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Sailors have told stories of sea monsters throughout the ages. On p. 19 is a documented report on one of them.

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Haem 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

When the March 2001 *Quarterly* was being placed in final form by Lane Lester, I was too sick to give any editor's comments. It was a great *Quarterly*, covering many issues and different topics. I urge you to carefully read any items of interest and send me your comments or a formal letter to the editor.

Having recovered from several months of sickness, I am delighted to be able to comment on this first issue of a new volume of the CRSQ. Michael Oard offers a new model for geomorphology of the earth. His model covers the later stages of the Flood including his concept of vertical tectonics. Also discussed is the massive erosion caused by water movement in the final periods of the Flood. He divides this phase of his model into two cycles, sheet erosion, then channelized erosion.

In connection with this geological article, a new monograph has been published by the Society, *Plate Tectonics - A Different View*, edited by Dr. John K. Reed. Oard wrote some chapters for this monograph, and you will enjoy reading them in conjunction with his *Quarterly* article.

You will find various opinions on certain subjects being discussed in the *Quarterly*. One author takes a negative view of the thermodynamic model of star formation presented by George Mulfinger, whereas another author offers support for the model. John Goertzen offers evidence

that the *Zuiyo Maru* cryptid is actually a marine tetrapod. There has been much previous literature written on this topic in various creationist publications. As the number of creationists increases, so will differences of opinion on creationist models increase. This is a healthy sign that many concepts will be thoughtfully reviewed and discussed. It is good to have disagreements aired, allowing readers some insight into creationist thought.

Jerry Bergman reveals how some of the ideas of Darwin were used by Nazi scientists to support the killing of numerous people in the Holocaust. It is not a pleasant subject, but it will illustrate the application of certain Darwinist principles to justify the mass slaughter of so-called "inferior" races.

Other subject matter is presented in the notes and book reviews. I hope you find much material that will give you some thought-provoking moments. May we hear from you?

My heart-felt thanks are given to the Associate Editors and the Managing Editor for their work during my illness. It is a privilege to work with such fine gentlemen in the service of the Creator.

Emmett L. Williams
Editor

Book Review

Astronomy on Trial by Roy C. Martin, Jr.

University Press of America, Lanham, MD. 1999, 246 pages, \$19.95

The title of this book, along with its ambitious subtitle, "A Devastating and Complete Repudiation of the Big Bang Fiasco," holds promise to those, including recent creationists, who oppose the current standard model of cosmology. Unfortunately, the book fails to deliver. There are many problems with simple editorial items. For instance, there are 297 numbered items in the bibliography at the end of the book that are referenced in the text. However, the bibliography is not organized in any order that I could recognize: not in order of appearance in the text, not alphabetically or chronologically, nor do they seem to be grouped according to topic. There are numerous misspellings. I will list just a few. The "raison pudding model" is mentioned many times. In the index the Keck telescope is called the Kech telescope. "Alpha Centauri" is spelled "Alfa Centari." Twice Olber's name is spelled Obler. Faraday's name is misspelled the one time that it is mentioned.

There are countless typographical errors, such as substituting the word "where" when the word "were" was obviously intended. On page 51 the word "jive" was used for the word "jibe." On page 130 the word "neutron" was used when it is obvious that the intended word was "neutrino." These are only a few examples; I doubt that I even noticed most of them, and my list is quite long.

The spell checker on most word processors would not have caught many, if any, of these errors. One would expect that an editor would find these mistakes, so one can only conclude that the book was not edited by anyone other than the author, though the book does not give the appearance of being self-published. With no external editing, facts and figures are improperly reported as well. Bubbles and voids are stated to be hundreds of light years across rather than the correct figure of hundreds of millions of light years (p.90). It is said that a typical large galaxy has

200 million, rather than 200 billion stars (p.101). The text states that trigonometric parallax gives distances up to 2000 parsecs or 6000 light-years, when the correct figure is ten times smaller (pp. 126, 128). The galaxy is said to be about 10,000 parsecs or 30,000 light-years across, when the correct value is about 30,000 parsecs or 100,000 light-years (p.128). Biographical information is confused. The work of Copernicus seems to have been fused with the work of Kepler (p.17). Reference is made to Sir Edwin Hubble (p.39), though as a U.S. citizen, I do not believe that Hubble was ever knighted. Vesto Slipher's work on redshift is credited five years later than it actually was done (p. 207). The obscurity of Albert Einstein when he formulated his theory of special relativity is mentioned (p. 2). This is an all too common incorrect belief. Einstein's work on special relativity was preceded by his explanation of the photoelectric effect by four years, the work for which he was eventually awarded the Nobel Prize. By the time Einstein published his special relativity he had already published papers on Brownian motion and other topics as well.

Astronomical and cosmological concepts are badly mangled too. The author does not understand the source of the cosmic background radiation (CBR) in the big bang model, as he describes it as coming from gamma radiation from matter-antimatter annihilation (pp. 12, 50). In reality it is supposed to result from rather normal 3000K thermal radiation that had previously been intertwined with matter because of the opacity of the protons and electrons that filled the universe prior to their combination to form neutral hydrogen atoms for the first time. Almost any popular level book on cosmology can explain this in detail. The author states repeatedly that the CBR comes from starlight, though this is not demonstrated nor are problems with this suggestion (such as the homogeneity of the CBR) discussed. Other misconceptions about the big bang are common. For example, the author asks where the big bang happened (p. 23 and elsewhere). The answer is that the big bang supposedly happened everywhere, though this is obviously not satisfying to the author. Redshifts of distant galaxies are consistently called Doppler shifts, though this is not correct. However, in all fairness I hasten to add that most popular level books on cosmology get this wrong as well. The author implies that the cosmological constant is a fudge factor (p. 72 and elsewhere), though in reality it is a legitimate boundary condition in the most general case solution for the universe. Though many cosmologists (at least until recently) think that the cosmological constant is probably zero, there is no reason why it should be.

Astronomical misconceptions abound. The book claims that if a star accretes matter from its surroundings it

lifetime is extended (p. 79). I suppose that the author's reasoning was that more matter should result in more nuclear fuel. While this is true, more matter also results in greater gravity that causes the rate of nuclear reactions to increase much faster so that the lifetime of the star is decreased. The author asks how the separate elements in the interiors of stars can maintain their identities, given that oxygen and sulfur are so reactive (p. 82). I hardly know how to respond to this. Is the author referring to the chemical properties of those two elements? If so, that is immaterial, because in the interiors of stars the pressure and temperature are so high that there are no atoms, but only nuclei and free electrons. A supernova is said to be caused by the collapse of the envelope of a star when it is the core that collapses (p. 83). On that page the estimate of the number of supernovae in a galaxy per year is too high as well. The ages of elliptical and spiral galaxies are badly garbled (p. 98). The discussion of pulsars (p. 103) makes it clear that the author does not know what a pulsar is. The treatment of type Ia supernovae (p. 165) indicates that the author does not understand what they are either. The book states that clouds of gas in the interstellar medium are segregated according to composition (p. 153). Actually, clouds in the interstellar medium are quite mixed.

There are errors involving physics as well. For instance, it is asserted that gravity has been demonstrated to act instantaneously (p. 77). I am not aware of any evidence that this is true, but there are compelling reasons to believe that it is not true. There was no reference given for this. The author has stars moving apart as they accrete matter from their surroundings (pp. 87, 89). This is not possible unless some very special conditions are applied. The hypothetical particles called axions are said to interact only through the weak force (p. 110). However, unless they interact with the gravitational force, axions hardly could be the candidate for dark matter that they are. Particle accelerators are said to operate by bouncing photons off subatomic particles (p. 136).

All of this and more not mentioned here demonstrate that this is a poorly written book fraught with problems. The author seems to take the approach that unless proponents of the big bang can prove their model to his satisfaction, then it cannot be true. Unfortunately Martin has failed to understand much of the model so that he is hardly a credible critic. Anyone looking for a good critique of the big bang model needs to look elsewhere.

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Vertical Tectonics and the Drainage of Floodwater A Model for the Middle and Late Diluvian Period — Part I

Michael J. Oard*

Abstract

A model is presented for the erosional effects in the mid and late Flood that are due to large- and small-scale vertical tectonics of the crust coupled with Flood water movement. Other Flood models are briefly discussed without commenting on their merits or problems. Instead of a problem, all these models indicate a healthy state of Flood geology, according to the principle of multiple working hypotheses. The model is a further development of the Whitcomb-Morris concept using the terminology of Tas Walker. Evidence for great upward vertical tectonics of continents and subsidence of the ocean

basins is presented. During this great event, massive evidence of sheet erosion of the continents is ubiquitous in the form of erosional remnants, erosion surfaces, and the long distance transport of resistant clasts.

