biological information corresponds to the scientifically describable concepts of ultralogics and ultrawords.

It is clear, however, that Gitt information theory, if it is accepted as a basic model for certain biological processes, may have a very profound effect upon those processes that evolutionists claim lead not only to "life" but also to the diversity of life-forms. If random *mutations* are random alterations in the characteristics of a biological entity that are, necessarily, not dependent upon the original biological characteristics, then this model would tend to disallow random mutations as a viable source of new evolutionary Gitt information. Mathematicians have produced an extensive theory of consequence operators and, hence, the mathematical model presented in this paper could be a very useful and additional tool in analyzing such claimed evolutionary processes.

Glossary

Analog model: In this paper, this is a theory that mimics a physical scenario—physical processes, physical characteristics, or natural system behavior—by application of objects or processes distinctly different from those discussed within the physical scenario.

Content: All of the effects a particular string of symbols has upon the mind of an individual who recognizes the string as meaningful.

Discipline dictionary: A collection of terms and phrases that has meaning for individuals who are associated with a specific discipline.

Equivalence class: Although this can be formally defined, for this paper, it is the collection of all meaningful strings of symbols that are adjudged to be "saying the same thing" or as having the "same relative meaning."

Independent consequence operators: This means that there is no relationship, except for an identity relationship, between the consequence operators that is expressible in terms of the set-theoretic operators used to obtain the theory of consequence operators.

Inner-logics: The mental-like patterns that model behavior of or predict behavior for a specific natural system contained within our universe.

Internal transfer of information: This is information that is transferred between the Gitt information levels.

Model: A collection of statements that uses entities that need not correspond to the actual objects under consideration. The relationships that exist between specific entities within the statements are used to describe relationships that exist between the actual objects under consideration. It is these relations that mirror the behavior of the actual objects being discussed.

Natural system: A set or arrangement of physical entities within our universe that are so related as to form an identifiable whole.

Physical axiom: A statement using terms denoting assumed physical entities that is obtained by induction using empirical evidence.

Readable sentence: Another name for a word.

Representative: A single member of an equivalence class.

Ultralogics: An object that behaves like a mental process but is infinitely more powerful than any such process that models behavior that occurs within our universe.

Word: A nonempty finite string of symbols. Such a string can also correspond to visual and audio impressions.

Appendix

Theorem 1. Let $\mathcal{C}$ be the set of all consequence operators defined on $\mathcal{L}_1$. Let $C_1, C_2 \in \mathcal{C}$ and, for each $X \subset \mathcal{L}_1$, let $C_0(X) = C_1(X) \cup C_2(X)$. If $C_0 \in \mathcal{C}$, then for each $X \subset \mathcal{L}_1$, $C_1(C_2(X)) = C_2(C_1(X))$.

Proof. First notice that C_0 is a mapping on the power set of $\mathcal{L}_1$ into the power set of $\mathcal{L}_1$ and satisfies axioms 1 and 3 for consequence operators. Two auxiliary results need to be established using our three axioms.

Suppose that $X, Y \subset \mathcal{L}_1$ and $C \in \mathcal{C}$. From axiom 1, we have that $X \cup Y \subset X \cup C(Y) \subset C(X) \cup C(Y)$. Application of axiom 3, yields that (1) $C(X \cup Y) \subset C(X \cup C(Y)) \subset C(C(X) \cup C(Y))$. Since $X \subset X \cup Y$ and $Y \subset X \cup Y$, axiom 3 yields that $C(X) \subset C(X \cup Y)$, $C(Y) \subset C(X \cup Y)$. Consequently, $C(X) \cup C(Y) \subset C(X \cup Y)$. Applying axiom 2, it follows that (2) $C(C(X) \cup C(Y)) \subset C(C(X \cup Y)) = C(X \cup Y)$. It follows from (1) and (2) that (3) $C(X \cup Y) = C(X \cup C(Y)) = C(C(X) \cup C(Y))$.

For a given $C \in \mathcal{C}$, a $Y \subset \mathcal{L}_1$ is called a *C-system* if and only if $C(Y) \subset Y$, which is equivalent to $C(Y) = Y$. Note that for any consequence operator $C \in \mathcal{C}$, $\mathcal{L}_1$ is a *C-system*. Let $S(C)$ be the nonempty set of all *C-systems* for a given $C \in \mathcal{C}$. Suppose that (4) $\emptyset \neq \mathcal{A} \subset S(C)$ and (5) $X = \bigcap \{Y \mid Y \in \mathcal{A}\}$. Let arbitrary $Y \in S(C)$. Then $C(Y) \subset Y$. But fixed $X \subset Y$ implies that $C(X) \subset C(Y)$, which implies that $C(X) \subset \bigcap \{C(Y) \mid Y \in S(C)\} = \bigcap \{Y \mid Y \in S(C)\} = X$ since Y is arbitrary. Hence (6) $X \in S(C)$.

For each $C_1, C_2 \in \mathcal{C}$ define $C_1 \leq C_2$ if and only if for each $X \in \mathcal{L}_1$, $C_1(X) \subset C_2(X)$. The binary relation $\leq$ is a partial order on $\mathcal{C}$. The algebra $\langle \mathcal{C}, \leq \rangle$, along with other objects and relations is shown by Wójcicki (1970) to be a complete lattice. Our interest is in the structure of the least upper bound (the supremum) $C_1 \vee C_2$ for any $C_1, C_2 \in \mathcal{C}$. As shown by Wójcicki (1970, p. 276) for any $X \subset \mathcal{L}_1$, $(C_1 \vee C_2)(X) = Y_X = \bigcap \{Y \subset \mathcal{L}_1 \mid X \subset Y = C_1(Y) = C_2(Y)\}$. Thus the Y_X is by (6) a C_1 -system and C_2 -system. Indeed, intuitively the smallest (with respect to $\subset$) such common *C-system*. Now $X \subset Y_X$ implies that $X \subset C_1(X) \subset C_1(Y_X) = Y_X$ and $X \subset C_2(X) \subset C_2(Y_X) = Y_X$. Consequently, $C_1(X) \cup C_2(X) \subset Y_X$. Further, $C_1(X) \subset C_1(X) \cup C_2(X)$, $C_2(X) \subset C_1(X) \cup C_2(X)$. Define for each $X \subset \mathcal{L}_1$, $C_0(X) = C_1(X) \cup C_2(X)$ and assume that $C_0 \in \mathcal{C}$. First notice that $C_1 \leq C_0$, $C_2 \leq C_0$ and $C_0 \leq C_1 \vee C_2$. Thus $C_0 = C_1 \vee C_2$. This implies that for arbitrary $X \subset \mathcal{L}_1$, $C_1(X) \cup C_2(X) = Y_X = C_1(Y_X) = C_2(Y_X)$ by (6). Therefore, $C_1(C_1(X) \cup C_2(X)) = C_1(Y_X) = C_2(Y_X) = C_2(C_1(X) \cup C_2(X))$. From (3), $C_1(X \cup C_2(X)) = C_2(X \cup C_1(X))$. But, axiom 1 yields that $C_1(C_2(X)) = C_2(C_1(X))$ and the result follows.

Theorem 2. Let $\mathcal{C}$ be the set of all consequence operators defined on $\mathcal{L}_1$. Let $C_1, C_2 \in \mathcal{C}$. Then $C_2 \leq C_1$ if and only if $C_1 C_2 = C_2 C_1 = C_1$.

Proof. As shown in Herrmann (1987, p. 7), $C_2 \leq C_1$ if and only if the composition $C_1 C_2 = C_1$. Assume that $C_2 \leq C_1$. Then for arbitrary $X \subset \mathcal{L}_1$, $C_1(C_2(X)) = C_1(X) \subset C_2(C_1(X)) \subset C_1(C_1(X)) = C_1(X)$ implies $C_1(C_2(X)) = C_2(C_1(X)) = C_1(X)$. The converse is obvious and this completes the proof.

References

- CRSQ: *Creation Research Society Quarterly*
- Gitt, W. 1997. *In the beginning was information*. Christliche Literatur-Verbreitung e. V. Bielefeld, Germany.
- Herrmann, R. A. 1982. The reasonableness of metaphysical evidence. *Journal of the American Scientific Affiliation* 34:12–23.
- . 1984. The word. CRSQ 20:226–229.
- . 1985. Subparticles and realism in quantum theories. CRSQ 22:84–89.
- . 1986a. Developmental paradigms. CRSQ 22:189–198.
- . 1986b. D-world evidence. CRSQ 23:47–53.
- . 1987. Nonstandard consequence operators. *Kobe Journal of Mathematics* 4:1–14.
- . 1988. Physics is legislated by a cosmology. *Speculations in Science and Technology* 11:17–24.
- . 1993. Ultralogics and more.
www.serve.com/herrmann/books.htm
xxx.lanl.gov/abs/math.HO/9903081 and 9903082.
- . 1994a. The scientific existence of a higher intelligence. CRSQ 30:218–222.
- . 1994b. Solution to the general grand unification problem.
www.serve.com/herrmann/abst1.htm
xxx.lanl.gov/abs/astro-ph/9903110
- . 1994c. Your endangered mind: the great scientific deception. www.serve.com/herrmann/gsc.htm
- . 1999. The NSP world and action-at-a-distance. In *Instantaneous action-at-a-distance in modern physics: "Pro" and "Contra."* (Series Contemporary Modern Physics) Nova Science Books and Journals, New York.
- March, A. and I. M. Freeman. 1963. *The new world of physics*. Vintage Books, New York.
- Shannon, C. F., and W. Weaver. 1964. *The mathematical theory of communication*. University Press, Urbana.
- Steinbuch, K. 1968. *Falsch programmiert*. Deutscher Bucherbund, Stuttgart, Hamburg, Germany.
- Tarski, A. 1930. Fundamentale Begriffe der Methodologie der deduktiven Wissenschaften. I. *Monatshefte für Mathematik und Physik* 37:361–404. Translation in Tarski, A. 1956. *Logic, semantics, metamathematics (Papers From 1923–1938)*. Oxford Universe Press, Oxford.
- von Weizsäcker, E. 1974. *Offene systeme I—Beiträge zur zeitstruktur von information, entropie und evolution*. Ernst Klett Verlag, Stuttgart, Germany
- Wójcicki, R. 1970. Some remarks on the consequence operation in sentential logics, *Fundamenta Mathematicae* 68:269–279.
- Yockey, H. P. 1981. Self organization origin of life scenarios and information theory. *Journal of Theoretical Biology* 91:13–31.

Photo Essay

Fluted vase or sensory appendage?

The scarab beetle pictured in these scanning electron micrographs is a member of the Family Scarabaeidae in the Order Coleoptera. It has chewing mouth-parts (protected and not shown) and well-developed antennae that are folded into slots built into its exoskeleton (Figure 1). In addition, a pair of hard, opaque, waterproof wings (called elytra) which cover and protect the thin flight wings and the body characterizes the scarabs. Many of them have brilliant colors and patterns, but most are dull. They range in size from less than 1/32 in. (1 mm) to more than 6 in. (15 cm) in length. One of the most famous of the scarabs is the dung beetle, with many different species, which according to some is responsible for most of the earth moving on the planet.

The closer one looks at the surface features of living creatures, the more intricacy and detail becomes apparent to the observer. Notice for example, as a small portion of the scarab body near the antenna and the compound eye is enlarged (Figure 2), what appeared to be white hair-like structures in Figure 1 now takes on more of a three-dimensional appearance. The compound detail of the eye becomes apparent, as does the ribbed nature of those objects we once thought were merely spines. It is now clear that there are indeed spines on our subject, but they are much different from the fluted structures we are studying. These structures are tapered at the end where they appear to be embedded into pores on the exoskeleton. In Figure 3, the dramatic detail of these fluted vases now becomes clear. They have fluted ridges which terminate in an open mouth surrounded by spines and they are hollow. It appears that they serve some sensory function, perhaps communicating temperature and humidity changes or the proximity of a food source to the organism. If one were to study only a single magnification of an object, an erroneous assumption about what we are observing could easily be made.

What is abundantly clear from the world of the electron microscope is that there is order and complexity at all levels of magnification, from 100X to 10,000X—an order that speaks of an ordering intelligence. I postulate that this Intelligence is God.

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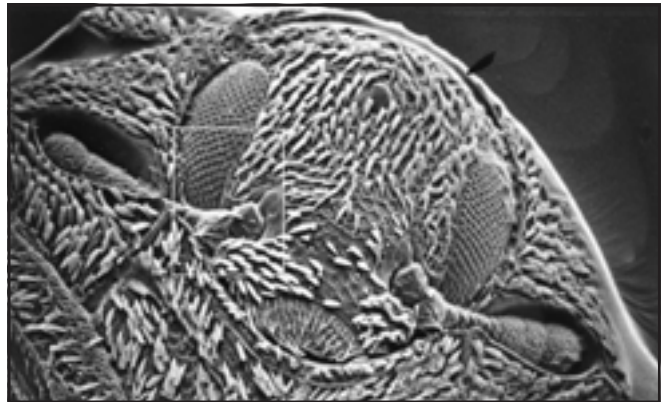


Figure 1. Scarab beetle *Plecocoma* sp., ventral view.

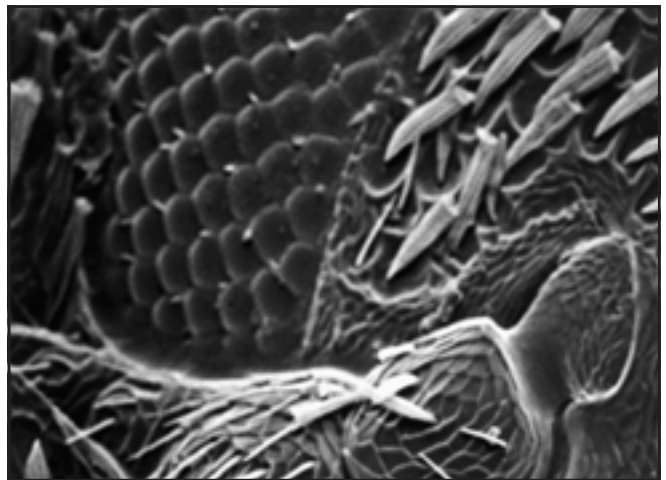


Figure 2. Beetle antenna ball joint/edge of eye.

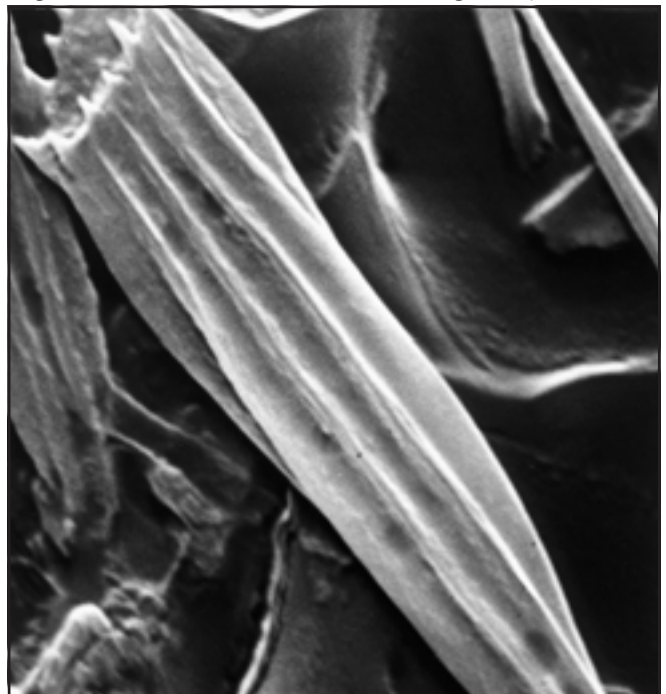


Figure 3. Single fluted structure.

How Gradual Evolution Is Disproved In the Textbooks

Randall Hedtke*

Abstract

Jevons' Rule states that a single absolute conflict between fact and a hypothesis is fatal to that hypothesis. Darwin's theory of gradual evolution cannot logically be sustained because it is a theory which is in direct conflict with paleontological facts and is thus falsified by Jevons' Rule. This conflict between Darwin's theory and paleontology was known from the time Darwin's book was published, but reliable investigative procedures were not allowed to stand in the way of the materialists' determination to establish an explanation for the origin of life. Thus began a policy of suppression, calculated ignorance, and deliberate closed-mindedness regarding unfavorable evi-

dence on the part of macroevolutionists in science education. Today the teaching of evolution is doctrinal rather than genuinely theoretical; it is a curriculum deliberately tailored to indoctrinate rather than educate and a curriculum whose palpable intellectual duplicity must be exposed.

When the gradualists' theory of macroevolution is analyzed in the context of paleontological facts, it is disproved by the obvious lack of intermediate fossil forms. Darwin foresaw this problem as did the theistic evolutionist, St. George Mivart, whose ideas are explored here. Mivart formulated an early version of the punctuated equilibrium model, a version predicated on Divine miracles.