The model is able to explain a number of mysterious phenomena in geomorphology, such as high-elevation erosional remnants, large-scale erosion surfaces, distally-deposited coarse gravel, continental margins, water gaps, pediments, and submarine canyons. The model has significant implications for other models and concepts concerning the Flood.

Introduction

A model can be considered a representation of a real event, object, or idea. Models of the past are necessary because we cannot observe what occurred then. Models of historical events are based on assumptions that are always tempered by what one believes about the past (Klevberg, 1999). Models of the past often need to be revised, falsified, or “verified” by data from the present. For example, geologic models constantly need refining by observation of existing fossils and rocks. A successful model can be considered one that has a reasonable explanation for a variety of observed data.

A model is presented for the mid and late Flood period based on surface features of the continents and ocean bottoms. The surface features of the earth come under the umbrella of the geological subdiscipline of geomorphology or physiography. The model presented here is preliminary; many details need to be fine tuned. Development of the model is more on the global scale. Complications may arise on the regional or local scales, but these can be dealt with later. The model must at least be able to explain the macroscale features of the Earth.

essarily exclusive. There are common threads in most of them. I shall briefly describe the main models or ideas on the Flood that seem to be in vogue.

One of the first models developed is the “Whitcomb-Morris model,” based on the classic book *The Genesis Flood* (Whitcomb and Morris, 1961). The book is primarily a Biblical and geological defense or apologetic for a global Flood, but it still represents a “model” in the sense that it describes details of the Flood and the expected geological consequences. The model includes two stages of the Flood: 21 weeks of “prevailing,” representing the first 150 days of the Flood, and 31 weeks of “assuaging,” in which the waters drain from the rising continents for 221 days. The Flood generates tectonic and volcanic upheavals, tremendous sedimentation that provides ideal conditions for forming fossils rapidly, and produces a post-Flood ice age. The book contains such concepts as ecological zonation, hydrodynamic sorting and the higher mobility of the vertebrates attempting to escape the encroaching Flood waters. It tries to explain seemingly anomalous features for a one-year global Flood, such as formations implying slow deposition, ancient “varve” sequences, and the

Creationist Models

There are a number of models or ideas about the Flood in various stages of development. These models are not nec-

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origin of coal and oil. Creationists have further developed many aspects of the Whitcomb-Morris model since 1961.

There are at least two vertical tectonics models that have been published. John Woodmorappe has introduced a concept called Tectonically-Associated Biological Provinces, called TABS (Woodmorappe, 1999, pp. 44–61). This concept or model postulates that tectonics and biogeography are generally linked resulting in a general ordering of fossils. He divides the uniformitarian Phanerozoic era into 4 divisions—I, II, III, and IV, which is their relative order of subsidence during the vertical tectonics of the Flood. Whatever these TABs represent in the antediluvian biosphere, each TAB is downfaulted in a certain order relative to the other TABs. This produces a general vertical order of the fossils. David Tyler (1990) has proposed a model in which crystalline blocks rapidly rise, resulting in catastrophic erosion, deposition, basin faulting, metamorphism, and gravity sliding of nappes.

A very elaborate geophysical model, called catastrophic plate tectonics, has been developed by John Baumgardner (1986; 1990; 1994a,b) and integrated into many other aspects of the Flood (Austin et al., 1994). This model is similar to plate tectonics but with a catastrophic separation of a single pre-Flood continent, resulting in the geography we see today. Besides catastrophic plate tectonics, the expanded model of Austin et al. (1994) includes pre-Flood geology and sedimentation; the rise of the ocean water onto the continents due to the addition of an all-new, hot ocean crust; the slow regression of the Flood waters off the continents in the late Flood and after the Flood; and isostatic uplift of the continents accompanied by intense mountain uplift, earthquakes, and high volcanism for hundreds of years following the Deluge.

Walter Brown (1995) has developed a model of the Flood that also asserts rapid continental drift. In his model, one supercontinent possessed interconnected chambers of water averaging 1 km in thickness at 16 km below the Earth's surface. Increasing water pressure caused the water to erupt along linear cracks that later became the mid-ocean ridges. The water, in the form of steam, rose at supersonic speeds into and above the atmosphere. Due to the release of the water and bulging upward of the lower crust and mantle at the mid-ocean ridges, the plates gravitationally slid away from the rupture zone for several thousand kilometers, ending with the present geography of the earth. The water from the chambers flowed out and covered the splitting continents. Water injected into the atmosphere fell as torrential rain, while the water above the atmosphere dumped as dirty ice, which in Siberia and Alaska resulted in the quick freezing of the woolly mammoths. Brown considers his model a working hypothesis that explains many mysterious features of the earth. He is constantly improving and revising his model.

Subdivisions of Geologic Time and Symbols					
ERA	PERIOD AND SUBPERIOD		EPOCH	AGE (Ma)	
CENOZOIC	QUATERNARY		Holocene	0.01	
			Pleistocene	←	
	TERTIARY	NEOGENE SUBPERIOD	Pliocene	5.3	
			Miocene	23.7	
			Oligocene	36.6	
		PALEOGENE SUBPERIOD	Eocene	57.8	
			Paleocene	←	
MESOZOIC	CRETACEOUS		Late		
			Early	144	
	JURASSIC			Late	
				Middle	
				Early	208
	TRIASSIC			Late	
				Middle	
				Early	245
	PALEOZOIC	PERMIAN		Late	
				Early	←
PENNSYLVANIAN				Late	
				Middle	
				Early	320
MISSISSIPPIAN				Late	
				Early	360
DEVONIAN				Late	
				Middle	
				Early	408
SILURIAN				Late	
				Middle	
				Early	438
ORDOVICIAN				Late	
				Middle	
				Early	505
CAMBRIAN				Late	
			Middle		
			Early	570	
PROTEROZOIC				570	
				2500	
ARCHEAN				3800	

Figure 1. The uniformitarian geological column and time scale. The three main locations that creationists have postulated for the Flood/post-Flood are in the late Paleozoic, the Mesozoic/Cenozoic boundary, and in the late Cenozoic (shown in age column by a horizontal arrow).

Mats Molén (1994) has developed a model in which an underground network of chambers filled with water burst forth as the “fountains of the great deep.” As the roof of the chambers collapsed, the hollows were filled with sediment, which being denser than water, caused the crust to sink, forming the “geosynclines.” The deepest parts of the lithosphere were forced downward, were melted, and formed magma that ascended. The ascending magma resulted in plutonism and volcanism, all mixed with the

thick geosynclinal sediments. The rising magma would compress the surrounding sediments and cause gravity sliding and nappes. This magmatism would take perhaps a few hundred years. He further adds a post-Flood continental drift scheme during the time of Peleg.

There are a number of models or ideas about the Flood based on where creationists place the Flood/pre-Flood boundary and the Flood/post-Flood boundary within the geological column (Figure 1). This assumes the geological column is a compressed chronology of the Flood (Austin, 1994, pp. 57–82; Brand, 1997; Coffin, 1983, pp. 69–81; Roth, 1998, pp. 153,163). The relationship of the geological column to Flood geology is a controversial matter (Reed, 1996; Woodmorappe, 1996, 1999; Froede and Reed, 1999; Klevberg, 2000), but it is generally assumed to be viable by many model builders. The question of how the geological column relates to the Flood is partly a problem of how *absolute* a modeler follows the geological column. The Flood/pre-Flood boundary is often placed at the end of the Precambrian by many creationists, mainly because of the almost total absence of fossils in Precambrian sedimentary rocks (Austin, 1994; Roth, 1998, p. 209). But there are creationists who would include most if not all the Precambrian sedimentary rocks, including Archean rocks, within the Flood (Snelling, 1991; Hunter, 1996).

There are three general locations within the geological column where the Flood/post-Flood boundary is commonly placed (Tyler, 1997): 1) in or below the upper Paleozoic (Garner, 1996a,b; Garton, 1996; Robinson, 1995,1996; Scheven, 1990,1996; Tyler, 1994,1996), 2) the Cretaceous/Tertiary boundary (Brand, 1997; Austin et al., 1994, p. 614), and 3) the late Cenozoic (Coffin, 1983; Holt, 1996; Morris, 1996; Oard, 1996, 1998; Roth, 1998, p. 209). The Cenozoic includes the Tertiary and the Quaternary periods, the later of which includes the Pleistocene and Recent stages. A Flood/post-Flood boundary in the late Cenozoic is deliberately vague because it depends upon the fine-scale accuracy of the various stages of the Cenozoic: the Paleocene, Eocene, Oligocene, Miocene, and Pliocene, and what exactly is meant by the Pleistocene stage. Just because a layer of strata is labeled “Pleistocene” does not mean it is automatically post-Flood (Holt, 1996; Froede and Reed, 1999). These stages are dated by fossils and radiometric methods, and sometimes have no relationship to surficial processes that are obviously post-Flood, such as the ice age. Creationists should be skeptical of these systems for building a chronology of earth history.

In contrast to using the geological column as a guide to Flood chronology, Tasman Walker (1994) and Carl Froede (1995) advocate that we should examine the rocks and fossils and classify them according to the *mechanism of deposition*. This mechanism is the Flood as described in Scripture and not the uniformitarian system of slow processes over millions of years. The pre-Flood, Flood, and

post-Flood stages are divided into a number of phases that we should see in the rock record. Classification criteria for determining this sequence have been developed but need further application.

The Principle of Multiple Working Hypotheses

It disturbs many creationists and Christians that there are so many models and ideas on the Flood. Many Christians have believed or leaned towards a certain creationist model only to discover later that the model has problems. I once leaned 80% in favor of the vapor canopy model for the pre-Flood environment, until the experiments of atmospheric scientist, Dr. Larry Vardiman of ICR. (I use probabilities, i.e. weather jargon, to describe my current leaning towards a particular model or idea that is equivocal. The percents change with time as more data are revealed.) Now I lean in favor of the vapor canopy hypothesis only 30% and 70% against it, because of the technical problems with the model. The model still has merit and investigation should continue. Further research may solve some or all of these problems, in which case my percentage confidence in the model would increase.

Creationists should not become disturbed about the “chaotic” state of Flood geology. They should continue reading and investigating, as this state is really a *healthy trend* under the circumstances. The reason this is a healthy trend is because there are really few technical data provided by the Bible by which to construct a model of the Flood. Furthermore, we do not understand the dynamics of such a global inundation very well. There is a tremendous scale problem in extrapolating from modern flash floods to the global Flood. Another problem is accurately interpreting the rocks and fossils. There are too many unknowns in geology and paleontology, especially about the mantle of the earth and the three-dimensional fossil distribution. These are crucial for developing a geological and geophysical model of the Flood. A third major problem is that many of the geological data creationists employ in their models come from uniformitarian sources, who have vastly different assumptions and philosophies from creationists. These “data” may be tainted by assumptions and theory (LeGrand, 1988). So, we need to first perform a data check, i.e. “separate the wheat from the chaff,” which is difficult in geology because it means doing field work and skeptically reading the existing literature on a subject. Given these circumstances, it is reasonable and healthy to have a number of models and ideas in trying to reconstruct real Earth history. I believe it is an exciting time for Christians with an interest in science, because the Creation/Flood model has made great progress and promises to continue that trend in the future.

The idea of using competing hypotheses simultaneously to advance science was recommended by T.C. Chamberlin just before the turn of the century. He wrote a paper advocating the principle of multiple working hypotheses (Chamberlin, 1995—reprinted as an historical essay with an introduction by David Raup in the *Journal of Geology*). He claimed that it is good to consider several working hypotheses instead of just one. It is too much of a human tendency to fall in love with one hypothesis, which blinds us to either its weaknesses or defects and makes us unwilling to investigate the merits of other hypotheses. A ruling hypothesis usually allows no competitors and stifles scientific advance. Chamberlin (1995, p. 351) writes:

The theory then rapidly rises to a position of control in the processes of the mind and observation, induction and interpretation are guided by it. From an unduly favored child it readily grows to be a master and leads its author whithersoever it will.

Chamberlin's essay is still controversial. Johnson (1990) believes Chamberlin's method of multiple working hypotheses is a chimera. It is believed to be unrealistic and excessively time consuming to examine all hypotheses to explain a certain phenomenon. Besides, *few* scientists (if any) have actually used the method (Johnson, 1990; Locke, 1990). However Railsback (1990) counters that Chamberlin's method is even more valuable today than ever because of some of the central problems of current science and the dominance of certain favored hypotheses. Blewett (1993) claims the method, similar to Popper's falsification criterion, is difficult to apply:

On all these bases, Chamberlin's method of Multiple Working Hypotheses cannot be supported on purely logical grounds, but neither can any other "method" when viewed from the perspective of the logic of science. Most scientific investigations ignore such difficulties, and rarely, if ever, is a method of inquiry followed as spelled out in formal terms (Blewett, 1993, p. 257).

This controversy clearly signifies that methods of investigation in geology are rather ill defined.

Patrick Spencer (1997) emphasizes that the spirit of Chamberlin's method should be preserved where its application is of great value, especially in undergraduate education for emerging scientists. He provides examples from the past where personalities and ruling hypotheses perpetrated bad science, for instance in Marsh's evolutionary horse series and the Salmon Creek "coprolites." He also provides a modern example—the ruling hypothesis of plate tectonics:

Students come out of their first geology course spouting plate tectonics as if it is the gospel rather than the most current acceptable explanation of an observed phenomenon (Spencer, 1997, p. 128).

I believe that in Flood geology we need multiple working hypotheses. It is in this spirit that I present the following model as one among many to be tested with further data. It only applies to the Flood after Day 150. However, the model does have implications for a model of the Flood during the first 150 days, as well as the post-Flood period. These implications will be discussed at the end of Part II of this series. It seems to me that a large amount of puzzling (to the uniformitarian scientist) geomorphological data support the model. But again, maybe I am in love with the model and am overlooking weaknesses. I hope readers will call these to my attention.

Tasman Walker's Recessional Stage of the Flood

The model that I will be unfolding is really not a new model in the strict sense. It is a derivative of the Whitcomb-Morris model using Tasman Walker's terminology and defining criterion with a Flood/post-Flood boundary in the late Cenozoic (Oard, 1996). At one time I could have accepted another model, but I have come to my present views by examining field data, especially in the northwest states of the U.S.A. and adjacent Canada, and by reading much geologic literature related to the subject. What I especially like about Walker's model is that it basically mirrors the straightforward meaning of the Bible without regard to speculations of "historical science." The Bible says that there was a global Flood about 5000 years ago that lasted 370 or 371 days. It was not a local flood because there would have been no need for an ark. A 370-day Flood would not have been local. The ark settled in the mountains and was not floated to the ocean or a flood plain. The covenant of the rainbow would make no sense because there have been thousands of local floods since the Flood of Noah's day.

About the same time that Walker's model was published, several other creationists, including myself, felt that we needed a model that groups the rocks by the mechanism whereby the rocks were deposited and not the uniformitarian system. One such effort was published by Carl Froede in the 1995 *Creation Research Society Quarterly*. Of the various geochronologic schemes, Walker's model is the most developed, including defining criteria for classifying rocks, for instance footprints.

Footprints were left by a living animal at the time the print was made. So footprints from air-breathing terrestrial animals could only come from 1) uneroded pre-Flood sediments, 2) Flood sediments from the first 150 days, or 3) post-Flood sediments. It is unlikely that much, if any, pre-Flood sediment or sedimentary rock survived the tremendous earth upheavals during the Flood. This only leaves options 2 or 3. If the sediments are likely from the Flood,

the footprints mean that the animal was alive during the first 150 days of the Flood while the water was rising and/or prevailing (Oard, 1998, p. 70).

Figure 2 presents Walker's Biblical geological model (modified by Peter Klevberg). The time scale is shown on the left, and the rock scale on the right, divided into events and eras. I will focus only on the Deluge, which occupies only 370 days, but as far as the rock scale is concerned, is responsible for deposition or emplacement of the vast majority of the sedimentary rocks.