Introduction

Darwin believed that all life forms are related and have descended from a common ancestry by a gradual natural process which came to be called evolution. Today, however, it is a common practice to distinguish between two types of evolutionary change. The first is sometimes labeled microevolution and involves minor changes, which can be observed or easily inferred from scientific evidence. The second usage, macroevolution, designates the belief that the major adaptive forms such as fish, amphibians, reptiles, etc. are all related. The word "evolution" as used in this paper, is referring to the concept of macroevolution. Like all other theories, macroevolution exists to be overthrown if possible and no amount of belief in it, as a doctrine, should prevent declaring it disproved. All of the pertinent evidence necessary to disprove evolution is in place. Although all explanations for the origin of life incorporate a religious element, the validity or invalidity of evolution is first and foremost an issue of good science versus bad science.

The Untestable and Inconclusive Evidence for Evolution

Humanism is a materialistic belief which requires a materialistic explanation for origins. Darwin's religious orientation also provided the motivation for presenting his theory in a dogmatic rather than scientifically objective way. He tailored his theory to make it more convincing in terms of his personal belief system. The legacy of Darwin is that today religious humanism stands in the way of objectively looking at evolution theory.

Evolution by means of gradual change has dual roles as both scientific theory and religious doctrine. In his autobiography, Charles Darwin described his humanistic religious belief:

A man who has no assured and no present belief in the existence of a personal God or a future existence with retribution and rewards, can have for his rule of life, as far as I can see, only to follow those impulses and instincts which are the strongest or which seem to him the best ones. A dog acts in this manner, but he does so blindly. A man on the other hand, looks forwards and backwards, and compares his various feelings, desires, and recollections. He then finds, in accordance with the verdict of the wisest men, that the highest satisfaction is derived from following certain impulses, namely the social instincts. If he acts for the good of others he will re-

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ceive the approbation of his fellow men and gain the love of those with whom he lives; and this latter gain undoubtedly is the highest pleasure on this earth. By degrees it will be more intolerable to him to obey his sensuous passions rather than his highest impulses, which when rendered habitual may be almost called instincts. His reason may occasionally tell him to act in opposition to the opinion of others, whose approbation he will then not receive; but he will still have the solid satisfaction of knowing that he has followed his innermost judge or conscience (Himmelfarb, 1959, pp. 318–319).

Darwin's belief seems to be the forerunner of the humanistic doctrine expounded in the *Humanist Manifesto*:

Religious humanists regard the universe as self-existing and not created. Humanism believes that man is part of nature and that he emerged as the result of a continuous process (Kurtz, 1984, p. 8).

We find insufficient evidence for belief in the existence of a supernatural; it is either meaningless or irrelevant to the question of the survival and fulfillment of the human race. As non-theists we begin with humans not God, nature not deity (Kurtz, 1984, p. 16).

In order to expose the fact that evolution by means of natural selection is disproved in the textbooks, one must not become beguiled by evolution's doctrinal aspects. Evolution must be held strictly accountable as a scientific theory. To do that, we need apply only one simple rule of logic, which is taken from W. Stanley Jevons (1958, p. 516): "A single absolute conflict between fact and hypothesis is fatal to the hypothesis". Jevons is merely stating an obvious elementary rule of logic that is applied in every walk of life. One can hardly get through the day without consciously or subconsciously using Jevons' Rule. It applies equally well to theories.

In evaluating the body of evolutionary evidence in the textbooks, we find that two categories exist, the untestable, inconclusive evidence and the testable, conclusive evidence. Within the inconclusive category we have the fossil evidence for alleged human evolution, alleged vestigial organs, comparative anatomy, comparative embryology, and geographic distribution. These are the same inconclusive evidences that Darwin employed in writing the *Origin of Species*. These cannot be interpreted conclusively because no empirical test is possible to prove the evolutionary interpretations. Such evidence is open to counterinduction or alternative points of view. The counterinductive interpretations are also inconclusive. The process of entertaining alternative interpretations has the effect of removing the entire body of inconclusive evidence from the arena of dogma and

putting it into the realm of scientific objectivity where it belongs.

Therefore, the first step in our criticism of customary concepts and customary reactions is to step outside the circle and either to invent a new conceptual system, for example, a new theory that clashes with the most carefully established observational results and confounds the most plausible theoretical principles, or to import such a system from outside science, from religion, from theology, from the ideas of incompetents, or the ramblings of mad men. This step is, again, counterinductive. Counterinduction is thus both a fact—science could not exist without it—and a legitimate and much needed move in the game of science (Feyerabend, 1975, p. 68).

Considering Darwin's underlying religiosity and the fact that evolution is a doctrine of certain religions, the dogmatic treatment of this inconclusive evidence in the public school textbooks constitutes a possible violation of the First Amendment Establishment Clause of the United States Constitution. That clause states that "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." We can demonstrate how an alternative explanation is possible with the evidence for alleged human evolution. In the textbooks, fossil specimens are interpreted in terms of an *a priori* belief in evolution. Regarding the origin of humans, an alternative point of view is that fossil specimens are remains of extinct races of human beings or extinct species of primates having nothing to do with evolution. Extinction we know is a fact in the natural scheme of things. In addition, many of the specimens were discovered on continents that presently host populations of primates. Experts will argue the ancestry of a fossil specimen endlessly because there is no empirical test to prove ancestry.

Counterinduction can apply to all the untestable, inconclusive evidence. With little effort it is possible and useful to formulate legitimate, nonevolutionary explanations for any of evolution's untestable evidences. Evolution theorists have not received any special dispensation in the United States Constitution allowing only their biased interpretations to be taught. Darwin knew that his evidence was vulnerable to counterinduction which is probably why, in the Introduction to the *Origin*, he begged the public's indulgence to postpone publishing "conclusions directly opposite."

For I am well aware that scarcely a single point is discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived. A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of

each question; and this cannot possibly be here done (Darwin, 1909, p. 20).

Darwin regarded the *Origin* as a mere abstract of a complete account which he assured the public he would provide in the future. Originally he wrote that in “two or three more years” he would finish the complete account. But in the final edition of the *Origin* he changed his mind.

My work is now nearly finished; but as it will take me many more years to complete it, and as my health is far from strong, I have been urged to publish this Abstract (Peckham, 1959, p. 71).

Presumably a completely developed version of his theory would have included counterinduction, but Darwin’s postponement in presenting alternative views turned out to be permanent and persists to this day. It is still the practice of most evolutionists to ignore alternative views. Why was it “impossible” for Darwin to include counterinduction? He may have known that evolution was more of a religious doctrine than a scientific theory, and perhaps he was reticent to present any religious views except his own. It is scientifically archaic, however, to consider only certain prejudicial interpretations of data.

The Testable or Conclusive Evidence

Evolution by means of natural selection contains a prediction that would ultimately determine its validity. The testable prediction was that abundant transitional fossils would be discovered and that the alleged transitional fossils would reveal a gradual evolutionary change from simple to complex in both the plant and animal kingdoms. But that is not what the real fossil record tells us.

One class of facts, however, namely, the sudden appearance of new and distinct forms of life in our geological formations supports at first sight the belief in abrupt development. But the value of this evidence depends entirely on the perfection of the geological record in relation to periods remote in the history of the world. If the record is as fragmentary as many geologists strenuously assert, there is nothing strange in new forms appearing as if suddenly developed (Darwin, 1909, p. 249).

In the following statement Darwin substantiated his position on the lack of intermediate links:

Why then are not every geological formation and every stratum full of such intermediate links? Geology assuredly does not reveal any such finely graduated organic chain; and this, perhaps, is the most obvious and serious objection which can be urged against the theory. The explanation lies, as I believe, in the extreme imperfection of the geological record (Darwin, 1909, p. 320).

In other words, Darwin’s theory was founded, not on the real fossil record that he and the scientific establishment recognized, but on a mythical, or idealized fossil record with abundant transitional fossils that he believed would be forthcoming. Since Darwin formulated his theory, testing of the prediction has been going on for about 150 years. In all of this time, only one or two questionable transitional fossils have been discovered, e.g. *Archaeopteryx* as a transition between reptile and bird. It is now an embarrassment for proponents of evolution to insist, as Darwin did, that numerous intermediate fossils will be forthcoming. The time has arrived when it must be declared that the test is finished and it has negated the gradual evolutionary theory. Many contemporary evolutionists have spoken of the overthrow of gradualism; two sample quotes are given here.

The absence of fossil evidence for intermediary stages between major transitions in organic design, indeed our inability, even in our imagination, to construct functional intermediates in many cases, has been a persistent and nagging problem for gradualistic accounts of evolution (Gould, 1980, p. 127).

We now have a quarter of a million fossil species but the situation hasn’t changed much. The record of evolution is still surprisingly jerky and, ironically, we have even fewer examples of evolutionary transition that we had in Darwin’s time. By this I mean that some of the classic cases of Darwinian change in the fossil record, such as the evolution of the horse in North America, have had to be discarded or modified as a result of more detailed information—what appeared to be a nice simple progression when relatively few data were available now appears to be much more complex and much less gradualistic (Raup, 1979, p. 25).

Consequently, gradualistic evolution by means of natural selection is disproved. Even Darwin hinted at such paleontological disproof:

The abrupt manner in which whole groups of species suddenly appear in certain formations, has been urged by several paleontologists—for instance, by Agassiz, Pictet, and Sedgwick—as a fatal objection to the belief in the transmutation of species (Darwin, 1909, p. 348).

Regarding these paleontological problems, Gould used a quote from Darwin:

The geological record is extremely imperfect and this fact will to a large extent explain why we do not find interminable varieties, connecting together all the extinct and existing forms of life by the finest graduated steps. He who rejects these views on the nature of the geological record, will rightly reject my whole theory (Gould, 1977, p. 14).

He would rightly reject it because a single absolute conflict between fact and hypothesis is fatal to the hypothesis (Jevons' Rule). Darwin well understood that ultimately his theory would be accountable to such logic. The following epitomizes the relationship between the fossil record and Darwinism:

The extreme rarity of transitional forms in the fossil record persists as the trade secret of paleontology. The evolutionary trees that adorn our textbooks have data only at the tips and nodes of their branches; the rest is inference, however reasonable, not the evidence of fossils. Yet Darwin was so wedded to gradualism that he wagered his entire theory on a denial of this literal record (Gould, 1977, p. 14).

Darwin wagered a prediction and lost. The mythical fossil record that he and generations of evolutionists after him have believed in has not become a reality. The consensus opinion against Darwin's prediction, however, is currently being censored from school textbooks. Despite such censorship, one can say that gradual evolution is disproved in these same textbooks and that there is in them that which confirms the consensus rejection of gradualism.

In textbooks there is a brief statement about the punctuated equilibrium theory which has become an accepted part of the evolutionary apologetic:

Evidence from the fossil record has led some scientists to propose that speciation need not occur gradually but can occur in spurts. According to the theory of punctuated equilibrium, all populations of a species may exist for a relatively long time at or close to genetic equilibrium. Then the equilibrium may be interrupted by a brief period of rapid genetic change in which speciation occurs (Towle, 1993, p. 249).

This statement seems innocuous at first until one realizes that it was formulated to take into account the absence of numerous intermediate fossils predicted by gradual evolution. Its significance becomes striking because it means that we have two opposing theories in the textbooks: one gradual and one abrupt. Both rely on the same fossil record which, of course, cannot support two opposing interpretations! The punctuated equilibrium theory is not a formal declaration by the evolutionists that gradual evolution is disproved, but it is nevertheless an indirect statement to that effect.

Now that the mythical fossil record had been openly rejected by the realists, the gradualists must prove that the mythical fossil record upon which evolution is founded is real. It is not the skeptics' responsibility to try to prove that abundant transitional fossils do not exist.

Instead, it is the gradualists' responsibility to prove that they do. This is the way matters should have played out from the very beginning.

A Mechanic's Obedience to Jevons' Rule

An auto mechanic must abide unquestioningly by Jevons' Rule; it would be both impractical and ludicrous not to. Let us say the mechanic has been hired to start an automobile engine. He initially hypothesizes that the problem is with the battery or its electrical connections. When those potential problems are eliminated, the mechanic unhesitatingly abandons his hypothesis and formulates a new one.

The same principle applies to evolution theory regarding the fossil record except for the element of practicality. The real fossil record conflicts with the theory of gradual evolution, but because of evolution's religious and philosophical underpinning, evolution theorists are guided by metaphysical considerations rather than by scientific facts. It is nonetheless ludicrous for evolution theorists to be recalcitrant in obeying Jevons' Rule; they should reject gradualism.

The leadership of the National Association of Biology Teachers (NABT, 1996) has refused to acknowledge the obvious absence of transitional fossils. It published a directive for teachers in every public school district on how to teach evolution. Two of their tenets read as follows: "Nothing in biology makes sense except in the light of evolution," (p. 61) and "Specific textbook chapters on evolution should be included in biology curricula, and evolution should be a recurrent theme throughout biology textbooks and courses" (p. 62). Could a purely secular theory inspire that much evangelistic zeal?

In that same document the NABT actually encourages biology instructors to teach a falsehood. "The fossil record, which includes abundant transitional forms in diverse taxonomic groups, establishes extensive and comprehensive evidence for organic evolution (p. 61)." There is, in fact, an absence of transitional fossils, such that Jevons' Rule takes effect and Darwinian gradualistic evolution should be presented as a falsified hypothesis.

On p. 61 the NABT states: "The model of punctuated equilibrium provides another account of the tempo of speciation in the fossil record of many lineages; it does not refute or overturn evolutionary theory, but adds to its scientific richness." "Scientific richness" should read "confusion". The NABT's endorsement of punctuated equilibrium is tantamount to admitting that they agree with paleontology, which has exposed the fact about abundant transitional fossils as being untrue.

How Mivart Descended Gradualism in 1872

Many people believe natural selection is the mechanism for gradualism and that gradual evolution is occurring in the environment. They reason that because the mechanism sounds reasonable, gradual evolution must be true regardless of the fossil record. This is rather like having the tail wag the dog. The correct reasoning is that the fossil record disproves gradual evolution, consequently the mechanism cannot be true. In fact the efficacy of natural selection to cause macroevolutionary changes was discredited in 1872 when Darwin conceded to the problem concerning how an organ might have even got started from rudimentary beginnings, a problem posed by St. George Mivart:

It was inevitable that a great crowd of half-educated men and shallow thinkers should accept with eagerness the theory of "Natural Selection". We refer to its remarkable simplicity, and the ready way in which phenomena the most complex appear explicable by a cause for the comprehension of which laborious and persevering efforts are not required, but which may be represented by the simple phrase "survival of the fittest". With nothing more than this, can, on the Darwinian theory, all the more intricate facts of distribution and affinity, form and color, be accounted for; as well as the most complex instincts and the most admirable adjustments, such as those of human eye and ear (Mivart, 1871, p. 23).

Mivart regarded natural selection as incapable of producing new kinds or adaptive features. His criticism of natural selection was as follows:

Natural selection utterly fails to account for the conservation and development of the minute rudimentary beginnings, the slight and infinitesimal commencement of structures, however useful those structures may afterward become (Mivart, 1871, p. 35).

In other words, natural selection cannot play a role in the minute beginnings of useful structures before they have a use. Should minute, indefinite, and fortuitous variations somehow be preserved in one direction, they would merely result in an incipient, functionless organ on which natural selection is incompetent to act, since the incipient organ could not have conferred an advantage in survival or reproduction.

That such variations should come into existence and be somehow preserved in one direction is the miraculous part of Darwinian evolution and thus not scientifically accountable. All explanations for the origin of life, whether theological or scientific, ultimately rely on miracles. Mivart continued with his opposition to Darwin's touting natural selection as a mechanism for major changes:

The author of this book can say that, although by no means disposed originally to dissent from the theory of "Natural Selection", if only its difficulties could be solved, he has found each successive year that deeper consideration and more careful examination have more and more brought home to him the inadequacy of Mr. Darwin's theory to account for the preservation and intensification of incipient, specific and generic characters. That minute, fortuitous, and indefinite variations could have brought about such special forms and modifications as have been enumerated in this chapter, seems to contradict not imagination, but reason.

In spite of all the resources of a fertile imagination, the Darwinian, pure and simple, is reduced to the assertion of a paradox as great as any he opposes. In the place of mere assertion of our ignorance as to the way these phenomena have been produced, he brings forward, as their explanation, a cause which it is contended in this work is demonstrably insufficient.

Of course in this matter, as elsewhere throughout Nature, we have to do with the operation of fixed and constant natural laws, and the knowledge of these may before long be obtained by human patience or human genius; but there is, it is believed, already enough evidence to show that these as yet unknown natural laws or law will never be resolved into the action of "Natural Selection", but will constitute or exemplify a mode and condition or organic action of which the Darwinian theory takes no account whatsoever (Mivart, 1871, pp. 74–75).

Darwin's Response to Mivart

In the final edition of the *Origin* (1872), Darwin included a section for a response to Mivart in which he did not deny the validity of Mivart's incipency criticism.

I have now considered enough, perhaps more than enough of the cases selected with care by a skilful naturalist, to prove that natural selection is incompetent to account for the incipient stages of useful structures; and I have shown, as I hope, that there is no great difficulty on this head. A good opportunity has thus been afforded for enlarging a little on gradations of structure, often associated with changed functions—an important subject, which was not treated at sufficient length in the former editions of this work (Darwin, 1909, pp. 243–244).

Darwin surrendered further with this admission: "Even if the fitting variation did arise, it does not follow that natural selection would be able to act on them, and produce a structure which apparently would be beneficial

to the species" (Darwin, 1909, p. 222). The significance of Darwin's concession to the validity of the incipency problem is profound. It means, since natural selection cannot account for the beginning stages of an organ, it cannot account for the present existence of complete, functional organs and organisms. It is for this reason some people will perform mental contortions in order not to interpret Darwin literally. What was Darwin's alternative? Could he disagree with Mivart and insist that natural selection can account for incipient organs? Of course not; the superficial logic of natural selection would be shattered. The phrase "survival of the fittest" would no longer have application and it would mean that incipient organs, with no survival value in the beginning, could make an organism more fit for survival in the end. It would be illogical to the Darwinian concept to have useless organs mysteriously maintained and preserved by natural selection. Instead, Darwin's strategy was to concede to Mivart's criticism by giving natural selection only a secondary role, and advancing other methods by which evolutionary changes can be accomplished. This is seen in the latter part of the first quote in which Darwin stated: "I have shown, as I hope, that there is no great difficulty on this head." When Darwin responded thus to Mivart, he was not trying to defend his natural selection view against incipency, since it is obviously indefensible. Instead he took Mivart to task for not informing his readers of alternative methods of evolution:

When discussing special cases, Mr. Mivart passes over effects of use and disuse of parts, which I have always maintained to be highly important... He likewise often assumes that I attribute nothing to variations, independent of natural selection... (Darwin, 1909, pp. 218–219).

Darwin formulated a new version of natural selection in an attempt to circumvent the incipency problem. Other methods of evolution and this new version of natural selection together overcome (in Darwin's mind) the difficulties confronting his theory which is why he asserted that: "...there is no great difficulty on this head."

Darwin attempted to salvage evolution by natural selection by appealing to variations independent of natural selection which simply means that favorable variations will accumulate into new kinds by themselves. But there is no naturalistic mechanism for such to occur. It was a scenario that the naturalistic evolutionary establishment would not have embraced. Use and disuse of parts is Jean Lamarck's (1774–1829) theory that the mere *need* for a new organ or body part would enable an organism to acquire it out of necessity, but Lamarck's theory has been refuted by modern genetics.

Darwin's new natural selection mechanism promoted the idea that useful gradations are always added, which is to say, that every evolutionary step must be useful. Since

Darwin could not overcome the incipency problem, he simply eliminated incipency! "Gradations of structure, with each stage beneficial to changing species, will be found only under certain peculiar conditions" (Darwin, 1909, p. 223). The air bladder in fishes, for example, would have become lungs in mammals by means of natural selection acting on alleged gradations that were always useful. It was proposed that every evolutionary stage from air bladder to lungs had been beneficial to the intermediate organisms. There is one very serious drawback, as Darwin admitted: "It is therefore impossible to conjecture by what serviceable gradation the one could have been converted into the other; but it by no means follows from this that such gradations have not existed" (Darwin, 1909, p. 237). This Darwinian statement demonstrated that the "always useful gradations" are not only beyond science; they are even beyond imagination!

In effect, Darwin was saying that in order for natural selection to work, one must always have useful gradations which natural selection will then make useful for survival. This makes natural selection redundant as a creative mechanism, because if the variations were already useful, how could natural selection make them useful later? It is no wonder that evolutionary scientists did not adopt Darwin's new natural selection mechanism. Their strategy instead has been to sweep the whole incipency problem under the rug; it is simply omitted from typical introductory biology textbooks. Darwin's belief in "serviceable gradations" again directs us back to the fossil record. These serviceable gradations must have been evident in nothing other than the elusive intermediate fossils!

The History of Punctuated Equilibrium

Few people realize that the punctuated equilibrium scenario was originally proposed by St. George Mivart under the name of "derivative creation." Although a contemporary of Darwin, Mivart stuck with the real fossil record rather than the mythical one and, "...he utilized the gaps in the palaeontological record...to support his view that evolution occurs through saltations (jumps) independent of the operation of natural selection" (Gruber, 1960, p. 54).

In his book, *On the Genesis of Species*, Mivart described his own theory of origins, which overcomes the problems in Darwinian gradualism by means of natural selection. Mivart's theory of evolution centered on a belief in a Divine Being.

Organic Nature speaks clearly to many minds of the action of an intelligence resulting, on the whole and in the main, in order, harmony, and beauty, yet of an intelligence the ways of which are not such as ours" (Mivart 1871, p. 253).

Mivart's aim was,

...to support the doctrine that these species have been evolved by ordinary natural laws (for the most part unknown) controlled by the subordinate action of "Natural Selection," and at the same time to remind some that there is and can be absolutely nothing in physical science which forbids them to regard those natural laws as acting with the Divine concurrence and in obedience to a creative fiat originally imposed on the primeval Cosmos, "in the beginning," by its Creator, its upholder, and its Lord. (Mivart, 1871, p. 255).

Consequently,

...an internal law presides over the actions of every part of every individual, and of every organism as a unit, and of the entire organic world as a whole. That by such a force, from time to time, new species are manifested by ordinary generation... That these "jumps" are considerable in comparison with the minute variations of "Natural Selection"—are in fact sensible steps, such as discriminate species from species. That the latent tendency which exists to these sudden evolutions is determined to action by the stimulus of external conditions. (Mivart, 1871, p. 255).

Therefore, according to Mivart, natural laws that were preordained by God induced the abrupt appearance of new species derived from antecedent species. The subordinate role of natural selection is to eliminate the antecedent species. The function of natural selection is thus relegated to an eliminating and stabilizing, not a creating, mechanism.

"Natural Selection" removes the antecedent species rapidly when the new one evolved is more in harmony with surrounding conditions. By some such conception as this, the difficulties here enumerated, which beset the theory of "Natural Selection" pure and simple, are to be got over. Thus, for example, the difficulties as to the origins and first beginnings of certain structures are completely got over (Mivart, 1871, p. 255–256).

Mivart's sudden appearance explanation for origins, like the punctuated equilibrium model, overcomes unresolved difficulties facing Darwinian gradualism, particularly incipency and the obviously abrupt appearance of species in the fossil record. But Mivart's derivative creation theory had a feature that made it unacceptable to the prevailing naturalistic mindset of the Darwinists. It did not have an on-going naturalistic mechanism, being instead a teleological explanation for the origin of life. Teleology means that natural phenomena are determined not only by mechanical causes but by an overall design or purpose in nature. Mivart's theory called for a Divine Being and we know from Darwin's

humanistic belief that the religious imperative of his theory was to deny the activity of a personal God. Any kind of abrupt explanation for the origin of life immediately implies miracles and miracles imply a creator. It is for that reason Darwin was absolutely opposed to Mivart's theory:

He who believes that some ancient form was transformed suddenly through an internal force or tendency into, for instance, one furnished with wings, will be almost compelled to assume... that many individuals varied simultaneously. He will further be compelled to believe that many structures beautifully adapted to all the other parts of the same creature and to the surrounding conditions, have been suddenly produced; and of such complex and wonderful co-adaptation, he will not be able to assign a shadow of an explanation. To admit all this is, as it seems to me, to enter into the realms of miracle, and to leave those of Science (Darwin, 1909, p. 250).

Mivart's derivative creation theory is really a version of theistic evolution. Darwin's opposition to Mivart's theory tells us in no uncertain terms that any theistic evolutionist who thinks he shares common ground with orthodox, atheistic, evolutionists is sadly mistaken. Teleology is still the forbidden element in the theorizing of orthodox evolutionists.

Mivart's reward for betraying evolutionary orthodoxy was ostracism:

Until the day of his death, Mivart was haunted by the hostility, latent and overt, of the small circle which had surrounded Darwin. The continuing, if not growing antipathy toward Mivart as both a man and scientist, expressed by those who were becoming the leaders of post-Darwinian science, virtually excluded him from the mainstream of science for which Darwinism was the source. This antipathy, gradually established the caricature of Mivart as a dogmatic and biased opponent of Darwinism, led for all practical purposes to the negation of his more pregnant observations. As an apostate he was forgotten, relegated to the ash heap upon which lay the remains of all whose who, for one reason or another, selfish or unselfish, good or bad, sought to check the wholesale acceptance of all things Darwinian (Gruber, 1960, p. 80).

Where was the tolerance and the fabled scientific objectivity and open-mindedness? And that was not the full extent of Mivart's tribulation. To add insult to injury, Mivart, a prominent Catholic layman, was excommunicated by Cardinal Vaughn for trying to advance an explanation for origins other than special creation (Gruber, 1960, pp. 209–210). We must give Mivart credit for having the courage to stand up to the Darwinian juggernaut

and point out the incipency problem. We must also applaud him for having the mental fortitude to base his origins theory on the real fossil record while others were committed to gradualism based on a mythical fossil record. Mivart's analysis was, in fact, a declaration that Darwinian gradual evolution was already disproved. It was because of this declaration and his teleology that he was ostracized and his work suppressed. His one fault seems to have been that he insisted on his theory being accepted because it overcame incipency and accounted for the gaps in the fossil record. In actuality it merely proved to be a superior theory to Darwinian gradualism in agreeing with the facts, but it, like Darwinian gradualism, remained a tentative explanation and could not be empirically supported.

About 120 years passed before orthodox evolutionists have again confronted the issue of the absence of abundant intermediate fossils with the formulation of the punctuated equilibrium theory. Orthodox evolutionists finally had to admit that the mythical fossil record is indeed a figment of their imaginations and could no longer be perpetuated in the real world. So why are not the formulators of punctuated equilibrium, Eldridge and Gould, ostracized? Why was their punctuated equilibrium theory accepted when Mivart's was not? It is obvious that Darwin's objection to Mivart's theory applies as well to their punctuated equilibrium view. Both theories are based upon the abrupt appearance of organisms. The answer is that the punctuated equilibrium model of Gould and Eldridge is not teleological; its miracles are not called such and they do not demand a Miracle Maker. The punctuated equilibrium view fulfills the orthodox evolutionists' religious imperative to exclude God from the process of origins. To the evolutionist, the question of whether or not there was a Miracle Maker behind the obvious "miracles" is an issue for religion to discuss, not science.

The Need for Academic Honesty in School Curricula

The general taxpayers and scientists should be in favor of an open presentation of the scientific origins data and an honest evolutionary curriculum. Such a curriculum should correct the work of Darwin who was dedicated to a form of religious indoctrination rather than to scientific open-mindedness. By his own admission he knew that his data were subject to "conclusions directly opposite".

What would constitute an enlightened and academically honest origins curriculum? First and foremost it would incorporate counterinduction (alternative expla-

nations) in keeping with scientific objectivity. It should also include all of the pertinent information unfavorable to evolution that is presently censored. It should detail the "incipency problem" and Darwin's response to it. It ought to inform students of Darwin's new concept of natural selection that required gradations that were always useful. Students should be informed that in every field of investigation the real data are the only data scientists consider reliable. They must learn how evolutionary investigators have promoted a mythical fossil record rather than the real one. When the real fossil evidence is analyzed, Jevons' Rule applies and gradual evolution stands disproved. Students should be allowed to decide for themselves whether or not to apply Jevons' Rule. In an academically honest origins curriculum, discussions of the punctuated equilibrium model ought to include Mivart's pioneering "derivative creation" theory, which, like the punctuated equilibrium view, was formulated to take into account the absence of abundant intermediate fossils. Students should learn that both theories are similar in that neither is scientifically accountable and that the fundamental difference is the teleology of Mivart's theory versus the materialism of Gould's and Eldridge's view. Mivart's derivative creation requires a Miracle Maker while the miracles of Gould's punctuated equilibrium theory supposedly occur "naturally". They should see that the difference between Gould and Mivart is in the metaphysics, not the science.

An academically honest origins curriculum would enable students to have a well-rounded education on the subject of origins. In a scientifically based curriculum there should be discussion of whether or not any explanation for the origin of life can be empirically proved. Indeed, some explanations for the origin of life may be disproved but can any be empirically proved? Without exception all so-called scientific explanations for the origin of life begin with a modicum of scientific accountability and ultimately veer off into the domains of speculation, imagination, myth, miracle, and wishful thinking. It is socially divisive and reflects a lack of scientific integrity for scientists to promote one particular explanation for the origin of life under the name of "science" when no explanation can be empirically verified.

The scientific establishment should stop theorizing about origins unless it becomes socially neutral by including all other theories of origins. All explanations for origins share the common feature of relying on miracles that are scientifically unaccountable and all have religious underpinnings. There really is no scientific, social, or other basis for excluding any particular explanation for the origin of life in a science curriculum.

Doctrine versus True Science in Teaching Evolution

Two versions of evolution exist, the doctrinal and the truly scientific. The educational world promotes only the doctrinal version. Scientific information unfavorable to evolution has been systematically omitted because doctrinal evolutionists are religiously motivated.

No one can claim to be an authority on evolution if they are unaware of information that is unfavorable to their theory. No other investigative body would consider forsaking real evidence for imaginary evidence; only doctrinal evolutionists have this distinction. They formulated a theory that was unavoidably destined to self-destruct in the face of Jevons' Rule.

Because doctrinal evolutionists are unwilling to include unfavorable information about evolution in the curriculum, they automatically forfeit their claim of authority on the subject. The open-minded and truly scientific evolutionists and others willing to deal with evolution in a truly scientific framework need to claim that authority.

The doctrinal version of evolution as presently taught in public schools should be rejected not on constitutional grounds alone but because it is also self-serving, prejudicial, and religiously dogmatic. Students are not able to make an educated judgment concerning evolution when the unfavorable information is withheld and only favorable information is presented. This is the grand strategy that has shaped the evolution curriculum and it is time for a change.

References

- Darwin, Charles. 1909. *The origin of species*, sixth edition. P. F. Collier and Sons, New York.
- Feyerabend, Paul. 1978. *Against method: outline of an anarchist theory of knowledge*. Humanities Press, London.
- Gould, S. J. 1977. Evolution's erratic pace. *Natural History* 76(May 5):14.
- Gould, S. J. 1980. Is a new general theory of evolution emerging? *Paleobiology* 6(1):127.
- Gruber, Jacob. 1960. *A conscience in conflict—the life of St. George Jackson Mivart*. Columbia University Press, New York.
- Himmelfarb, Gertrude. 1959. *Darwin and the Darwinian revolution*. Chatto and Windus, London.
- Jevons, W. Stanley. 1958. *The principles of science: a treatise on logic and the scientific method*. Dover Publications, New York.
- Kurtz, David. 1984. *Humanist manifestos I and II*. Prometheus Books, Buffalo.
- Mivart, St. George. 1871. *On the genesis of species*. D. Appleton, New York.
- NABT. 1996. NABT unveils new statement on teaching evolution. *American Biology Teacher* 50(1):61–62.
- Peckham, Morse. (editor). 1959. *The origin of species by Charles Darwin*. A variorum text. University of Pennsylvania Press, Philadelphia, PA.
- Raup, David. 1979. Conflicts between Darwin and paleontology. *Field Museum of Natural History Bull.* 50(1):26.
- . 1960. The history of life in the evolution of life, Sol Tax (editor). Vol. 1. Evolution after Darwin. The University of Chicago Press, Chicago, IL.
- Towle, Albert. 1993. *Modern biology*, eighth edition. Holt, Reinhart and Winston, Austin, TX. .

On the 200th anniversary of the death of the first President of the United States

Of all the dispositions and habits, which lead to political prosperity, Religion and Morality are indispensable supports. In vain would that man claim the tribute of Patriotism who should labor to subvert these great pillars of human happiness, these firmest props of the duties of Men and Citizens. The mere Politician, equally with the pious man, ought to respect and to cherish them. A volume could not trace all their connections with private and public felicity.

Let it simply be asked where is the security for property, for reputation, for life, if the sense of religious obligation desert the oaths which are the instruments of investigation in Courts of Justice? And let us with caution indulge the supposition that morality can be maintained without religion.

Whatever may be conceded to the influence of refined education on minds of peculiar structure—reason and experience both forbid us to expect that national morality can prevail in exclusion of religious principle.