Peter Klevberg modified Walker's Flood timescale slightly to make the Inundatory Stage 150 days instead of Walker's 60 days (Genesis 7:24; Whitcomb and Morris, 1961, pp. 4–7). This made the Recessive Stage of the Flood 220 days, instead of about 310 days. The reason for this is that Klevberg and I lean towards the Flood reaching maximum depth at 150 days (based on Scripture). An alternative reading could have the Flood peaking at 40 days and then prevailing for 110 more days. Regardless, Scripture indicates all air-breathing animals died by Day 150 and the Ark grounded on the mountains of Ararat at the same time. Day 150 seems like the time of the maximum depth of the Flood water with regression thereafter. Our understanding is the same as the 21 weeks of "prevailing" and the 31 weeks of "assuaging" in the Whitcomb-Morris model. For my purposes, this is not a significant change, and even Walker (1994, p. 585) acknowledges that the Inundatory Stage could have lasted 150 days:

Figure 5 (and Figure 7) is drawn assuming an Inundatory Stage a little longer than 40 days—arbitrarily shown as 60 days to allow time for the Flood to peak. Although these figures would need to be modified if the Inundatory Stage were 150 days long, the validity of the model would not be affected.

Since I will only be providing more details for the Recessive Stage, the time difference is 220 days vs. 310 days, which is insignificant for model considerations.

The model I will be developing begins at Day 150 of the Flood, when the earth was totally covered by water, and goes to Day 370 as the waters drain from the surface of the

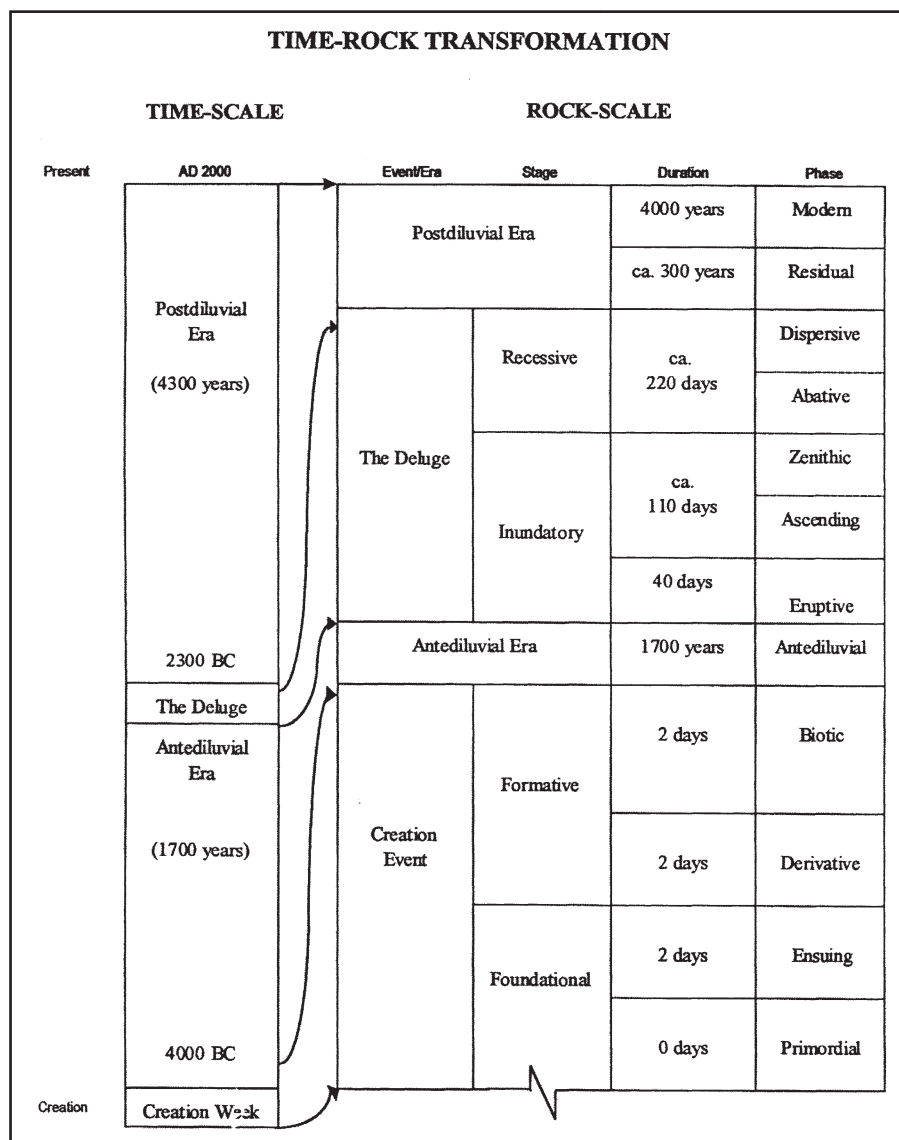


Figure 2. Tasman Walker's Biblical geological Flood model (permission from Tasman Walker with modifications by Peter Klevberg, especially in the durations of the Flood stages and phases).

earth forming the general topography of today. This is called the *Recessional Stage* of the Flood by Walker. There is a question of whether the Flood was raging at other locations far from the mountains of Ararat at the end of Day 370. In other words, does Noah's description of falling sea level represent what occurred for the whole earth? I have addressed this subject elsewhere (Oard, 1999b), and will have more to add on the topic in the section on continental margins in Part II. I lean towards the Flood being finished everywhere at Day 370 with sea level about 40 meters higher than today since the Greenland and Antarctic Ice Sheets had not yet developed, as well as several other smaller factors. Thus, the earth changed from being totally covered by water at Day 150 to the general geography we see today at Day 370.

Viewing Figure 2 in more detail, note that the Recessional Stage has two phases: 1) The Abative or Sheet Flow Phase, and 2) the Dispersive or Channelized Flow Phase. The Abative Phase applies to the Flood waters soon after 150 days when huge currents were flowing around the earth as wide sheets with few obstacles to disturb the flow. This situation would have been similar to the jet stream in the atmosphere today. During the middle and end of the Recessive Stage, mountains and plateaus would be protruding out of the Flood water, diverting the flow and forcing the water to become quite channelized. The Recessive Stage was very likely a gradual progression from the Sheet Flow Phase to the Channelized Flow Phase as the waters flowed over and drained from the continents.

The Recessional Stage and Vertical Tectonics

The Recessional Stage of the Flood requires huge vertical tectonics for the Flood waters to drain from a totally flooded Earth and end with essentially the geography we observe today. This implies vertical tectonics on a number of scales, from the small scale of individual mountain ranges and adjacent basins or valleys to the large scale of continents and the ocean basins. This *differential* vertical tectonics is likely what is meant by Psalm 104:8,9:

The mountains rose: the valleys sank down to the place which Thou didst establish for them. Thou didst set a boundary that they may not pass over; that they may not return to cover the earth (NASV).

Verse 9 indicates that verse 8, as well as verses 6 and 7, refer to the last time the earth was covered by water, i.e. Noah's Flood. Charles Taylor (1998, 1999) examined the meaning of Psalm 104:8 and concluded that the NASV as quoted above is the correct meaning. I believe that differential vertical tectonics is required to drain the Flood waters.

Is there geological evidence for such great vertical tectonics occurring recently? Yes, the evidence is ubiquitous. Most of the mountains of the Earth have a sharp, fresh appearance, whether glaciated or not in the post-Flood rapid ice age (Oard, 1990). Marine fossils are found in most of these mountains. For example marine crinoid fossils are found in limestone on the top of Mount Everest (Gansser, 1964, p. 164), indicating that Mount Everest has been vertically raised at least 9 km from below the sea to its present height. The fresh appearance of the Himalaya Mountains, Zagros Mountains, and many other mountains over the earth has caused uniformitarian geologists to postulate that these mountains are "youthful," mostly rising in the Miocene, Pliocene, or even the Pleistocene. This postulated time is the late Cenozoic in the uniformitarian time scale.

One evidence that the ocean basins have sunk is the widespread presence of guyots (Oard, 1999a). Guyots are flat-topped seamounts or possibly the remnants of broken-apart carbonate plateaus. It is likely that the flattened seamounts, most of which are capped by carbonate, were sheared off at sea level, possibly by rapid currents. (One of the evidences for sea level erosion of guyots is shallow water benthic organisms on them, but within a Flood model, their paleodepth significance is equivocal, since in a global Flood shallow water benthic organisms can be eroded and transported to deep water.) There are thousands of guyots on the ocean floor, especially in the western Pacific Ocean. The tops of the guyots are generally about 1,500 meters below sea level, although depths vary considerably. Distinguished geomorphologist, Lester King (1983, pp. 168,171), states:

Marine volcanic islands which have been truncated by the waves and since subsided below sea level are called guyots. Most of them seem to have sunk by 600 to 2000 m and it is evident that they afford a measure of the amount by which the ocean floor has sunk in later geologic time. The Pacific floor especially has subsided...All the ocean basins afford evidence of subsidence (amounting to hundreds and even thousands of meters) in areas far from land.

In fact, thick carbonates on Eniwetok and other islands—perceived as a persistent creationist problem—could simply be sea level remnants associated with drowned guyots or a fractured carbonate platform (Oard, 1999a). So, the evidence from the sea floor indicates that great areas of the floor have subsided around 1,500 meters.

The tremendous evidence from land and sea demonstrates that great vertical movements of the crust have occurred recently. Continents and mountains have risen out of the water, and the ocean basins have sunk. King (1983, pp. 16, 71) states that this large-scale crustal vertical motion is *fundamental and clearly seen*:

So the fundamental tectonic mechanisms of global geology are *vertical, up or down*: and the normal and most general tectonic structures in the crust are also vertically disposed...But one must bear in mind that every part of the globe—on the continents or in the ocean basins—provides direct geological evidence that formerly it stood at different levels, up or down, and that it is subject *in situ* to vertical displacements (*italics his*).

What is the powerful geophysical mechanism causing such stupendous vertical displacement occurring at the middle and end of the Flood? I really do not know, but I am pondering several hypotheses. I do not believe any creationist model has provided an adequate mechanism. However, our knowledge of geology, especially of the lower crust and mantle, is increasing, so possibly in the future new information will point to a likely mechanism.

It is interesting that many critics of the Flood, Christian and non-Christian, have presented the “problem” that Flood water supposedly had to cover the high mountains of today. Bernard Ramm (1954, p. 166), who wrote the very influential book, *The Christian View of Science and Scripture*, states the problem as follows:

If the earth were a perfect sphere so that all the waters of the ocean covered it, the depth of the ocean would be two and one-half to three miles. To cover the highest mountains would require eight times more water than we now have.

Besides his poor mathematics, the problem with this criticism is that the mountains *rose out of* the Flood waters—the ocean did not have to rise to cover Mount Everest. The Himalaya Mountains rose out of the Flood waters. Theologians and other critics of Genesis, like Ramm, have especially one problem: *They believe men’s speculations about the unobservable past ahead of God’s infallible word.* Ramm (1954, p. 8) even acknowledges his unrecognized problem right in his *preface*: “With reference to technical details of the sciences I must depend on what other men say, and I am thereby at their mercy.” Is it any wonder that the Christian church has so many confused theologians, scientists, and laymen, who seem to accept every speculative hypothesis about the unobservable past by scientists who did not observe the past and who do not regard the Bible as God’s holy word?

Large-Scale Evidence for the Abative or Sheet Flow Phase

During the great vertical change when the continents rose and the ocean basins sank, large-scale currents likely were sweeping over the Earth. The velocity of the currents would likely be swift, due to several mechanisms. One mechanism is water acceleration due to earthquakes. Large tsunamis would be likely (Whitcomb and Morris, 1961). Another mechanism would be tidal effects, especially in shallow water, and possibly amplified by resonance (Clark and Voss, 1990; 1994).

A third mechanism that would cause high velocity currents is the spin of the earth. Barnette and Baumgardner (1994) modeled a completely flooded earth using the shallow water equations on a rotating sphere. On shallow continents, the currents started from rest and quickly accelerated to 40–80 m/sec, depending upon the boundary conditions. The currents mimicked the jet stream in the atmosphere with large-scale waves on the shallow water continent. The currents generally flowed west to east in large curves. The continent had to be at least 2500 km long and the water depth shallower than 1000 m. The spin of the earth represents a powerful force to accelerate and

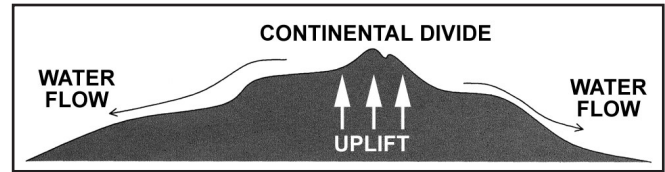


Figure 3. Currents induced by continental uplift during the Recessive Stage of the Flood (drawn by Peter Klevberg).

maintain high velocity currents over large, relatively shallow, areas during the Flood.

A fourth mechanism for water accelerations would be the large-scale uplift of the continents while the ocean basins were sinking. In addition to the other forces, this force would tend to cause the water to flow off the continents into the ocean basins (Figure 3). It would be slow in developing because the other forces discussed above likely would be overwhelming. Eventually, however, it would predominate. An analogy for this force would be raising a plate in dishwater. The water is forced to accelerate off the dish. The analogy is even more realistic if you stir the dishwater with a spoon to simulate the large currents before the Recessive Stage and then drain the dishwater to simulate the regressing Flood waters. During the Recessive Stage, the currents likely would gradually change from a rapid global flow, mainly on shallow continents, to more regionalized flow from high areas of continents towards the ocean basins. These regional currents likely would vary in velocity due to the momentary accelerations of crustal uplift. Various degrees of uplift would result in various current speeds rushing from the rising land. Considering all four mechanisms, powerful, vast currents would flow over and off the continents as the land rose out of the water during the 220 days of the Recessional Stage of the Flood.

The erosional potential of flowing water varies significantly, based on such factors as rock lithology, depth of flow, material being transported along the bottom, and current velocity. The size of the clast that can be transported is conservatively proportional to the square of the current velocity (Blatt, Middleton and Murray, 1972, p. 93). Doubling the velocity would increase the clast size that can be transported about four times. Increase the current velocity four times, the transported clast size would increase around sixteen fold. If the clast size (competence) can be linearly related to the capacity of the current, and the other variables are small compared to the velocity, then the erosion rate would generally be proportional to the square of the velocity. The clasts dragged along in the lower part of the flow would act as abrasive cutting tools. The faster the current, the larger the clasts and the more abrasive the transported debris likely becomes. Thus, such powerful currents during the Abative or Sheet Flow Phase of the Flood would cause massive sheet erosion of the con-

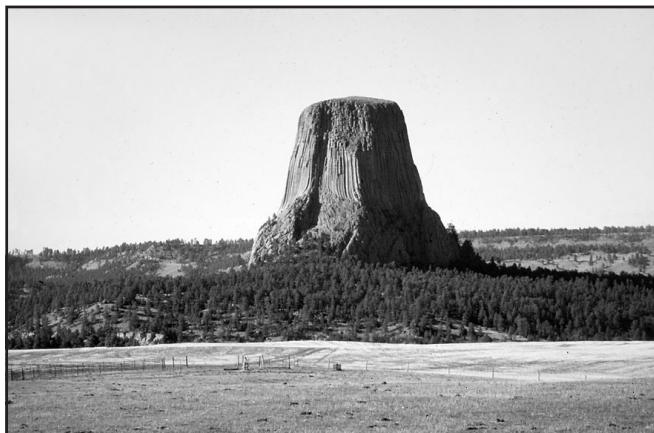


Figure 4. Devil's Tower in northeast Wyoming is evidence for sheet flow erosion.

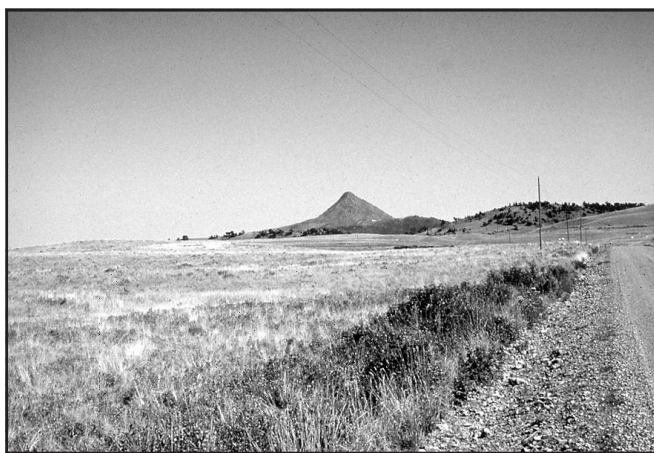


Figure 6. Haystack Butte just east of the Rocky Mountains in Montana is believed to be an intrusive igneous remnant of sheet flow erosion.

tinents. This erosion would be greatly aided if some of the sediments deposited during the Inundatory Stage were still unconsolidated or partly consolidated.