George Washington, from his Farewell Address

The Piltdown Hoax's Influence on Evolution's Acceptance

Jerry Bergman*

Abstract

The Piltdown hoax history and its importance in convincing the world of evolution is reviewed. Compelling evidence existed from the beginning that the find was a hoax or, at the very least, did not provide support for human evolution. Yet, the Piltdown was touted for decades as one of the most important evidences of human evolution by textbooks, articles and major first class museums

such as the American Museum of Natural History in New York. The hoax is an excellent illustration of the difficulties inherent in drawing conclusions about evolution from the fossil record. It was concluded that the hoax served to convince many people of the validity of Darwinism and its final definitive exposure probably did little to alter the views of most Darwinists.

Introduction

Of the many fossil forgeries used to try to prove Darwinism, the most well known was the Piltdown hoax. For close to forty years, *Eoanthropus dawsoni*, a.k.a. Piltdown man (Figure 1) was taught as fact in textbooks throughout the world and was exhibit one for evolution in major museums the world over (Blinderman, 1986, p. 238). Its importance was explained by Walsh:

The Piltdown hoax—though that is much too mild a word for an event never intended as a light-hearted prank—during the four decades that passed before it was exposed, *played a pivotal role in one of the most critical scientific pursuits of modern times*, the theory of human evolution. Appearing on the scene just as the fossil record of man had slowly begun to accumulate ... It created, as one scientist recently expressed it, what was easily the most troubled chapter in human paleontology, with the fraudulent bones receiving nearly as much attention *as all the legitimate specimens in the fossil record put together*. Young scientists and old alike wasted untold thousands of hours on the Piltdown phenomenon. The laborious study, and the writing and publishing of the several hundred research reports and papers worldwide, the sheer, enormous amount of space in books and articles given to sober discussion of its every smallest aspect, make a picture sad to contemplate (Walsh, 1996, p. xvi emphasis mine).

Many famous scientists were involved in the hoax including Dr. Arthur Smith Woodward, Director of the Natural History Museum of London, and Sir Arthur Keith (1866–1955), Professor of Anatomy at the London Hospital Medical School and later Conservator of the Museum of the Royal College of Surgeons. The Piltdown bone fragments were accepted by many well respected scientists as important proof of evolution for almost half of a century. Furthermore, Piltdown man absorbed the professional attention of many fine scientists [and] ... led millions of people astray for forty years (Gould, 1983, p. 225).

Although several other putative finds existed that were used to prove human evolution, the Piltdown fossils had a major impact in proving the theory of evolution and were used as proof of evolution in textbooks for decades (Baitsell, 1929). It was no minor find, but of central importance to evolution: As Christ was to Christianity, and the atomic theory was to chemistry, Piltdown man was to human evolution. Piltdown even made the careers of some of the most eminent 20th century scientists. When Arthur Smith Woodward retired he found his days were as busy as they were during

his forty crowded years at the Natural History Museum in London. Still youthful at sixty ... he was to remain active in paleontology for almost another two decades ... The ultimate honor came ... in the spring of 1924: conferral of a knighthood. Woodward's eminence had been fairly won ... by sheer brilliance and unflagging energy he had worked his way upward at the museum, at thirty-seven becoming keeper (director) of its world-famed geology department. Along the way his many out-

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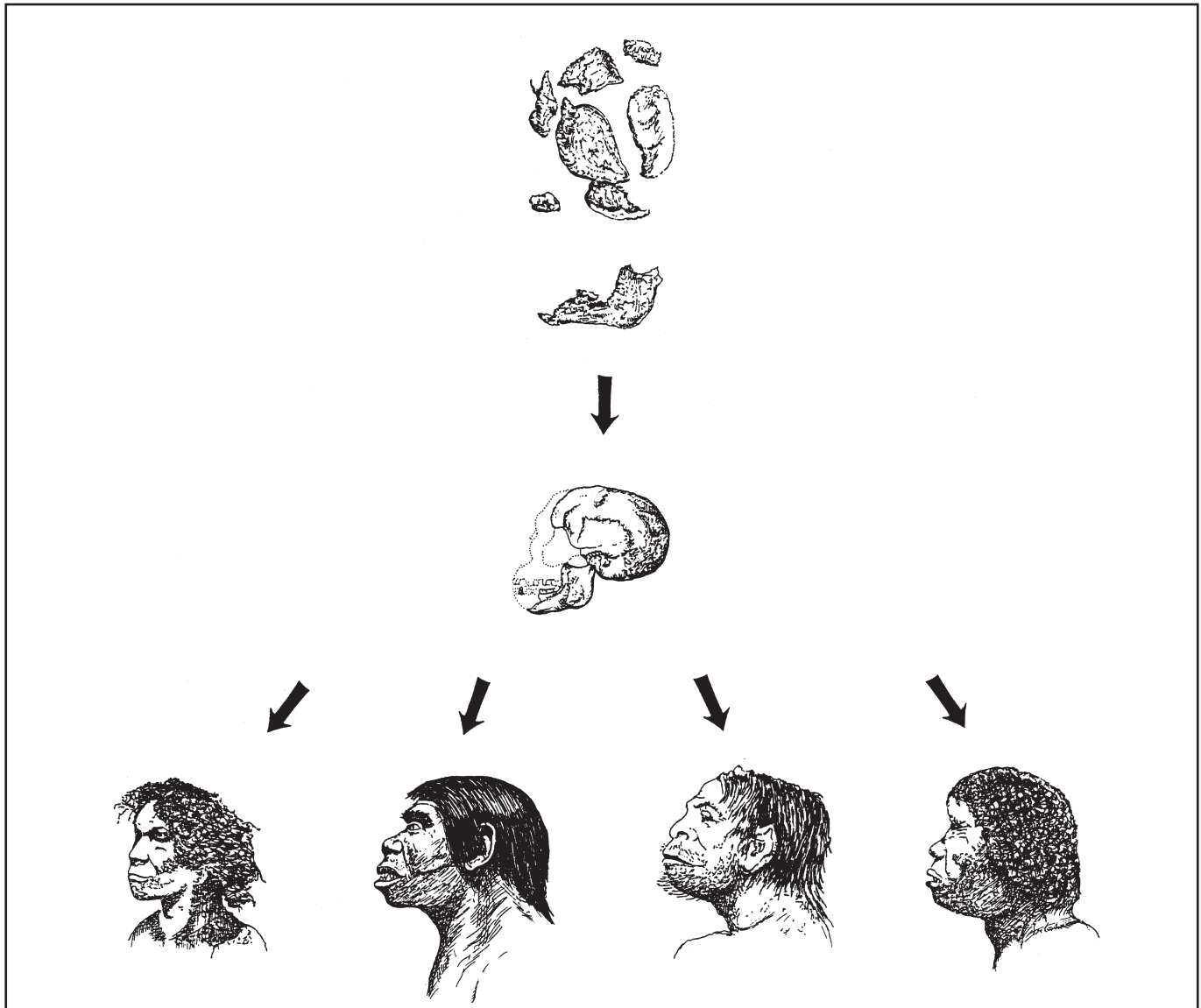


Figure 1. Adapted from Blinderman (1986), Winslow and Meyer (1983), and Walsh (1996) by artist Richard Geer. From the bone fragments and a human jaw shown above the reconstruction shown in the middle was produced (the solid lines represent then actual skull parts, the dotted lines the missing parts). From the skull reconstruction was then produced by four artists the illustrations shown, each which was represented as an accurate depiction of the Piltown man head.

standing achievements in paleontology... had been fully recognized. A fellow of the Royal Society before he was forty, by the time of his retirement he had been president at different times of three prominent scientific bodies. A recipient of the Gold Medal of England's Royal Society, he had also been awarded the Lyell Medal, the Linnean Medal, the Wollaston Prize, the Prix Cuvier of the French Academy, and the Thompson Medal of the American Museum. Aside from his half dozen technical books, the total of his scientific writings exceeded a remarkable four hundred papers. *Capping all was the association that had brought*

him fame and secured his place at the pinnacle of his profession, the central role he took in the drama of Piltown Man. Hailed by most as evolution's first true missing link, that sensational find since its arresting debut in 1912 had usurped a large portion of his time at the museum, and through his twenty-year retirement it continued to rivet his attention ... To a reporter from a London paper who interviewed him on the day he quit the museum for good, Woodward readily admitted that the Piltown discovery had been the most important thing that ever happened in my life (Walsh, 1996, pp. 3–4 emphasis mine).

History of the Piltdown Discovery

The story began with Charles Dawson, a geologist awarded the coveted fellowship of the London Geological Society at the young age of 21 (Youngson, 1998, p. 53). Dawson claimed that he noticed several small pieces of brown flint when workers were digging gravel from a shallow pit to repair a road near the village of Piltdown in Sussex country, England. Dawson claimed that the flint indicated the site might contain humanoid fossils and so asked the workers to contact him if they found any bones.

He later claimed that the men did find some "old bones" in 1908 and four years later, on December 18, 1912, Dawson and Woodward introduced to the world—to a packed and excited audience at the Geological Society of London—Piltdown man, the most important archaeological discovery of all time (Youngson, 1998, p. 54; Millar, 1972). The find not only fulfilled Charles Darwin's predictions but was the ideal missing link (Millar, 1972, p. 9). The evidence consisted of skull fragments, a jawbone, and a single tooth found in a shallow gravel. The Piltdown brain capacity was at first estimated to be about halfway between that of humans and apes, but later more evaluations indicated that its brain size was closer to about 1,400 cubic centimeters, close to modern Piltdown residents.

Later named *Eoanthropus dawsoni* by Woodward in honor of Dawson, the skull was pieced together from fragments that had been putatively deposited during the Pleistocene era, roughly around the last ice age. Further finds, including a lower canine tooth uncovered in 1913 and cranial fragments at a second site called Piltdown II allegedly found two miles away found in 1915, dispelled much of the doubt about the validity of the original finds (Gould, 1979, p. 87; Lubenow, 1992, p. 41). The bones, teeth, and antlers of a variety of extinct and non-extinct animals including mastodons were also allegedly found nearby Piltdown's grave as were crudely flaked flint stones called coliths (Winslow and Meyer, 1983, p. 34).

Many scientists—and much of the world—were elated at the discovery. Now many evolutionists felt that for the first time they finally had solid empirical evidence of human evolution. Piltdown bridged the gap between humans and lower primates, and was judged by many of the world's leading paleontologists as neither a monkey nor a human but an ape-man link. Piltdown soon became the basis for many beliefs about the so-called "missing links" discovered since then. The find was soon widely regarded as the earliest known human fossil, older than anything the French or Germans or anyone else had yet found (Winslow and Meyer, 1983, p. 33). A close associate of Dawson, Sir Arthur Smith Woodward, who was then head of the geology department at the British Museum,

was so enthusiastic about the find that he widely publicized it at every opportunity. The importance of the find is clear in a contemporary account:

A GREAT company assembled in the rooms of the Geological Society of London on the evening of December 18th, 1912, to receive the first authentic account of the discovery at Piltdown . . . It was quite plain to all assembled that the skull thus reconstructed by Dr. Smith Woodward was a strange blend of man and ape. At last, it seemed, the missing form—the link which early followers of Darwin had searched for—had really been discovered. No one had ever suspected that a secret of this kind lay hid away in the Weald of Sussex (Keith, 1915, p. 306; emphasis in original).

With the support of many well-known eminent scientists, many of the experts of the day were easily convinced that an important and unique find had been made. Jesuit Priest Pierre Teilhard de Chardin helped Dawson with the digs which improved Dawson's credibility even more. Professor de Chardin, who was then teaching at a seminary in Hasting, soon uncovered another part of the missing link, this time a canine tooth. With the church on his side and further discoveries to come, major challenges to Piltdown Man appeared unlikely.

The importance of Piltdown in convincing the populace of the validity of evolution cannot be overestimated. The other fossil finds of the time included a jawbone found near Heidelberg, Germany (Heidelberg man) and a skullcap, thighbone and three teeth discovered in Java (Java man). These were then the only known fossil evidence of the putative modern human ancestors and for years both remained the subject of intense scientific controversy (Larson, 1997, pp. 11–12). Neanderthals contributed little to the story of human evolution because they came from a later era, were fully human and died out (Larson, 1997, p. 12). This left Piltdown as one of the most important missing links between man and the higher apes (Lawson, 1997, p. 12).

One day after the Piltdown find was announced to the world a headline in the *New York Times* stated that the "Piltdown Bones Probably Those of a Direct Ancestor of Modern Man" (Dec. 19, 1912, p. 6). The very next day the *Times* (Dec 20, 1912 section c, p 1) followed up with an interview of Woodward who stated, "Hitherto the nearest approach to a species from which we might have been said to descend that had been discovered was the cave-man," and that "the authorities constantly asserted that we did not spring direct from the cave-man. Where, then, was the missing link in the chain of our evolution? . . . the answer lies in the Piltdown skull, for we came directly from a species almost entirely ape." Many American and European newspapers carried similar claims.

The *New York Times* in its next Sunday edition concluded its coverage of the Piltdown discovery with a page-one summary of the find and its meaning for evolution. The banner headline proclaimed “Darwin Theory Is Proved True” and added the subheadline that the skull was thought to be a woman’s. Another subtitle added “English Scientists Say the Skull Found in Sussex Establishes Human Descent from Apes.” This article printed Keith’s conclusion that the discovery is what anthropologists have been seeking for forty years because it provided proof of a stage in the evolution of man which we have only imagined since Darwin propounded the theory. He adds that

there is no doubt at all that this is the most important discovery concerning ancient man ever made in England. It is one of the three most important discoveries of ... [fossil man] ever made in the world. The other two were the discovery of the individual known as Pithecanthropus, made in Java in 1892 by Prof. Eugene Dubois. The other, which equals it in instructiveness and importance, is the skull discovered at Heidelberg six years ago (Quoted in The New York Times, Dec. 22, 1912, p. C1 emphasis mine).

Note how extremely confident the scientists were in their assessments:

It is, therefore, generally agreed that the skull belonged to a race of men who lacked the power of speech. A prominent anthropologist ... said that the evidence on that point was convincing, the speech centres in the brain being so feebly developed that brain power was practically nonexistent (New York Times, Dec. 22, 1912, p. C1).

The renown of Piltdown man soon rapidly spread throughout the world. Replicas of the famous skull made from the original (which was regarded as priceless and kept safe locked away in the British Museum protected from vandals and skeptical investigators alike) soon found their way into many state museums and college science classrooms (Johnson, 1991, p. 186). In a set of glass cases in the Hall of the Age of Man display at the American Museum of Natural History, for years Professor Henry Osborn exhibited his best case for human evolution. In case No. 2 he mounted a bust of the Piltdown man conceived by Professor J. H. McGregor. Described as a restoration of a missing link, to the uninitiated it was half-ape, half-human which was designed to impress the high school students and their teachers, visiting the Museum in ever increasing numbers, with the conclusion that human evolution is true (McCann, 1922, p. 1).

Lubenow concludes that one reason why the Piltdown hoax was so successful was because it conformed to what certain evolutionists were expecting to find, namely a big-brained human ancestor. “Sir Grafton Elliott Smith

had successfully predicted that a fossil very similar to Piltdown would be found.” This successful prediction is one reason why he was one of the suspects of the hoax (1992, p. 43). The eminent Sir Arthur Keith even wrote a 520 page scholarly book on the human fossil record, much of which discussed Piltdown man in enormous detail, including extensive discussions of its biology, life habits and even its death. A sample section follows:

Early in the summer of 1912, when Dr. Smith Woodward commenced his examination of the Piltdown fragments, he realized that the peculiar and characteristic features of this ancient form of man were centered in the region of the chin. Such features had never been found or seen in any mandible or skull to which the term human could be applied . . . It is the lower or muscular part which principally concerns us. There is no projection of the anterior surface at the lower border of the symphysis to represent a chin in the chimpanzee; the anterior or labial surface of the jaw slopes downwards and backwards to a chinless lower border. On the hinder surface of the symphyseal region—the surface directed towards the tongue—there is seen a deep pit, almost large enough to take the tip of the little finger . . . Such is the conformation of the symphyseal or chin region of the lower jaw in apes . . . When a corresponding section is made of the symphyseal region of a human lower jaw, a very different conformation is seen (Keith, 1915, pp. 322-323, spelling modernized).

Reading this work is enormously enlightening about the wild speculations involved in establishing evolution theory. The Nature Conservancy even spent much taxpayer money to designate the Piltdown site as a national monument. Nor were a few loners only involved in accepting the fraud. Gould admitted that the three leading lights of British anthropology and paleontology—Arthur Smith Woodward, Grafton Elliot Smith, and Arthur Keith—had staked their careers on the reality of Piltdown (Gould, 1979, p. 90). So important was the find that Millar claims were it not for his premature death, Dawson would been knighted by the British crown for it (1972, p. 9). Fix claims that for many Piltdown Man was the most important evidence of human evolution (1984, p. 12).