Since the Flood ended about 5000 years ago, erosion in the present climate would have been slight, except in highly erosive environments such as badlands, landslide areas, glaciated areas, etc. Summerfield (1991, p. 396) summarizes the present rate of erosion over many areas of the Earth based on climate, precipitation, and relief. Although the rates vary considerably, they generally range from about 40 cm/1000 years for mountainous areas to about 0.5 cm/1000 years for low relief, tropical areas. Undoubtedly, erosion would have been higher during the post-Flood ice age because of more precipitation (Oard, 1990; Holt, 1996). Therefore, erosion generally has been slight since the time of the Flood. What one observes on the surface of the Earth is predominantly what remains after the Recessional Stage of the Flood. Thus, one should observe copious evidence for the Sheet Flow Phase of the Flood on the surface of the Earth. (I will discuss possible post-Flood catastrophism in Part II of this series.)



Figure 5. Square Butte (right butte in background) in central Montana. Round butte is another erosional remnant to the left of Square Butte. In the foreground is a remnant of a flat-topped, gravel capped erosion surface.

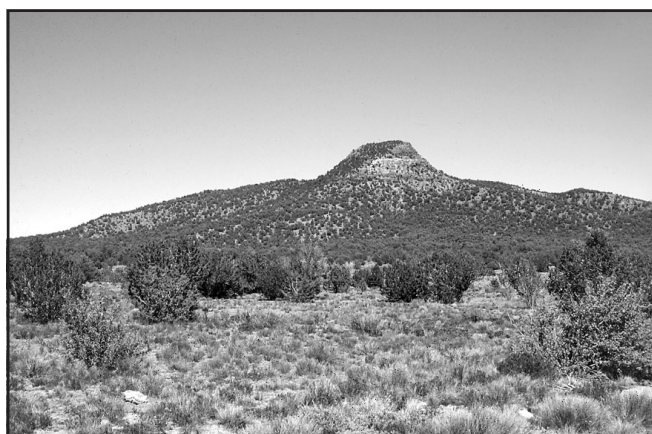


Figure 7. Red Mountain just southeast of Grand Canyon. The top is capped by basalt, which was obviously horizontally continuous before erosion.

There is evidence for the sheet flow erosion of the continents in the form of igneous and sedimentary erosional remnants. I previously presented a case that 500 to 1000 m of sediment and sedimentary rock likely has been eroded from the high plains of Montana, adjacent southern Canada, and northern Wyoming (Oard, 1996, pp. 261, 262). Igneous remnants include Devil's Tower of northeast Wyoming, 400 meters above the surrounding area (Figure 4); Round and Square Butte of central Montana, 600 meters above the plains (Figure 5); and Haystack Butte, just east of the Rocky Mountains and about 600 meters above the plains (Figure 6). Devil's Tower is very likely the throat of an eroded volcano or lava dike, while Square Butte, Round Butte, and Haystack Butte are believed to be intrusive igneous rocks. These igneous rocks had to *intrude* into other rock, which no longer exists. For some reason, these igneous and sedimentary remnants were more resistant while the surrounding sedimentary rocks were being rapidly eroded during the Recessive Stage of the Flood. These ero-



Figure 8. Remnants of rapid erosion can be seen in Monument valley on the border of Utah and Arizona.

sional remnants provide evidence for very rapid erosion of the surrounding sedimentary rock, because these remnants could not have been left standing today if the surrounding rocks were eroded slowly over millions of years, as believed by uniformitarian scientists. Erosion at the present rate would have destroyed all of them probably within a million years. This is because at the present rate of erosion, continents will be reduced to sea level in anywhere from 10 million to 33 million years (Roth, 1998, pp. 263–266; Schumm, 1963). Sedimentary erosional remnants include Pumpkin Buttes in the Powder River Basin of northeast Wyoming, Tatman Mountain in the Bighorn Basin of north central Wyoming, and the Cypress Hills of southeast Alberta and southwest Saskatchewan (discussed below) (Oard, 1996; Oard and Klevberg, 1998).

Igneous and sedimentary remnants exist at other locations of the intermountain west, such as Red Mountain, south of the Grand Canyon (Figure 7); Ship Rock in northwest New Mexico; and Monument Valley, along the Arizona-Utah border (Figure 8). Ship Rock is considered an eroded remnant of a former volcano, indicating a former land surface around 750 to 1000 m higher than the valley floor (Plummer and McGeary, 1996, pp. 77,78). All these remnants indicate that great erosion of the Rocky Mountains, Basin and Range, and the high plains has occurred recently, or else the remnants would not be present.

Further evidence of the great sheet scouring of the continents is provided by remnants of large erosion surfaces. An erosion surface is defined in the *Dictionary of Geological Terms* (Bates and Jackson, 1984, p. 170) as: “A land surface shaped and subdued by the action of erosion, especially by running water. The term is generally applied to a level or nearly level surface.” Erosion surfaces are not plains of deposition, such as a flood plain, alluvial fan, or river terrace. Erosion surfaces are *smoothly planed rock*. The rocks can be either hard, soft or a combination of both. It does not matter; hard and soft rocks commonly are

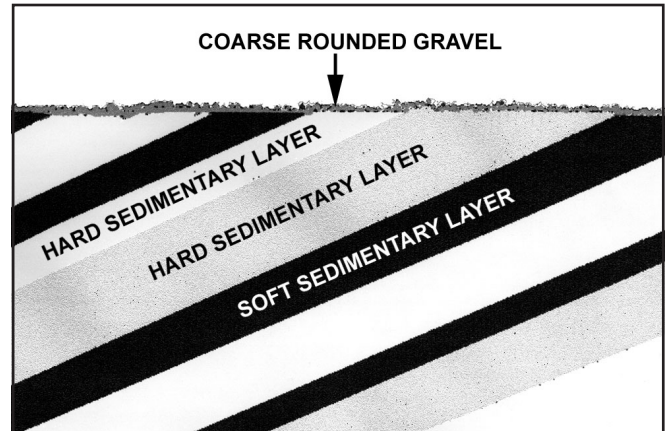


Figure 9. Schematic diagram of a gravel capped erosion surface on tilted sedimentary rocks that has truncated all lithologies the same amount whether hard or soft (Drawn by Peter Klevberg).

truncated the same by the eroding mechanism. An erosion surface can be eroded in horizontal sedimentary rocks, but the most significant and easily identified erosion surfaces are cut on tilted sediment rocks. Figure 9 illustrates an erosion surface cut across interbedded, tilted hard and soft sedimentary rocks and covered with a veneer of rounded, coarse gravel, as commonly seen in the field.

While erosion surfaces were being formed, other Flood processes continued, modifying these surfaces. For instance, continued Flood erosion would carve the edge or dissect a newly formed erosion surface, leaving behind only remnants of the original surface. The erosion surface could have been completely obliterated. Continued vertical tectonics could cause an erosion surface to fault with parts eventually being at different elevations. In other situations, volcanic products sometimes would cover an erosion surface.

Assuming the uniformitarian paradigm, normal erosion over long periods of time tends to carve softer rocks faster than harder rocks. Thus, if a generally flat surface could form, somehow, it would soon be roughed with increasing relief with time. Thus, the flat surface would form a configuration as depicted in Figure 10. Erosion surfaces are not being formed today, except possibly on a very small scale. Natural processes do not favor their formation or preservation. Erosion surfaces, hence, are relics of a past process. In the present world, we observe them being eroded and dissected (Figure 11).

During the erosional process by Flood waters, soft lithologies are expected to be pulverized quickly. More resistant lithologies, such as quartzite and chert, are expected to break apart as blocks and become smaller and rounded while being transported large distances by the Flood water. These clasts eventually would disintegrate also. Therefore, during this rapid sheet erosion event, resistant rocks would

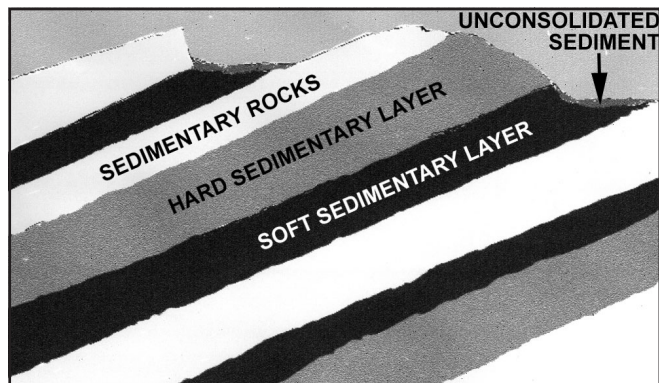


Figure 10. Schematic diagram of normal erosional processes forming ridges and valleys. (Drawn by Peter Klevberg).

be transported far from their sources. These rounded, resistant clasts should sometimes be found on top of the erosion surfaces.

Peter Klevberg and I are studying the Cypress Hills of southeastern Alberta and southwest Saskatchewan, and the Flaxville plateaus of northeast Montana (Klevberg and Oard, 1998; Oard and Klevberg, 1998). The Cypress Hills form a high, flat plateau about 300 meters above the next highest erosion surface and about 600 meters above the rivers to the north and south. Therefore, at least 600 meters of sedimentary rock has been eroded from the region around the Cypress Hills, since the substrate is generally horizontal. Over eastern Montana and adjacent Canada, the erosion has left behind generally four erosion surfaces at different altitudes. The Cypress Hills erosion surface had an area of about 2000 km², before being dissected into channels, probably by glaciofluvial activity. The gravel on both the Cypress Hills and Flaxville plateaus is mostly well-rounded, iron-stained quartzite pebbles, cobbles and boulders with abundant percussion marks. The gravel cap is approximately 25 m thick and is massive with few sand interbeds in the western and central blocks of the Cypress Hills (Vonhof, 1965). The largest clast we observed was in the western Cypress Hills and has a length of 39 cm and a width of 24 cm with a mass of 26 kg. Based on inferred paleocurrent directions from imbricate clasts and interbedded sand, the nearest source for the clasts is the Rocky Mountains of northwest Montana (Vonhof, 1965). Thus, the quartzite clasts have been transported over a slope ranging from less than 0.1 degree to a maximum of 0.4 degree (Klevberg and Oard, 1998, p. 372) for a distance of 300 km to the western Cypress Hills and 700 km to the eastern Flaxville plain. Some researchers suggest that the coarse gravel may have originated from central Idaho (Leckie and Cheel, 1989). If this is the case, one has to add another 200 km to the above distances, making a total transport of up to 900 km.



Figure 11. Gravel-capped pediment east of the Little Rocky Mountains of north central Montana which is currently being dissected.



Figure 12. A boulder with percussion marks 10 cm in diameter found in the western Cypress Hills, southeast Alberta (head of rock pick for scale).

Intuitively, modern rivers cannot transport abundant cobbles and boulders this long distance on such low slopes. To quantitatively estimate current velocities, current depths and other paleohydrological variables, Peter employed standard coarse-sediment hydrologic equations. He calculated that to transport the clasts as bedload, minimum current velocities of 4 to 6 m/sec with minimum water depths of 3 to 40 meters are required over a broad area. Unless very narrow channels are postulated, for which there is contrary evidence, resulting discharges would have been orders of magnitude greater than historic regional floods. Furthermore, the abundant percussion marks, a few 10 cm in diameter (Figure 12), imply that much of the pebble- and cobble-size fractions were transported as intermittent suspension. Based on the size and shape of these clasts, and the relationship between the horizontal velocity and the fall velocity (Blatt, Middleton, and Murray, 1972), Peter calculated a *minimum current velocity of 30 m/sec* with a flow depth of at least 55 m (Klevberg and Oard,



Figure 13. Gypsum Mountain, northwest Wind River Mountains of central Wyoming. The mountain is composed of limestone with beds dipping about 30° to the right. The flat top is a remnant of an erosion surface.

1998). The geomorphology of the flat-topped Cypress Hills alone indicates a sheet flow at least 20 km in width. The current necessary to produce a sheet of gravel such as that observed capping the Cypress Hills and Flaxville Plateaus in both lateral and run-out distance exceeds any conceivable flash flood or jökulhlaup (burst glacial lake) by many orders of magnitude. We believe the Cypress Hills and Flaxville Plateaus erosion surface and coarse-gravel cap defy uniformitarian processes and are more consistent with a diluvial mechanism (Oard and Klevberg, 1998; Oard, 2000).

The Cypress Hills Formation, based on paleontology, is now dated as 45 to 15 millions years old. The Flaxville Formation is dated possibly as young as 1 million years old, depending upon whether an “early Pleistocene” camel tooth is accepted or not. An important characteristic we discovered is that no matter what the putative age of these gravels, the clasts are little weathered and identical—no matter where they are found (within the Cypress Hills, on the Flaxville Plateaus, or between on other gravel-capped plateaus or reworked by glaciation). This data suggest to us: 1) that the gravel is not very old, and 2) the Tertiary fossil dating scheme is subjective. The edge of the Cypress Hills is actively eroding (Crickmay, 1974; Sauchyn, 1990), so it could not have lasted 45 million years.

Erosion surfaces, occasionally with a capping of well-rounded cobbles and boulders, are observed regionally in the northwest states. Erosion surfaces are most impressive when they are at the tops of mountains, for instance at about 3,500 meters ASL in the northwest Wind River Mountains, Wyoming (Figures 13 and 14), and 4000 meters ASL in the Beartooth Mountains of south central Montana (Figures 15 and 16). Quartzite gravel from the Rocky Mountains of western Montana and northern and central Idaho is found not only on the Cypress Hills and



Figure 14. Round Top Mountain (center), northwest Wind River Mountains of central Wyoming. The mountain is composed of granite. Another flat-topped mountain on the right is tilted, probably caused by faulting. These erosion surface remnants and the one in Figure 13 are parts of a larger erosion surface beveled in granite and limestone in the area that are now seen only at the mountain tops.

Flaxville Plateaus, but also can be traced, sometimes as very thick deposits, in southwest Montana, southeast Idaho, western Wyoming, northern Oregon as far as Astoria, and southern Washington.

One of the most interesting locations for quartzite boulders is on the tops of ridges in the Wallowa Mountains of northeast Oregon. Figure 17 shows a 10 meter thick outcrop of well-rounded quartzite boulders up to 1 meter in diameter on a ridge just southeast of Lookout Mountain at 2,500 m ASL. The largest boulder we found was 0.7 m in diameter with an estimated weight of 200 kg (Figure 18). The nearest outcrop of quartzite is 100 km east in central Idaho. Especially interesting is that gold is mixed in with the gravel deposits and was even placer mined at one location. John Eliot Allen, late professor of geology at Portland State University, discovered these quartzite boulders on eight ridges in 1938, and related that the boulders have haunted him ever since (Allen, 1991, p. 104). He believed that the boulders had to be deposited by torrential paleocurrents.

All of these many outcrops of quartzite cobbles and boulders indicate large-scale erosion and long distance transport east and west of the Rocky Mountains during a period of massive regional erosion. Since the boulders are often found one to several mountain ranges away from their source, their transport implies that the uplift of the mountains had not yet occurred or was just beginning while the boulders were transported many hundreds of kilometers. The mountain top erosion surfaces, therefore, were formed while the northwest states were generally a flat, planed surface during the Flood. The rugged relief of



Figure 15. View of the flat-topped crest of the granitic Beartooth Mountains, south central Montana. These flat-topped peaks likely are remnants of an erosion surface that had been broken up and uplifted to the lofty elevation seen today.



Figure 17. Ten meter thick outcrop in foreground of well-rounded mostly quartzite boulders just southeast of Lookout Mountain, Wallowa Mountains of northeast Oregon.

the area, therefore, was produced during the Recessive Stage of the Flood due to vertical tectonics and the more channelized phase of the Flood, which will be discussed in Part II.

Especially interesting is that generally flat erosion surfaces are a worldwide observation. Lester King (1967) documented this in his book: *The Morphology of the Earth*. He reiterated this theme throughout his writings, and in his last book he wrote:

A planation of extraordinary smoothness developed over enormous areas in *all* the continents... Outside the rare areas in which the older Gondwana and Kretacic planations (I and II) can be identified, this 'Moorland' planation is sought upon the highest, and often bleak, plateaux. It has been given many lo-



Figure 16. Another view of the flat-topped mountains of Figure 15 (right of center). The lower altitude of some of the peaks is probably due to faulting.