To most creationists and a few critical scientists including Franz Weidenreich, though, the skull and jaw fit did not seem right. The jaw was too much like an apes and the cranium was far too much like an Anglo-Saxon human cranium. Although other persons also eventually came to believe the two did not belong together, evidently most scientists did accept the Piltdown hoax. According to Lubenow

evolutionists now like to boast that not everyone accepted Piltdown. Technically they are correct.

There were a few, such as Weidenreich and Hrdlicka, who did not accept Piltdown. But the vast majority of paleoanthropologists worldwide did accept Piltdown as legitimate, especially after the confirming discoveries at Piltdown II (1992, p. 41).

Finally, in 1949 British geologist Kenneth Oakley, who was evidently convinced of the validity of the Piltdown find, read a 1892 paper by the French scientist Carnot. Carnot demonstrated that the fluorine content of bone generally *increases with age*. One can therefore obtain an estimate of the age of previously living bone by ascertaining the fluorine content. Dr. Oakley decided he would test the famous Piltdown skull using this new knowledge to prove *once and for all* that the finding was genuine (Walsh, 1996). Oakley found the fluorine content showed that the Piltdown man had made a monkey out of almost everyone involved in propagating Piltdown. According to this technique, Piltdown man was closer to 10,000 years old and not up to 500,000 years old as was originally claimed. (Modern radiocarbon dating indicates it is only 520 to 720 years old—see Lubenow, 1992, p. 42). This finding raised serious questions about the Piltdown find which led to its eventual exposure (Gee, 1996).

The events leading up to this retesting as told by Walsh are a very revealing part of the story. After Woodward published a book on fossil man, a renewed zest about human evolution resulted. The book, although very technical, served to help trigger

a lively renewal of interest in the original Piltdown discoveries, and a call soon went up to do something about preserving the site of the excavations. Under government auspices, after some final excavations, the small plot of ground was bricked in, with the precise spot of the discoveries being kept open and protected behind thick glass. Piltdown had become a major event in the unfolding of man's remote past, it was declared, and the ground that had yielded the fossils would have great historical value for unborn generations. When in the spring of 1950 the almost forty-year-old site was thrown open for public viewing, it quickly become a focal point for tourists and school outings. It was in this same year that the first puzzled suspicions, ironically *triggered by a wish to obtain the clinching evidence for authenticity*, began to stir. Late in 1949 the bones were taken from the vault of the Natural History Museum and submitted to a test that had been only recently perfected. The new procedure, it was thought, would settle the vexed question of the jaw-cranium association (Walsh, 1996, pp. 9–10 emphasis mine).

The skull is now known to be from a modern human, and the jaw was from a juvenile female orangutan (Winslow and Meyer, 1983, p. 33). The first rigorous discussion

of the hoax was published in a 1953 British Museum bulletin by Dr. Oakley and two scientific collaborators in a paper titled "The Solution of the Piltdown Problem." The paper concluded that the canine tooth had been filed down to articulate better with the skull and it was stained to appear more primitive, and also was impregnated with grains of sand so as to "imitate" fossilization. Joseph Weiner is credited for finally bring the forgery to light (Spencer, 1990, p. xiii).

In light of this background, a 1948 account is enormously revealing about the tendency to reach broad sweeping conclusions from a minuscule amount of data:

... Piltdown man, long considered one of mankind's oldest ancestors, is a mere anthropological infant, not more than 10,000 years old, Dr. K.P. Oakley of the British Museum disclosed to the British Association for the Advancement of Science Previously considered to be between 100,000 and 500,000 years old, the jawbone and skull are now proved by analysis of their fluorine content to be definitely of the last interglacial period. Fossil animal bones of known geological age, dating from the Pleistocene or glacial period, unearthed nearby the human bones at Piltdown, England, had the same content of the chemical fluorine picked up from the ground water of the locality (Davis, 1949, p.185).

The Piltdown exposure was first covered in *The Times* of London (Nov. 23, 1953) and the *Manchester Guardian* of November 26, 1953, which called the hoaxer extraordinarily skillful. It soon became obvious that the hoaxer was actually extraordinarily sloppy, almost beyond belief (Millar, 1972, p. 228). The scientific world was stunned by the Piltdown exposure partly because one of the most important star evidences for evolution was now lost. One major question remaining was: Who was the culprit? Blame fell first on the putative discoverer, Charles Dawson, but his role was difficult to investigate for he had by then been dead for 37 years. Dawson, an amateur anthropologist with limited experience had putatively made some significant fossil discoveries, and was a member of the prestigious Geological Society (Lubenow, 1992, p. 40). Nonetheless, many authorities still conclude he was the most likely candidate (Walsh, 1996).

Also accused was Father de Chardin who was well known for his religion of evolution and his research into the putative evolutionary origins of humans. Harvard professor Stephen Jay Gould concluded de Chardin, Dawson and possibly others were all involved (1979, 1983). Millar concluded that Sir Grafton Elliot Smith of the British Museum was the hoaxer (1972). Even Sir Arthur Conan Doyle was once a suspect (Winslow and Meyer, 1983). Most early investigators of the various distinguished paleontologists and archeologists who originally took part in the investigations of Piltdown were

either perpetrators or the victims of a carefully planned hoax.

Since then a number of other possibilities have surfaced, but *none* of them has produced conclusive evidence. The latest is Martin A.C. Hinton who was a Curator of Zoology at the British Museum in from 1936 to 1945 (Menon, 1997). A trunk that belonged to him was found to contain bones and teeth artificially stained in a way very similar to the Piltdown hoax bones (Gee, 1996, pp. 261–262). This and other evidence have caused some persons that were close to the case to conclude that the evidence for “Hinton having been the sole hoaxer is now conclusive” (Gee, 1996, p. 262). To others, though, the case still remains a mystery, an unsolved hoax. Nonetheless, the significance of the hoax by far is its importance in understanding both the mind set and the paucity of evidence the true believers in evolution actually had.

Piltdown, Creationists and the Scopes Trial

Creationists especially were critical of the find, often by noting the disagreement that existed among evolutionists themselves about the validity of many of the various interpretations that soon surfaced about the find. Typical of the many creationists critiques was the following by Price:

Considering the fact that these fragments were not all found together or at one time, some of them having been found in the autumn and the rest in the spring of the next year, the various fragments being scattered over an area of several yards, the difficulty of being sure of the real form and size of this skull will be appreciated. As for the geological age of these remains, Keith calls them Pliocene, while Smith Woodward thinks them Pleistocene. Keith thinks the skull is that of a woman (1923, p. 299).

Assuming much of the information presented in the media about Piltdown was true, Price elsewhere stated he believed that Piltdown Man may be a degenerate human offshoot (1924, p. 110). William J. Bryan argued that the Piltdown man did not prove man’s relationship to the anthropoid ape (quoted in Larson, 1997, p. 8). Plaster casts of Piltdown man soon even appeared as evidence for the defense in Scopes’ legal challenge to Tennessee’s anti-evolution law.

Some creationists such as John Roach Straton openly denounced Piltdown as a fraud (Larson, 1997, p. 32). At about this time creationist Harry Rimmer asserted that the Piltdown hominid consisted mostly of plaster of Paris and imagination (1995, p. 427). William Bell Riley referred to it as imaginatively created (quoted in Trollinger, 1995, p. 101). Unfortunately, evidently no creationists then had carefully analyzed the find and provided a de-

tailed review of it. One reason was because few people had access to the original bones which were carefully guarded by the British Museum.

Probably the most extensive early discussion of the Piltdown man problem by creationists was by Catholic biologist George O’Toole (1929) and Catholic author Alfred McCann (1922). McCann does an excellent job evaluating the evidence, albeit in journalistic prose, showing that the obviously poorly executed hoax was accepted only because of the powerful desire of evolutionists to find support for human evolution. McCann traced the Piltdown discovery from its beginning to about 1920. He confidently concluded that Piltdown was clearly a discredited hoax and that the skull-cap was human, the jaw was the jaw of an ape, and the pair were deliberately designed to look like a man half way along his journey from simian to the human stage (McCann, 1922, p. 1). Professor O’Toole correctly concluded twenty years before it was finally recognized by the scientific world that

Eoanthropus Dawsoni is an invention, not a discovery, an artistic creation, not a specimen. Anyone can combine a simian mandible with a human cranium, and, if the discovery of a connecting link entails no more than this, then there is no reason why evidence of human evolution should not be turned out wholesale (1929, p. 323).

O’Toole also concluded Dr. Woodward’s major error was in his

failure to discern the obvious disproportion between the mismated cranium and mandible. As a matter of fact, the mandible is older than the skull and belongs to a fossil ape, whereas the cranium is more recent and is conspicuously human. Woodward, however, was blissfully unconscious of this misalliance. What there is of the lower jaw, he assures us, shows the same mineralized condition as the skull and corresponds sufficiently well in size to be referred to the same individual without hesitation (1929, p. 322).

Extreme Confidence of Many Leading Scientists in the Find

Many of the leading paleontologists expressed extreme confidence in the importance of the Piltdown find for evolution. William J. Bryans nemesis, Henry Fairfield Osborn, even included several chapters devoted largely to Piltdown Man in his major 1928 book on human evolution. The high level of confidence Osborn had in his conclusion is clear from his forceful prose:

There has been on the part of anthropologists no conspiracy or hasty acceptance of any of these fossil men. The Neanderthal Stone Age man discovered

in 1848, the Trinil ape-man of Java discovered in 1891, the Piltdown Dawn Man discovered in 1911, have had in turn a hard struggle for scientific recognition, lasting thirty-nine years in the case of the Neanderthal man, more than thirty years in the case of the Trinil ape-man (*fide* Dubois), and no less than ten years in the case of the Dawn Man of Piltdown (Osborn, 1927, p. 48).

Osborn added that Arthur Smith Woodward had finally established

... beyond question the authenticity of the Dawn Man of Piltdown. The confirmation of the reality of the Piltdown man as a veritable dawn man must be followed by renewed and determined effort to fix more precisely his *geologic antiquity*, about which there has also been a great difference of opinion and on which the discovery of Foxhall man, described above, may have some bearing (Osborn, 1927, p. 48).

Sir Authur Keith even stated of those who concluded that the jaw was that of an ape and the skull was that of a human was a mistake that could never have been made if those concerned had studied the comparative anatomy of anthropoid apes (1927, p. 204). A common conclusion was that the jaw and cranium *must* belong together because the chances of the two being found together accidentally was infinitely small (Gates, 1948, p. 239). The extreme confidence of the genuineness of the Piltdown find is commonly found in many pre1950 works on evolution. One scientist in a summary of the current state of support for Piltdown concluded that if the second fossil lower jaw found at Piltdown belongs with the first

Piltdown skull, as nearly all authorities now believe, it affords a clear case of an ape-like canine belonging in a human jaw; only it should be noted that the Piltdown canine is much more like the lower canines of certain female gorillas, which have not attained the tusk-like stature of male canines. The human canines may indeed be most reasonably regarded as reduced and infantilized or feminized derivatives of a primitive anthropoid type, and the process of reduction and infantilization may well have taken place during the millions of years of the Lower Pliocene epoch, at a period when the fossil record of human remains so far discovered is still blank. The great mass of collateral evidence for the derivation of man from primitive anthropoids with well developed but not greatly enlarged canines, has been reviewed lately with great thoroughness by Remane, who finds no justification for the view that man has avoided the primitive anthropoid stage and has been derived from wholly unknown forms with the canine tips not projecting much beyond the level of the premolars (Gregory, 1929, pp. 141–142).

The Piltdown case is not an isolated example, but only one of many in which the enthusiasm of Darwinists went well beyond the facts. That the hoax occurred is less surprising than the fact that *it was accepted by so many scientists for almost half a century*. Steven J. Gould concluded that one of the most interesting questions about the affair is Why did *anyone* ever accept Piltdown Man [as genuine] in the first place? (1979, p. 86 emphasis mine). Among the many reasons that exist for its acceptance include the fact that the skull was unwittingly shattered by a workmans pick and had to be reassembled, allowing preconceptions to influence reassembly as is true of most putative human fossils (Baitsell, 1929, p. 167). Gould and many others largely ignore what is probably the best answer to the question as to why it was accepted for so long: the often blinding desire of naturalists and others to find evidence for their worldview. The lesson here was well expressed by Hawkes, namely that he found it was shocking to discover how often preconceived ideas have

affected the investigation of human origins. There is, of course, nothing like a fake for exposing such weaknesses among the experts. For example, to look back over the bold claims and subtle anatomical distinctions made by some of our greatest authorities concerning the recent human skull and modern apes jaw which together composed Piltdown Man, rouses either joy or pain according to ones feeling for scientists (Hawkes, 1964, p. 956).

She adds that there is no reason to suppose that tendencies to error [in this field] have grown very much less since then (1964, p. 952). A major problem for those many leading paleontologists who accepted the hoax was that *the forgery work was extremely sloppy*:

One reason for believing that the jaw went with the skull was the fact that the tops of the teeth were worn down in a manner which seemed to be characteristic of humans and not of apes. But no one noticed that the teeth had been artificially ground down to look like human teeth. No one noticed the scratches left by the abrasive agent, which the careless perpetrator of the hoax did not polish away. No one noticed that the job of flattening the surfaces of the teeth was overdone and the surfaces were too flat to be realistic. No one noticed that the teeth were so flat on top that the edges were angular instead of rounded. No one even noticed that the job had been done so carelessly that the tops of the different teeth were flattened at different angles. Also, because of the crudeness of the operation, the Piltdown cusps exhibit dentin quite flat and flush with surrounding enamel, a state of affairs explicable only by rapid artificial rubbing down of the surface (Davidheiser, 1969, p. 342).

To help look the part, the bones were painted with ordinary hardware store paint, probably a shade called Vandyke brown (Walsh, 1996, p. 70). Piltdown II fragments—a piece of the forehead and an isolated molar—were later found to be part of Piltdown I skull (Walsh, 1996, p. 70; Millar, 1972, p. 228). Davidheiser adds that x-ray analysis of the loose canine tooth found with the Piltdown skull had been worn down so far that

the pulp cavity was exposed, a phenomenon which does not happen as a result of natural wear, and someone had filled the pulp cavity with sand! Besides all this, it was an immature tooth which would not have had time to wear down a great deal. All of this was not only overlooked as evidence that something unnatural had happened, but it was rejected when it was pointed out. A dentist named Lyne pointed out that the canine tooth could not have been worn down naturally, but his cogent arguments were brushed aside by Woodward. Professor Woodward let himself be influenced by a Dr. Underwood who spoke in violent disagreement with Mr. Lyne's contention of the immaturity of the canine and its paradoxical nature, and who declared that the wear of the canine was indubitably natural (1969, pp. 342–343).

History has proved that Mr. Lyne was correct and Dr. Underwood was wrong as should have been clear to anyone who had a basic knowledge of dentistry. Furthermore, the site where it was found was frequently underwater or damp and otherwise the area appears to be a most unlikely place where bones could last even hundreds of years, not to mention thousands (for photographs of Piltdown gravel pit where the bones were allegedly discovered see Spencer, 1990, pp. 160–163).

Evolutionists today in trying to rationalize the widespread acceptance of the Piltdown hoax often stress that doubters existed from the start, and the process of science eventually worked because the hoax was in due time exposed (Blinderman, 1986, p. 235). The same can be said for most all, if not all, of the evolutionists' arguments, both those now discredited such as the vestigial organ theory, biogenesis, homology and many others as well as theories largely discredited but still touted as proof for evolution such as the abiogenesis theory and mutations as the major source of genetic variety (Larson, 1997, p. 30). These dissenters are frequently quoted by creationists to the chagrin of orthodox Darwinists. Both today and in the past, the dissenters of Piltdown man could be explained away:

G. S. Miller, Jr., who studied, not the original but a cast, came to the conclusion that the jaw and skull could not possibly pertain to the same individual or even the same genus, but that the former was that of a fossil chimpanzee . . . despite the fact that fossil

anthropoids were heretofore unknown in England. In this conclusion Mr. Miller has had quite a large American following. The matter has, however, been settled beyond question by the finding of a second specimen of the Piltdown man some two miles distant, consisting of diagnostic cranial fragments associated again with a lower molar of precisely similar character to those in the first jaw, a happening which could hardly occur, according to the law of probabilities, in both of the only known instances if the jaw and skull were not those of the same form (Baitsell, 1929, p. 168).

Another significant fact that illustrates the trend today is the Piltdown hoax appeared for some time in texts published *after* it was exposed. One egregious example of delayed admission is in the 1960 book *Adams Ancestors* by L. S. B. Leakey. In the fourth edition published by Harper it was finally corrected but only by adding a section on the hoax and retaining the internal discussions which in places implies Piltdown was a legitimate find, and other places which, to Leakey's credit, raises major questions about the find. This example is of special note because Leakey was then one of the foremost anthropologist in the world. Similarly, examples of now discredited ideas about evolution are still commonly found in evolution and biology textbooks.

Conclusions

The Piltdown case is an excellent example of how social and cultural expectations can powerfully influence scientific opinion. One researcher concluded that an inquest into Piltdown affair does not

offer much cheer to those of us who think that science is a legitimate enterprise that has drawn a credible chart of human evolution. Anyone conversant with the Piltdown history will readily, if not eagerly, agree that many of the researchers shaped reality to their hearts desire, protecting their theories, their careers, their reputations, all of which they lugged into the pit with them (Blinderman, 1986, p. 235).

In one of the most insightful assessments of the whole Piltdown affair, Eiseley noted that the amount of subjective speculation

indulged in for years over the Piltdown fossil, and to which many leading authorities contributed, can now be viewed historically as a remarkable case history in self-deception. It should serve as an everlasting warning to science that it is not the theologian alone who may exhibit irrational bias or give allegiance to theories with only the most tenuous basis in fact. That scientists in the early years of a new

discipline should have been easily deceived is not nearly so embarrassing as the rapidity with which they embraced the specimen solely because it fell in with preconceived wishes and could be used to support all manner of convenient hypotheses. The enormous bibliography in several languages which grew up around the skull is an ample indication, also, of how much breath can be expended fruitlessly upon ambiguous or dubious materials (Eiseley, 1966, p. 111).

Fix concludes that what was especially embarrassing for paleontology is not that one of its members should have stooped to manufacturing the evidence, but that so many made so much out of so little (Fix, 1984, p. 13).

Keith even said the exposure caused him to have a "loss of faith in the testimony of Man" (quoted in Williams, 1969, p. 286). The fact that it was proven a forgery is somewhat irrelevant now: It influenced millions of persons to accept Darwinism and was even used at the Scopes trial as proof of evolution. Once Darwinism was widely accepted, the fact that most of the evidence for the theory including vestigial organs, homology, the biogenetic law and the putative fossil evidence has been proved false does not now matter. What happened was eloquently stated by Pagel:

Darwin proclaimed a wholly material explanation for species, based on the principle of descent with modification. Lyell had opened the door, and Darwin showed God out. Palaeobiologists flocked to these scientific visions of a world in a constant state of flux and admixture. But instead of finding the slow, smooth and progressive changes Lyell and Darwin had expected, they saw in the fossil records rapid bursts of change, new species appearing seemingly out of nowhere and then remaining unchanged for millions of years—patterns hauntingly reminiscent of creation. But *there was no turning back*, and biologists have for the past century fought over how best to explain the diversity of life (1999, p. 665, emphasis mine).

Millar (1972 p. 10) estimates some 500 scholarly articles were written about Piltdown during its 40 year lifespan. If references to Piltdown in textbooks and articles about evolution were included, no doubt the count would be in the multi-thousands. Since clear evidence existed from the beginning that Piltdown was a hoax, or at least it was not evidence for human evolution, why did it take almost 50 years for this information to be published? It required almost 40 years before it was conclusively exposed. To answer this question

...the great German anatomist, G. Schwalbe, so frequently quoted by Professor Osborn, had to abandon the missing link opinion so picturesquely and noisily voiced as a scientific fact when he declared

that the proper restoration of the Piltdown fragments would make them belong not to any preceding stage of man, but to a well developed, good sized *Homo sapiens*, the true man of today. Why are such facts as these withheld from the young student and from his teacher if truth is really an objective? (McCann, 1922, pp. 8–9 *Italics mine*)

The most important lesson of Piltdown, as adroitly summarized by McCann almost 70 years ago, was that the affair showed the ease that evidence which evolutionarily links apes and men can be fabricated even if it requires

wide stretches of imagination in support of preconceived opinions. The materialistic evolutionists, who have misrepresented the Piltdown man and all that they have sought to make it signify, are careful not to refer to the English authorities in the biological sciences who discussed all the Piltdown remains upon the first report of their discovery to the Geological Society of London, December, 1912. They avoid all mention of the fact that even at that early date the English authorities refused to accept the cranium and jaw as belonging to the same individual (1922, p. 9).

Unfortunately, many Piltdown type fossils which are not what they are reported to be still exist in the textbooks today. In fact, Lubenow speculates that

if the australopithecines had not come into favor as the preferred evolutionary ancestors of humans, and Piltdown had not become an embarrassment because it no longer fit the scenario, the fraud might still be undiscovered and Piltdown might still be considered a legitimate fossil (Lubenow, 1992, p. 43).

In a survey of the human fossil record Fix (1984, p. 14) concluded that "the Piltdown fiasco has happened repeatedly" and is still being reenacted today. This is the true lesson of Piltdown (Vere, 1959).

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References

- CRSQ: *Creation Research Society Quarterly*.
 Baitsell, George. 1929. *The evolution of earth and man*. Yale University Press, New Haven, CT.
 Blinderman, Charles. 1986. *The Piltdown inquest*. Prometheus Books, Buffalo, NY.

- Davidheiser, Bolton. 1969. *Evolution and Christian faith*. Presbyterian and Reformed, Nutley, NJ.
- Davis, Watson. 1949. Old Piltdown man is only about 10,000 years old. *Science News Letter* 56(23):185.
- Eiseley, Loren. 1966. Fossil man and human evolution. In Thomas McKern, editor, *Readings in physical anthropology*. Prentice-Hall, Englewood Cliffs, NJ.
- Fix, William R. 1984. *The bone peddlers; selling evolution*. Macmillan, New York.
- Gates, R. Ruggles. 1948. *Human ancestry from a genetic point of view*. Harvard University Press, Cambridge, MA.
- Gee, Henry. 1996. Box of bones 'clinches' identity of Piltdown paleontology hoaxer. *Nature* 381 (6580):261–262.
- Gould, Stephen. 1979. Piltdown revisited. *Natural History*, 88 (3):87–96.
- . 1983. The Piltdown conspiracy. Chapter 16 in *Hens teeth and horses toes*. W. W. Norton, New York.
- Gregory, William. 1929. *Our face from fish to man*. G.P. Putnam's Sons, New York.
- Hawkes, Jacquetta. 1964. Antiquity of man. *Nature*, 204: 952–953.
- Johnson, Phillip. 1991. *Darwin on trial*. Regency Gateway, Washington D.C.
- Keith, Sir Arthur. 1915. *The antiquity of man*. Williams and Northgate, London
- . 1927. Darwin's theory of man's descent as it stands today. *Science*, 66(1705):201–204.
- Larson, Edward. 1997. *Summer for the gods*. Basic Books New York.
- Leakey, L. S. B. 1960. *Adams ancestors*. Harper and Brothers, New York.
- Lewin, Roger. 1987. *Bones of contention*. Simon and Schuster, New York.
- Lubenow, Marvin. 1992. *Bones of contention*. Baker Book House, Grand Rapids, MI.
- . 1994. Human fossils CRSQ 31:70.
- Mather, Kirtley. 1929. *Old mother earth*. Harvard University Press, Cambridge.
- Menon, Shanti. 1997. The Piltdown perpetrator. *Discover*. 18(1):34.
- McCann, Alfred W. 1922. *God or gorilla*. Devin-Adair, New York.
- Millar, Ronald. 1972. *The Piltdown men*. St. Martin's Press, New York.
- Oard, Michael J. 1994. Review of *Bones of contention*. CRSQ 30 (4):222–223.
- Osborn, Henry Fairfield. 1927. *Man rises to Parnassus; critical epochs in the prehistory of man*. Princeton University Press, Princeton, N.J.
- O'Toole, George Barry. 1929. *The case against evolution*. Macmillan, New York.
- Pagel, Mark. 1999. Happy accidents? *Nature* 397:664–665.
- Price, George McCready. 1923. *The new geology*. Pacific Press, Mt. View, CA.
- . 1924. *The Phantom of organic evolution*. Fleming H. Revell, New York.
- Riley, W. B. 1995. Evolution—a false philosophy. In William Vance Trollinger, Jr. editor, *The antievolution pamphlets of William Bell Riley*. Garland, New York.
- Rimmer, Harry. 1995. Monkeyshines: Fakes, fables, facts concerning evolution. In Edward B. Davis, editor, *The antievolution pamphlets of Harry Rimmer*. Garland, New York.
- Spencer, Frank. 1990. *Piltdown; a scientific forgery*. Oxford University Press, New York.
- Trollinger, William Vance. 1995. *The antievolution pamphlets of William Bell Riley*. Garland, New York.
- Vere, Francis. 1959. *Lessons of Piltdown*. The Evolution Protest Movement, Hampshire, England.
- Walsh, John Evangelist. 1996. *Unraveling Piltdown: the science fraud of the century and its solution*. Random House, New York.
- Williams, Trevor. 1969. *A biographical dictionary of scientists*. Wiley-Interscience, New York.
- Winslow, John Hathaway and Alfred Meyer. 1983. The perpetrator at Piltdown. *Science* 83(9):33–34.
- Youngson, Robert. 1998. *Scientific blunders, a brief history of how wrong scientists can sometimes be*. Carroll & Graf, New York.

Notes on the Panorama of Science

Unaweep Canyon—Another Visit

Recently an interesting article (Shaver, 1998, pp. 218–224) on the origin of Unaweep Canyon (Figure 1) in southwest Colorado appeared in the *Quarterly*. Shaver suggested some puzzling geological problems facing creationists who would study the region. I would like to add some comments to Shaver's thought provoking paper.

The Origin of Unaweep Canyon—Uniformitarian Speculations

The origin of Unaweep Canyon has been puzzling to uniformitarians as noted by the variety of origin scenarios which have been offered to suggest how the canyon formed. Of course erosion by fluvial means is employed in most cases. Peale (1877), Cater (1966; 1970) and Sinnock (1981) conjectured that the ancestral Gunnison River carved the canyon. Gannett (1882), however, postulated that the canyon was once a channel of the Colorado River. Lohman (1961; 1965; 1981) proposed an elaborate scheme of stream piracy (two successive phases) involving both the Gunnison and Colorado rivers to form the canyon. Cole and Young (1983) listed evidences for glaciation found in Unaweep Canyon: U-shape canyon, truncated spurs, cirques, hanging valleys, till, outwash, solifluction features and blocked drainages. They considered "...that glaciation was an important agent in the final sculpting of the canyon" (p. 77). Oesleby (1977; 1983) measured the thickness of valley fill in Unaweep Canyon, which could be interpreted to be debris from previous erosional events.

Such fill along the edges of the canyon wall could yield a U-shape not carved by glacial forces. Sinnock (1981), when presenting his model involving a sequence of seven geomorphic events that led to the formation of the canyon, aptly commented that, "This model is but one of an infinite number of possible solutions to the problem of geomorphogenesis in the study area..." (p. 127). Thus when Shaver (1998) employed the wording, Unaweep Canyon mystery, in the title of his article, it described perfectly the state of origin speculations concerning the canyon.

Creationist Efforts in Southwest Colorado

Shaver has recently written another treatise (1999, pp. 11–16) on the region, describing a possible young earth origin of the Colorado National Monument (CNM), in which he further elaborated his two-phase model for the development of regional geomorphic features related to



Figure 1. Unaweep Canyon looking southwest. The inner gorge is cut into hard crystalline rocks. Slope above rim of the inner gorge on right are Triassic strata capped by a flat bench of Entrada Sandstone.

Flood and post-Flood events. He discussed Holroyd's work on Bangs Canyon (1994) claiming that catastrophic events were necessary to form the canyon as opposed to slow uniformitarian processes. Shaver also noted that the process of cliff sapping probably was instrumental in the formation of the CNM similar to rapid canyon development in the southeastern United States (Froede, 1996; Williams, 1995).

Oard (1998) joined the discussion on Unaweep Canyon and proposed a general canyon formation model throughout the world as a direct result of the Flood event. A related article on the catastrophic formation of the Black Canyon of the Gunnison River in southwestern Colorado was presented by Williams (1998).

Unaweep Canyon—Additional Observations

Considering the origin of Unaweep Canyon, possibly channelized high-velocity Flood water laden with abrasive particulate matter removed the sedimentary strata overburden then continued to scour into the crystalline basement. Once a preferred drainage pathway had been established, retreating Flood water continued to cut into the basement rock forming a canyon. Rapid uplift during the late stages of the Flood combined with a falling base level eventually left Unaweep Canyon "high and dry" with later post-Flood ice age precipitation accounting for any further erosion. Canyon sidewall erosion during the immediate post-Flood period resulted in scree piles along the floor of the canyon forming the U-shape thought by

some to reflect glacial weathering and erosion. Other interpretations are possible and I urge creationists to study this fascinating region of Colorado and offer their ideas for the development of geomorphic features such as Unaweep Canyon.

Acknowledgments

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References

- CRSQ: *Creation Research Society Quarterly*
- Cater, F. W. 1966. *Age of Uncompahgre Uplift and Unaweep Canyon, west-central Colorado*. United States Geological Survey Professional Paper 550-C, pp. C86–C92.
- Cater, F. W. 1970. *Geology of the Salt Anticline region in southwestern Colorado*. United States Geological Survey Professional Paper 637, pp. 4, 48, 69, 71.
- Cole, R. D. and R. G. Young. 1983. Evidence for glaciation in Unaweep Canyon, Mesa County, Colorado in Averett, W. R. (editor) *Northern Paradox Basin—Uncompahgre Uplift*. Grand Junction Geological Society Field Trip Guidebook. pp. 73–80.
- Froede, Jr., C. R. 1996 Rapid canyon formation through the cliff sapping of unconsolidated clastic sediments: Examples from the southeastern United States. CRSQ 33:39–43.
- Gannett, H. 1882. The Unaweep Cañon. *Popular Science Monthly* 20:781–786.
- Holroyd, III, E. W. 1994. Bangs Canyon—A valley of boulders. CRSQ 31:99–109.
- Lohman, S. W. 1961. *An abandonment of Unaweep Canyon, Mesa County, Colorado, by capture of the Colorado and Gunnison rivers*. United States Geological Survey Professional Paper 424B, pp. B144–B146.
- Lohman, S. W. 1965. *Geology and artesian water supply of the Grand Junction area Colorado*. United States Geological Survey Professional Paper 451, pp. 69–76.
- Lohman, S. W. 1981. Ancient drainage changes in and south of Unaweep Canyon, southwestern Colorado in Epis, R. C. and J. F. Callender (editors). *Western Slope Colorado*, New Mexico Geological Society Guidebook. Thirty-Second Field Conference. Socorro. pp. 137–143.
- Oard, M. J. 1998. Were the Colorado valleys cut during Post-Flood or Flood times? CRSQ 35:104–107.
- Oesleby, T. W. 1977. Geophysical determination of valley-fill thickness in Unaweep Canyon, Colorado. *Geological Society of America Abstracts with Program* 9: 753–754.
- Oesleby, T. W. 1983. Geophysical measurement of valley fill thickness Unaweep Canyon, West Central Colorado in Averett, W. R. (editor). *Northern Paradox Basin—Uncompahgre Uplift*, Grand Junction Geological Society Field Trip Guidebook pp. 67–70.
- Peale, A. C. 1877. *Geological report on the Grand River district*. United States Geological and Geographic Survey of the Territories. Annual Report 9, pp. 31–102.
- Shaver, M. 1998. Flood geology sheds light on Unaweep Canyon mystery. CRSQ 34:218–224.
- Shaver, M. 1999. Rapid cliff formation at Colorado National Monument, Mesa County, Colorado. CRSQ 36: 11–16.
- Sinnock, S. 1981. Pleistocene drainage changes in Uncompahgre Plateau—Grand Valley region of Western Colorado, including formation and abandonment of Unaweep Canyon: A hypothesis in Epis, R. C. and J. F. Callender (editors). *Western Slope Colorado*. New Mexico Society Guidebook, Thirty-Second Field Conference. Socorro pp. 127–136.
- Williams, E. L. 1995. Providence Canyon, Stewart County, Georgia—Evidence of recent rapid erosion. CRSQ 32:29–43.
- Williams, E. L. 1998. Rapid canyon formation: The Black Canyon of the Gunnison River, Colorado. CRSQ 35: 148–155.

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Catastrophically Buried Old-Growth Forests Along the Oregon Coast

Hundreds of tree stumps of varying sizes are occasionally uncovered within the surf zone along portions of Oregon's coast (Figures 1–4. Other investigations into paleoforests in a surf zone setting along the United States Gulf of Mexico are found in Froede, 1995; 1997.). These stumps represent what were once old-growth forests which existed close to the former shoreline. An investiga-

tion of these paleoforests was recently conducted by Hart and Peterson (1997). The following account is a summary of their report:

Typically, tens to hundreds of tree stumps become exposed within the surf zone along portions of Oregon's coast following severe storm events associated with the Southern Oscillations of El Niño.



Figure 1. Neskowin Beach, Oregon. Tree stumps exposed within the surf zone in March 1998. The stumps are approximately 3 feet in height. Photographs by Fred Brauer.



Figure 2. Neskowin Beach, Oregon. Large tree stump in surf zone adjacent to Neskowin Creek exposed in March 1998.



Figure 3. Neskowin Beach, Oregon. Large weathered tree stump containing marine borings exposed in the surf zone in March 1998. Proposal Rock is in the background. The stump is approximately 3 feet in height.



Figure 4. Moolack Beach, Oregon. Large tree root mass with missing (eroded) stump exposed in the surf zone in March 1999. The root mass diameter is 18 feet which suggests an original trunk diameter of 6.5 feet.

These large late-Holocene age trees occur *in-situ* with their roots still intact. Radiometric dating of the freshly exposed tree stumps has been conducted in an attempt to age-date the former forest (ranging from $1,970 \pm 50$ to $4,340 \pm 70$ radiocarbon years). Unfortunately, the age of the wood creates a conflict between the age of the forest and a sea-level highstand position.

Paleosols and forest litter are in many cases found beneath and/or around the *in-situ* stumps. The excellent condition of the buried wood and underlying litter reflect rapid burial and preservation. Exposure of the wood and litter in the surf zone even for short periods of time results in the rapid destruction of both.

While changing sea-level position is believed to play a role in the inundation and burial of the

paleoforest, it is regional vertical tectonic movement associated with the active convergent margin of the Cascadia subduction zone which is believed to play the greatest role in the burial and preservation of these surf zone forests. Six stages are viewed as necessary to account for the formation of the tree stumps in the surf zone: 1) Wave cutting of the shore-line at a fixed sea-level position, creating a broad platform, 2) tectonic uplift of the platform, 3) growth of a forest (similar to the modern forest of that region) on the wave-cut platform, 4) rapid burial and preservation of the forest, 5) inundation of the forest at sea level, and 6) renewed erosion of the beach platform exposing the tree stumps in the surf zone. Debris flows and clastic dikes associated with many of the buried forests reflect tectonic conditions along this portion of Oregon's coast.

Within the Young-Earth Flood framework it is not surprising to expect the catastrophic burial and preservation of a forest in an area known to be seismically active. Place this buried forest adjacent to a coast and with the erosion of the overburden it would eventually become exposed in the surf zone. This is what we find along Oregon's shoreline today.

The Oregon coast at some point in the past experienced significant erosion resulting in the creation of a beach platform. Following this period, vertical tectonic movement (probably coupled with sea-level retreat) allowed this coastal area to become covered with old-growth forest. Later, the area dropped back within the surf zone, probably due to sea-level rise and vertical tectonism, and was buried under several feet of quartz sand. Today, large-scale storms remove the quartz sand and uncover portions of this once impressive forest. By the condition of the preserved wood and underlying forest litter it is obvious that these materials have only recently become exposed or the organic material would have been rapidly and completely destroyed. Perhaps recent regional uplift of this area has aided in the removal of the overlying sand exposing the tree stumps, or the beach sand source has been lost limiting the amount of sand available to cover the stumps within the surf zone. Either way the stumps, underlying

forest litter, and paleosols are exposed for the first time since they were originally buried.

Due to the size of some of the trees (some estimated to be over six feet in diameter) it is apparent that considerable time passed (a few hundred years) allowing the former forest to mature to a full growth stage. Stacked successions of paleoforests have not been found in this region. We are only observing the remainder of one paleoforest. This is expected within a Biblical framework, but not in the vast expanse of uniformitarian time.

References

- CRSQ: *Creation Research Society Quarterly*
 Froede, Jr., C. R. 1995. Dauphin Island: Evidence for rapid erosion. *CRSQ* 32:143–149.
 ———. 1997. Dauphin Island, Alabama: Radiocarbon dating and questions about age. *CRSQ* 33:238–239.
 Hart, R. and C. Peterson. 1997. Episodically buried forests in the Oregon surf zone. *Oregon Geology* 59:131–144.

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Book Reviews

Summer of the Gods by Edward Larson

Harvard University Press, Cambridge, MA. 1997, 318 pages, \$15.

The book is a detailed account of the Scopes trial of 1925 at Dayton, Tennessee, an event often tagged as the "Scopes Monkey Trial." Probably few if anyone in creation circles are unaware of this trial, one which has to this day ramifications in the battle between creation and evolution. Larson is a Professor of History at the University of Georgia at Athens and received his Ph.D. from the University of Wisconsin. One of his past professors was Ronald Numbers, who is no friend of young-earth creation (p. ix). This may be his bias. The book is subtitled *The Scopes Trial and America's Continuing Debate Over Science and Religion*. Much has already been written about this trial but Larson's treatment, while somewhat stilted, presents details lacking in other accounts.

There is little need to re-hash the story, one which has been so often repeated. Perhaps the value of Larson's work is that he has placed the trial in the midst of other concerns of early 20th Century America, an era when

there was unrest in the wake of the recent world war. The original intent of the trial was a test of a Tennessee law which forbid the teaching of evolution. Dayton merchants got on the bandwagon as they saw the possibilities of drawing folks to their sleepy town in the Tennessee hills. Soon others saw the trial as a line drawn in the sand between evolution and creation, and things escalated to the point that Clarence Darrow and William Jennings Bryan found themselves facing each other in a stuffy courtroom. The trial started as a contest as to who controls the classrooms.

While my own investigation into the trial may be faulty, I have been under the impression that Scopes was a physical education teacher (coach) and, occasionally, subbed as a teacher in science. Larson, however, says that Scopes was "a 24 year old science instructor and part-time football coach" (p. 89). The former seems to be a more accurate job description.

The movie and play *Inherit the Wind* are often held up as representing the facts of this trial but Larson goes to great lengths to show the error of this. The book provides valuable information, material which can be helpful when *Inherit the Wind* shows up in a local community. An interesting point revealed in this book is that many of the arguments brought forth in this trial remain with us today. This shows that the conflict is not, as alleged, between science and religion, but between two faith systems. Larson takes pains to show the inner workings of this trial, one in which no expert witnesses ever got to the stand. Although a number submitted depositions, none actually testified.

The author, perhaps lacking perception into things having to do with this issue, quotes a Unitarian minister who defends Scopes, implying that it was alright for a minister to be opposed to the anti-evolution bill in Tennessee. Larson, who should know better, fails to understand that Unitarianism and Evolutionism are similar.

In my opinion, the best parts of Larson's book are chapter 9 and 10, titled "Retelling the Tale" and "Distant Echoes." Here Larson shows how the account has become distorted over the years so that what we read today is far from what actually took place. His closing comments are worth reading: "As the amens for creationism

have increased in both number and volume over the years. ...secular critics have tended to revise their views of the play and the trial. Even aloof intellectuals have come to realize that a vast number of Americans still believe in the Bible and accept it as authoritative on matters of science. Moreover, if people accept the biblical account of special creation over the scientific theory of organic evolution, which is, after all, one of the core theories of modern biology, they most likely defer to biblical authority on other matters of public and private concern" (p. 265). The book's title came from Darrow's autobiography, *The Story of my Life*, published in 1932.

This is a generally good attempt to present an objective account of such a controversial event. As an historian, it is imperative that Larson not take a position, yet despite this concern, his bias came through as he tended to write of some who supported the anti-evolution bill as being "ultraliteral." He often noted that the problems at Dayton revolved around who took a literal view of the Bible, and yet those who read his book are expected to take his works literally! *Summer for the Gods* is good reading and could be useful in a classroom, provided there is careful attention by a teacher who can show where problems in the discussion exist.

Reviewed by Dan Schobert

The Creation Interpretation by Catie Frates

1997. Noble Publishing Associates, Gresham, OR. 112 pages, \$10.00

Author Catie Frates gives creation seminars nationally, and lives near Ocala, Florida. She also produces creation videos, and homeschools her three children.

This book presents basic creation material in a pleasant and accurate manner. Catie writes for those who believe in a recent creation, but who have questions.

The creation event is estimated at 4004 B.C., with the Flood beginning in 2400 B.C. Walter Brown's hydroplate theory is described as the probable Flood mechanism.

Since the peppered moth evidence for evolution now has been debunked, the next book edition needs to clarify this point, and also improve overall editing. In suggesting further resources, the *CRS Quarterly* is not mentioned. These weaknesses are eclipsed by the book's humor and user-friendly approach. The Foreword is written by Dennis Petersen.

Reviewed by Don DeYoung

Electromagnetism and the Sacred by Lawrence W. Fagg

Continuum, New York. 1999. 144 pages, \$24.95

This is the third book by nuclear physics professor (retired) Lawrence Fagg. He is well versed in modern scientific concepts from elementary particles and quantum electrodynamics to cosmology and the big bang. Fagg believes that a god (monotheist p. 111) has created the universe. However, the god to whom he credits creation used

evolution (p. 27) and can be inferred to be physically operating in the created world around us (p. 20). Christianity is only one of the many religious traditions that point to this creator god and refer to him as light like. Fagg does not present the arguments for creation or for the evolutionary methods used. But he assumes all that

modern science has uncovered about this creation leads to those conclusions. Based on this assumption Fagg proposes that this god remains immanent in nature and the only way humans can directly infer this immanence (p. 21) is through electromagnetic interactions (EMI) within nature. In fact EMI has been the underlying “work horse” of evolution (p. 115) and will be the driving force for human evolution to the next level (p. 71).

The book subtitle is “At the Frontier of Spirit and Matter”. The book proposes that ubiquity of electromagnetic interactions in nature (matter) can be used as an analogy of how God (spirit) is present and interacts with his creation. This idea is promoted to help integrate science and religion. God created the universe and left signs in it that humans can recognize. A large majority of these signs can only be recognized by scientific studies using EMI as the medium for detecting and characterizing (p. 64) such phenomena. The other three known forces (gravity, nuclear and weak) have much less noticeable effect on us and the world we live in. Ultimately these

forces may also be shown to originate from the same source, as already the weak force has been in theory successfully unified with electromagnetism during the early stages of the big bang (p. 36). The bringing together of science and religion in what Fagg calls natural theology should be mankind’s goal as part of the next evolutionary step. Electromagnetism in all its subtle forms is how we can best interact with our environment and will necessarily be the means to that end. To a theistic evolutionist this book may make sense as to how humans may learn of God’s immanence by analogy with the role of EMI in nature. However, to a Christian and Young Earth Creationist Jesus’ words in Matthew 11:27 are more applicable, “...neither knoweth any man the Father, save the Son, and he to whomsoever the Son will reveal him.”

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The Wisdom of the Bones by Alan Walker and Pat Shipman
Alfred A. Knopf, New York. 1996, 336 pages, \$25.50

It was August 22, 1984, and Kamoya Kimeu, the foreman of the fossil hominid expedition was prospecting for hominid remains west of Lake Turkana in Africa. The others of the group were resting. Search in that area had been disappointing and it was planned to move the camp to a new location the following day. Then he found a small piece of hominid frontal bone. He knew from its thickness that it was *Homo erectus*. The others were summoned but they could find nothing else on the surface. The tedious task began to break up the top layer of ground and sieve it for fossil fragments. With no success, they were about to give up when pieces of bone began to appear. As it turned out, they had discovered the most nearly complete skeleton of a hominid ever found, an adolescent *H. erectus* boy.

Intricate laboratory work is described, like a detective story, revealing features of the boy’s life. The authors comment, “How could an animal the size of a large, strong, tall youth manage with the brain of a toddler? What combination of mute cunning and amazing strength enabled *H. erectus* to spread out of Africa, the continent that had contained its ancestors for millions of years? What happened to the ecosystems it invaded? We do not know.”

In 1973 Kamoya Kimeu had found what was at that time the most nearly complete skeleton of *H. erectus*. It

was an adult female with a fatal bone disease. The malady was diagnosed as due to the ingestion of too much vitamin A. In the early days of Antarctic exploration men suffered from this when their rations ran out and they killed their dogs and ate the livers. The carnivore liver is rich in vitamin A. The significant thing in this case is that the scientists deduced that without aid an individual with this affliction could not live long enough for it to progress as far as it had in this case without the care of another individual. This led to the conclusion that *H. erectus* creatures were sufficiently advanced to have compassion on others of their kind and sustain them when in distress.

From their study of hominid bones the authors also conclude that “first our ancestors got *less* apelike, then the females got *more* apelike while the males continued to get less apelike, then the females reversed evolutionary directions and both sexes continued to follow the trajectory toward decreasing apishness.”

As evolutionists, the authors conclude, “We are first and foremost mammals and have to operate under the same biological, physiological, and biochemical “rules” as any other mammal. There was no special creation for humans, and there are no special exemptions from the constraints of anatomy.”

Reviewed by
Bolton Davidheiser

Letters to the Editor

Elginerpeton pancheni's Costly Walk Through Time

So far, *Elginerpeton pancheni* is the oldest known amphibian to date. Those working close to it reckon that it is about 373 myrs old. The earliest type of fish thought to have transformed into amphibians are known as Panderichthyids dated as 378 myrs ago.

The early amphibians show many signs of being predominantly, if not totally, aquatic creatures. But according to the latest discoveries, *Elginerpeton* had once left its watery existence for life on land, only to return again to a mainly, if not totally, aquatic existence (Westenberg, 1999, p. 124). This conclusion is based on the fact that *Elginerpeton* had robust limbs perfect in every way for life on land, but its foot had the sole twisted in such a way that it faced backwards rather than downwards and so the creature could not put its foot flat on the ground. Naturally, that arrangement would have been perfect for paddling in water. Therefore, it is believed that the rest of the perfectly terrestrially adapted limb would have once walked on, ground before returning to the water (Westenberg, 1999, p. 124). So it is imagined that *Elginerpeton* must have gone first from fish ancestor to a totally terrestrial amphibian. Then it must have begun to return again to the water.

In order to reach this date of 373 myrs where we find *Elginerpeton* returned to an aquatic existence, we must first trace the history of this amphibian. First of all *Elginerpeton* would have spent time living a land existence and a three myrs history for this is not unreasonable and this would bring us to 376 myrs. We must then take into account *Elginerpeton* going from an aquatic existence onto land and before all of this the time it must have taken going from fish to amphibian. We may or may not discover fossils believed to be within the time period from 373 myrs and 378 myrs, but if we take into consideration the aforementioned account of the history of *Elginerpeton*, we cannot help but conclude that fish simply did not evolve into amphibians and then back into an aquatic form again in a mere 5 myrs. This is a view that will be welcomed by creationists.

The oldest known lungfish are dated at 390 myrs. For the next 10 myrs they would have been giving rise to many of the other members of the order of fish that included Panderichthyids. But because of this, the time from 378 myrs to 370 myrs becomes the most important area for expecting to find evidence for fossils showing the transition from fish to amphibia. At the time of this writ-

ing no fossil corroborates the looked-for evolution of fish to amphibians. The article in the *National Geographic* describes *Elginerpeton* as being 370 myrs old. I am informed by those closest to it, however, that 373 myrs is the actual date involved. But even if we take 370 myrs as the *Elginerpeton* date and give it a history of three myrs, that would bring us back to 373 myrs. During the five million years between 373 myrs and 378 myrs a fish ancestor would have had to evolve into a fully terrestrial amphibian. Then the amphibian would have had to produce the partly aquatic *Elginerpeton*. Since these various changes could not possibly have occurred in the scant five myrs, the evolutionary theory should be abandoned no matter what further fossils are discovered. Amphibians must have already existed during that alleged time.

Perhaps three myrs would have been needed to produce the aquatic foot. Before that, many millions of years would have been required to convert a totally aquatic limb to one that is for the most part that of a land-dwelling creature. And before all of this, millions of years would have been necessary to change a fish to an amphibian in the first place. All of this would have taken sufficient time to rule out the idea that *Elginerpeton* had become an amphibian by 378 myrs ago. Thus even using an evolutionary time scale there is no way to produce all these changes in further fossil discoveries. Evolutionary theory is falsified. These fossil data point instead to the shared-themes model (or gene-them model) which accounts for any shared features between fish and amphibians.

For further reading of Devonian fish and amphibians see Brown, 1996; 1997.

References

- CRSQ: *Creation Research Society Quarterly*
 Brown, C. 1996. Devonian fish and amphibians and the gene-theme model. CRSQ 33:13–15.
 ———. 1997. Devonian fish and amphibians: An update. CRSQ 34:104.
 Westenberg, K. 1999. From fins to feet. *National Geographic* 195(5):114–126.

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Comments on Wetumpka Impact Paper (CRSQ 36:32-37)

I would like to commend Carl Froede and Emmett Williams for their excellent paper on the Wetumpka structure in Alabama in a previous issue. It has been exciting to me to see papers by creationists regarding geological field work at impact sites.

Though the presence of the special "shock minerals" such as shocked quartz, coesite, or stishovite are more definitive indicators of an impact, the geological context sometimes tends to eliminate events other than impacts. This appears to be the case at Wetumpka. The severely jumbled underlying metamorphic and igneous rock, the remnants of a circular rim, and the lack of clear evidence of a volcanic origin seem to point to the structure being an astrobleme, or crater remnant. The authors do not rule out the possibility of it being of volcanic origin, though that seems unlikely. The authors provide I think a very plausible means of relating this impact to a young-earth Flood model. They suggest it may have took place in the late Flood/early post-Flood in a shallow marine environment or a beach perhaps. The geology of the area seems to definitely place it after most of the deposition of the Flood but before the post-Flood ice age. Flood waters would have been retreating and little or no additional marine sediments formed on top of the structure. On the other hand, terrestrial sediments were laid down on the crater after its formation, then these sediments were later eroded away to expose the structure. This is an example of how the geological study of impacts can shed light on the Flood and post-Flood phenomena. This tends to confirm that impacts were occurring during Noah's Flood. The impacts, which I believe began at the onset of the Flood, apparently continued occasionally into the post-Flood period.

I would like to have seen some discussion in the paper of the distribution of impact ejecta in the Wetumpka region. The authors make a comment about the elevational differences between the northern and southern crater rims, the north rim being higher. It is pointed out that this "is believed to be due to the angle of impact." From the perspective of crater physics, it is usually the ejecta that tells more about the direction of motion of the impactor than the shape of the crater. If the crater is elliptical in shape rather than circular, then this may indicate the object struck at a very low angle of approach (or high angle from the vertical). Thus, judging only from the information presented in this paper, I would think erosion by the local streams is a more likely explanation of the breaks and unevenness of the crater rim.

Using energy scaling techniques as well as some reasonable assumptions allows a rough estimate of the energy and size of the Wetumpka impactor. It is reasonable to use the Barringer impact in Arizona as a baseline in the scaling calculation. The diameter, kinetic energy, mass of

the impactor, and diameter of the impactor can be considered known for the Barringer site in Arizona (Norton, 1994). The Lampson Scaling Law (Melosh, 1989) can be used to calculate the energy in the Wetumpka impact from the Arizona impact.

$$\left[\frac{D}{D_0} = \sqrt[3]{\frac{W}{W_0}} \right]$$

In this equation, D is the diameter of the Wetumpka crater, D₀ the diameter of the Barringer crater, and W represents the kinetic energy in a likewise manner. The Wetumpka crater diameter is a little over four times the diameter of the Barringer site. This implies that if the energy of the Barringer impact was 1.7 megatons (7.1x10¹⁵ joules) the energy of the Wetumpka impact would be about 144 megatons (6x10¹⁷ joules). The Barringer impactor is believed to have been about 80 feet or 24 meters in diameter. Assuming a speed of 20 km/s and a density the same as for the Barringer object (assume 3.5 g/cm³), this will give a Wetumpka impactor about 300 feet or 90 meters diameter. (To obtain this, use the equation for kinetic energy and the relationship between volume, density, and mass for both impactors.) Of course, if the density and speed were different it would change these figures somewhat and the speed would be the more significant factor.

References

- Froede, C. R. Jr., and E. L. Williams. 1999. The Wetumpka Impact Crater, Elmore County, Alabama: An interpretation within the young-earth Flood model. *Creation Research Society Quarterly* 36:32-37.
- Norton, O. R. 1994. *Rocks from space*. Mountain Press, Missoula, MT. pp. 113, 116, 124, 126.
- Melosh, H. J., 1989, *Impact cratering: A geologic process*. Oxford University Press, New York. p. 112.
- Spencer, W. R. 1998a. Catastrophic impact bombardment surrounding the Genesis Flood. In Walsh, R. E. (editor). *Proceedings of the Fourth International Conference on Creationism*. Technical Symposium Sessions. Creation Science Fellowship, Pittsburgh, PA. pp. 553-566.
- . 1998b. Geophysical effects of impacts during the Genesis Flood. In Walsh, R. E. (editor). *Proceedings of the Fourth International Conference on Creationism*. Technical Symposium Sessions. Creation Science Fellowship, Pittsburgh, PA. pp. 567-579.

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Wetumpka Impact Crater Confirmed

Over a year ago we submitted an article which was recently published in the *Creation Research Society Quarterly* (Froede and Williams, 1999). In our article we agreed with the uniformitarian proposal that the Wetumpka Impact Crater was of extraterrestrial origin. However, at the time we wrote our article no conclusive evidence existed which confirmed this feature as an impact crater. We suggested that perhaps the coring of the crater floor might provide clearer evidence of impact origin.

During a period extending from June to August 1998, David King and Tony Neathery conducted a well drilling program on the floor of the Wetumpka Crater. Their effort was undertaken to retrieve basement rock from the bottom of the crater which would validate the impact origin for this feature. Two wells were drilled with the first well approximately 628 feet, and the second at 589 feet beneath the ground surface (King, n.d.). Neither of these wells reached the bottom of the crater floor.

In early March 1999, I had the opportunity to attend a field trip led by King and Neathery to the Wetumpka Crater. During this field trip it was shared with the participants that shocked quartz grains retrieved from one of the well cores provided the necessary evidence which clearly identifies the Wetumpka Crater as being of impact origin. A public meeting was held in the city of Wetumpka a week before our field trip where Peter Schultz, internationally recognized planetary geologist and professor of geology at Brown University, announced to the crowd that the Wetumpka Crater was of extraterrestrial origin (Blackburn, 1999).

Many questions still remain regarding the timing, type of object, direction, and size of the initial crater. However, these investigations can now proceed with an understanding that this large surface feature was formed as a result of impact with an extraterrestrial object.

None of the new information gained as a result of the crater floor drilling project or subsequent sedimentary analysis changes our original interpretation with regard to the timing, mechanism, or method of formation within the framework of a young-earth. We are optimistic that further investigation into this feature will show our proposed paleoenvironmental setting as being the best to fit the physical evidence.

References

- Blackburn, P. 1999. Wetumpka confirmed as impact crater site. *The Wetumpka Herald*. 101(35):1.
- Froede Jr., C. R. and E. L. Williams. 1999. The Wetumpka Impact Crater, Elmore County, Alabama: An interpretation within the young-earth Flood model. *Creation Research Society Quarterly* 36:32-37.
- King, D. T. n.d. Wetumpka Impact Crater drilling. Accessed 3/03/99: Made available from <http://www.mindspring.com/~rwhigham/trips/wetu/drill.htm>.

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Earth Impacts, the Geologic Column, and Chicxulub

Some CRSQ readers will be aware of the papers on Earth impacts which I presented at the Fourth International Conference on Creationism, August 1998 (Spencer, 1998). Following are some comments on research I have done on the subject of impacts since the publication of these papers. I would like to mention Earth crater data obtained after the publication deadline of the *ICC Proceedings*, a minor error in the paper, and some recent findings relevant to the subject from the scientific literature.

In the *ICC Proceedings* paper, "Catastrophic Impact Bombardment Surrounding the Genesis Flood" I presented a table giving data on Earth astroblemes in relation to the Geologic Column. Table 1, page 559 of the *Proceedings* gives two data sets from Earth crater data compiled by O. Richard Norton, an astronomer and educator, and Richard Grieve of the Canadian Geological

Survey, Canada. The Norton data set was only 50 points, but was recent data from 1994 while the Grieve data was from 1982 and included 88 points. The 50-point data set included good information on the sites and is a set where there is a high confidence of them being impact sites. The Grieve data set of 1982 was considered a very authoritative list at the time and it has been quoted and used by many other authors. The Grieve data from 1982 also included some information on the sites. Richard Grieve used a ranking system to describe the state of preservation of the impact structures. After the publication deadline for the ICC papers, I was able to obtain a data set from the Canadian Geological Survey, including Grieve's Earth impact site list from 1998. There was no way to get this data into the *Proceedings* papers but it was in my presentations at the conference. The 1998 list of Earth astroblemes included 121 points (points without an as-

signed age figure were thrown out). This data set has the advantage of being very up to date but the disadvantage of their being no information about each site.

The crater numbers were totaled in the *ICC Proceedings* in a manner that contained an error. Following is a table showing how it was presented for the case of the 1982 data set.

Table I. Data presented as in ICC 1998 *Proceedings*; italicized labels are not correct.

Geologic Column Label	Evolutionary Age (Ma)	No. of Impacts, Grieve, 1982
Recent	< 1	7
Upper Cenozoic	5–1	3
Lower Cenozoic	65–5	7
<i>Mesozoic</i>	100–65	3
<i>Upper Paleozoic</i>	300–100	15
<i>Lower Paleozoic</i>	600–300	12
<i>Precambrian</i>	> 600	3

The Mesozoic, Upper Paleozoic, Lower Paleozoic, and Precambrian labels are not correct for the age periods shown in Table I (same for the Norton data set, not shown here). The counts of impact sites in each category are correct for the numerical age ranges shown, but not correct for the Geologic Periods shown. The Lower Paleozoic and Precambrian Period counts are not quite correct because geological societies recently adopted a different boundary age between the Precambrian and Cambrian Periods than the figure used in the *Proceedings*. This places the Precambrian/Cambrian boundary at 550 Million years ago rather than 600. Of course, as young earth creationists we do not accept these ages, but the difference does affect the counts of the astroblemes.

It is important for creationist geologists to look into how Earth impacts are distributed in the Geologic Column. Though there is not a real consensus on some questions about the Geologic Column and the Flood among creationists, this kind of data can shed light on the complex events of the Genesis Flood. The most important point is that impact structures are found in all types of rock and all through the Geologic Column, from Precambrian upward. Such data may be counted and presented in a variety of ways, so there is a danger of bias appearing in such a table. After recounting the points with the 1998 Grieve data set, two interesting ways of presenting the numbers follow in Tables II and III.

Some creationists might argue that showing the data this way shows a bias towards the uniformitarian presuppositions of evolutionary geology. So, I counted the data in another way, breaking down the ages into 12 equal uniformitarian time periods of 50 million years each. Ta-

ble III shows the data this way from Grieve's 1998 data set. (The data sets mentioned here are available from Spencer, 1998c.)

Table III shows that the greatest number of impacts are in recent strata, which are easier to discover since they are more accessible for study. The accessibility of the various strata is a very important consideration. A paper by Trefil and Raup (1990), uses statistical analysis to determine whether most Earth craters have the same age as the rock in which they are found. They conclude that this is the case at most impact sites. This conclusion needs to be reexamined based on young-age assumptions. Small craters are more likely to be eroded before the rock in which they are found is eroded. On the other hand, large craters are likely to "survive" even if there is significant erosion around the site. A large impact produces a variety of indicators of impact that may be observed even if the crater rim has eroded away, such as shocked minerals, breccia and deformed strata, magnetic anomalies, and various circular structures in the subsurface rock. Trefil and Raup show statistical data on the percentage of the continental surface which has each geological rock classification available near the surface. Cenozoic and Mesozoic rock are much more common on the surface of the continents than is Paleozoic rock. So, for example, Cambrian rock is less accessible than Cretaceous since it is

Table II. 1998 Earth crater data recounted to correctly correspond to Geologic Periods.

Geologic Period	Evolutionary Age (Ma)	Grieve data, 1998, 121 points
Cenozoic	64–Present	43
Mesozoic	249–65	33
Paleozoic	549–250	37
Precambrian	> 550	8

Table III. Earth Impacts throughout the Geologic Column, by equal "time" periods.

Evolutionary Age (Ma)	Grieve, 1998, 121 points
50–0	39
100–50	16
150–100	12
200–150	?
250–200	7
300–250	5
350–300	9
400–350	6
450–400	5
500–450	7
550–500	4
> 600	4

found over a much smaller area near the surface where we can study it easily. This may imply that the impact structures in the Paleozoic strata were more numerous than the above numbers tend to show, since those strata are less accessible today. This tends to be consistent with what I proposed in my ICC papers.

Another item of note was brought to my attention by Thomas Fritzsche, who presented an excellent paper at the 1998 ICC on the Chicxulub structure, in Yucatan. This structure has been accepted by many in the scientific community as the impact that led to the global extinction of dinosaurs. Recent seismic reflection sounding studies of the Chicxulub structure have shed light on an interesting controversy over the size of the original Chicxulub crater. Estimates of the transient crater diameter have ranged from 180 to 300 km. After the impact, slumping would reduce the observed diameter from this value. The original paper by Luis and Walter Alvarez, Frank Asaro and Helen Michel, in 1980, quoted geologist Richard Grieve as estimating that a 10 km diameter asteroid would produce a structure 200 km in diameter. The new seismic data from Chicxulub have revealed that the transient crater diameter was more like 100 km, and that the shock waves of the impact produced a fault structure that reached into the upper mantle. There is a prominent scarp structure around the Chicxulub impact site at about 195 km diameter. This was thought previously to be the main crater rim, but based on the new seismic studies the scarp must be considered a ring. This means that the Chicxulub structure is now viewed as a two or three ringed complex crater. Multi-ringed craters can have the rings either outside or inside the main crater rim. Not many impact sites on Earth have been proposed to be multi-ringed craters. This may be the best evidence of such a structure to date on Earth, though they are common on our Moon and Mars. On Earth, where erosion, tectonics, and sedimentation have altered crater structures, it can be very difficult to determine the main crater rim diameter; hence the controversy over the size of Chicxulub. What is significant to creationists is that this new data on Chicxulub significantly reduces the energy of the "dinosaur killer" impact. My ICC papers argue that one large impact, even a large one such as the one at Yucatan, could not cause *global* extinctions of the dinosaurs (Spencer, 1998a). The environmental effects of such an event are not long-lived enough (Spencer, 1998b), and from an evolutionary interpretation of the fossil record, the extinctions required too much time to associate them with one impact. The smaller size of the Yucatan impact makes the single-impact extinction hypothesis even less plausible.

Recently published papers by creationists (Faulkner 1999; Froede and Williams, 1999; Steele, 1999) underscore that impacts from space are an important piece of the puzzle in a biblical and scientific understanding of earth history and the Flood. The events of the post-Flood period, in my opinion, are a very adequate explanation of the extinction of the dinosaurs. It is possible to incorporate a significant number of impacts in our models of Noah's Flood.

References

- Alvarez, L., W. Alvarez, F. Asaro, H. Michel. 1980. Extraterrestrial cause for the Cretaceous-Tertiary extinction. *Science* 208:1095–1108.
- Faulkner, D. 1999. A biblically based cratering theory. *Creation Ex Nihilo Technical Journal*. 13:100–104.
- Fritzsche, T. 1998. The Impact at the Cretaceous/Tertiary boundary. In Walsh, R. E. (editor). *Proceedings of the Fourth International Conference on Creationism*. Technical Symposium Sessions. Creation Science Fellowship, Pittsburgh, PA. pp 553–566.
- Froede, C. R. Jr., and E. L. Williams. 1999. The Wetumpka Impact Crater, Elmore County, Alabama: An interpretation within the young-earth Flood model. *Creation Research Society Quarterly* 36:32–37.
- Melosh, H. J. 1997. Multi-ringed revelation. *Nature* 390: 439–440.
- Morgan, J., M. Warner and the Chicxulub Working Group. 1997. Size and morphology of the Chicxulub impact crater. *Nature* 390:472–476.
- Spencer, W. R. 1998a. Catastrophic impact bombardment surrounding the Genesis Flood. In Walsh, R. E. (editor). *Proceedings of the Fourth International Conference on Creationism*. Technical Symposium Sessions. Creation Science Fellowship, Pittsburgh, PA. pp. 553–566.
- . 1998b. Geophysical effects of impacts during the Genesis Flood. In Walsh, R. E. (editor). *Proceedings of the Fourth International Conference on Creationism*. Technical Symposium Sessions. Creation Science Fellowship, Pittsburgh, PA. pp. 567–579.
- . 1998c. *Earth impacts and Noah's Flood: A resource guide for educators and researchers*. Creation Education Materials, Arlington, TX.
- Steele, S. R. 1999. The Upheaval Dome impact site: Flood model interpretations. *Creation Research Society Quarterly* 35:236–237.

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Erratum

CRSQ 36(2): September, 1999, pages 80 and 88. Two quotations were misattributed to Thomas Aquinas.

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Creation Research Society

History—The Creation Research Society was organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (graduate degrees in science) and about 1000 non-voting members. The *Creation Research Society Quarterly* has been gradually enlarged and improved and now is recognized as the outstanding publication in the field. In 1996 the CRSQ was joined by the newsletter *Creation Matters* as a source of information of interest to creationists.

Activities—The society is solely a research and publication society. It does not hold meetings or engage in other promotional activities, and has no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund is maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible. As part of its vigorous research and field study programs, the Society operates The Van Andel Creation Research Center in Chino Valley, Arizona.

Membership—Voting membership is limited to scientists who have at least an earned graduate degree in a natural or applied science and subscribe to the Statement of Belief. Sustaining membership is available for those who do not meet the academic criterion for voting membership, but do subscribe to the Statement of Belief.

Statement of Belief—Members of the Creation Research Society, which include research scientists representing various fields of scientific inquiry, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution) both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. All members of the Society subscribe to the following statement of belief:

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

2. All basic types of living things, including 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 Savior. The act 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.