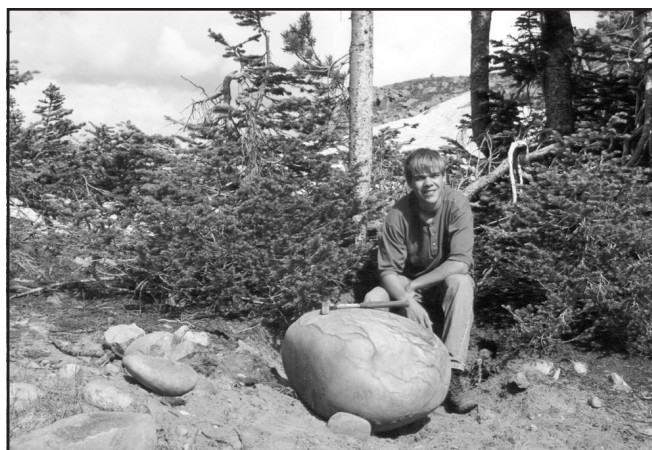


Figure 18. Two hundred kilogram quartzite boulder from outcrop shown in Figure 17. Sharp angled rocks in foreground likely due to frost cracking (photograph by Paul Kollas).

cal names...With emphasis upon its extreme planation, it appears particularly flat when viewed in cross-section as across the intervening valleys of succeeding cycles which commonly intersect it. From it, most of the world's present scenery has subsequently been carved by renewed erosions (King, 1983, pp. 188, 189).

Sixty percent of Africa is a planed erosion surface at one or more levels (King, 1967, pp. 241–309). Well-known Australian geomorphologist, C.R. Twidale (1998, p. 660) in a provocative article on supposed *very old* erosion surfaces that have been only slightly eroded over many tens of millions of years, admits that King's grand scheme of multiple worldwide erosion surfaces is generally correct.

There are many hypotheses to account for these large-scale erosion surfaces, but all have problems. Crickmay (1974, pp. 192, 201) summarized the deplorable state of

geomorphic research in 1974, including hypotheses for the formation of erosion surfaces:

The difficulty that now confronts the student is that, though there are plenty of hypotheses of geomorphic evolution, there is not one that would not be rejected by any majority vote for all competent minds. This situation is in itself remarkable in a respectable department of science in the latter half of the 20th Century...A century and a half of literature bearing on scenery and its meaning shows primarily the inspired innovations that carried understanding forward; followed in every case by diversion from sound thinking into inaccuracy and error.

I suggest that the situation is little different today.

Therefore, erosion surfaces are a powerful witness to the reality of a global Flood and against slow processes over millions of years. Erosion surfaces are a testimony to the sheet erosion during the Abative Phase of the Recessional Stage of the global Flood that produced a scoured surface on *all the continents*.

Summary

Several Flood models were briefly reviewed without comment. All these models indicate a healthy state of Flood geology, according to the principle of multiple working hypotheses. Based on the model of Whitcomb and Morris (1961) with the terminology of Tas Walker (1994), a general sequence of events for the Flood between Day 150 to Day 370 was introduced. During this period, uplift of the continents and the sinking of the ocean basins (to drain the Flood waters) resulted in great vertical changes of the Earth's crust. There is copious evidence for this vertical tectonism during the Flood in the form of massive sheet erosion of the continents, the formation of erosion surfaces, and the long-distance transport of resistant rocks.

Acknowledgments

I am appreciative of all those model builders and other creationists who have contributed ideas for the above described model. Many of these ideas are not original to me. I thank Peter Klevberg for drawing most of the figures and for reviewing the manuscript and as usual offering valuable criticism. The manuscript was improved by the suggestions of anonymous reviewers. I thank the Design Science Association of Portland, Oregon, for the opportunity to first present this model in their June, 1999, meeting and for discussion on various aspects of the model. Tim Skertich of Allison Park, Pennsylvania, showed me the famous Susquehanna water gaps, for which I am appreciative. I thank my son, Nathan, and son-in-law, Mark Wolfe,

for scanning slides, improving them when necessary, and for redrawing several figures.

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Book Review

The Age of the Universe by Gorman Gray
Morning Star Publications, WA. 1999, 146 pages, \$10

The purpose of the book, according to the author is to eliminate the young universe dogma of the Creation movement. The author is concerned that "Multitudes of sincerely interested people have been deflected from creation science by baseless assertions about the speed of light and isotope dating. Dogmatic young-earth contentions lead detractors into skepticism" (p. 59). The author believes that "Because the age-of-the-universe issue is the primary force leading to rejection of biblical literalism, the correction of this error will neutralize that *destructive tool*

and may even encourage theistic evolutionists to reconsider their assumptions" (Emphasis mine, p. 11). He attempts to do this with "alternative translations" to Scripture.

Having used such highly charged words as "destructive tool" and "embarrassment," the tone of the book is very critical of young-earth creationists to the point of being hostile. The author makes one conciliatory statement that almost seems obligatory. "A more accurate interpretation of Genesis is claimed by this author, but no aspersions are

cast toward creationists of other persuasions. Friendly, brotherly dialogue can improve our understanding” (p. 23). “It will be shown in this book that the Scriptures leave the age of the stellar heavens and the planetary earth foundation undefined. However, the same Scriptures are clear that all *biological* life and the construction of the biosphere itself is confined to about 6,000 years” (Emphasis his, p. 10). The author proposes the following alternative translation to Genesis 1:16. “Suppose we would render Genesis 1:16 (day four) worded: ‘and God *brought forth* two great lights... the stars also... and gave them forth in the expanse of air...’ The reader must visualize the verb ‘bring forth’ as a single thought blended from English words commonly translated from the Hebrew ‘asah,’ namely do, work, prepare, bring forth, accomplish. Those words, blended into one idea, are actually closer to the Hebrew meaning than the English made; and do not specify assembly of the sun and stars on day four” (Emphasis his, p. 14). The emphasis on interpreting “made” as “brought forth” is made numerous times throughout the book and is the foundation of the author’s alternative translation. The author insists that “asah” must be interpreted as “brought forth” and must be thought of in terms of a revealing event. “The sun, moon, and stars of day four had been created already (if we accept the simplicity of verse 1), and on day four the great lights of the heaven were ‘made’ or ‘brought forth’” (p. 29).

I do not believe the author presents a convincing case for his alternative translation to Genesis 1:16. He asserts that “made” must be a revealing event and does not specify assembly. The words he uses for “asah” (accomplish, do, work, prepare) all commonly refer to assembly except “bring forth” which he latches onto. The most common translation of “asah” is “made” which inherently implies assembly. The author even gives an example that contradicts his point. He says, “Perhaps the meaning would be clearer if we thought of ‘made’ in the sense of making a bed” (p. 47). The sheets and covers are assembled in an orderly fashion to cover a bed. Based on this example, it could be interpreted to mean that God made the raw materials for the stellar bodies on day one and assembled them into the actual sun, moon, and stars on day four.

The author’s treatment of Exodus 20:11 is really a matter of circular reasoning. The author contends that “The context of Exodus 20:11 relates to the activity of the sixth day—not celestial creation. To apply celestial creation to Exodus 20:11 violates the ‘six day’ context of the fourth commandment” (p. 34). This statement is only true if God created the stellar bodies prior to day one. Hence, The author’s view is modified gap theory where the gap is between Genesis 1:2 and Genesis 1:3 instead of between Genesis 1:1 and Genesis 1:2. More specifically the author asserts, “Most of the references to ‘heaven’ in the Bible simply refer to atmosphere, and most references to ‘earth’ refer to lands. Where used to-

gether, ‘heavens and earth,’ stellar heavens and the planets are usually indicated, but not always (as in Psalm 135:6-7). The language of Exodus 20:11 specifically prohibits that use [of the stellar heavens] with the self-imposed limiter of the six-day context, for which earth and heaven are defined as land and air (pp. 33-34). In other words, Exodus 20:11 can only be interpreted in the context of land and air if the author’s interpretation of the six days of Genesis is the only acceptable interpretation. The circular reasoning is that the author’s interpretation of the six days of Genesis drives his translation of Exodus 20:11 which is used to support his translation of Genesis 1:16.

Gray notes that “A large segment of creationists interpret Genesis as limiting the age of the universe to a maximum of 10,000 years. And yet galaxies exist whose light requires millions even billions of years to travel to earth. How can this be?” (p. 12). The author recognizes that young universe creationists are working on the problem but seems to think that because we do not yet have a clear, commonly accepted alternative explanation that one does not exist. The most comprehensive explanation to date is the work that Russ Humphreys has been doing. Of this work, the author says, “Dr. Humphreys tackles the problem head-on, but may be leading us down a dangerous, snowbound trail. Although the physics of his system may be worthy of consideration, the biblical basis for his cosmology is flawed, as we will see” (p. 12).

In short, I reject the author’s assertion that “Creationists are trying to make the Bible say what it does not say. We are critically vulnerable on one point. We are asking our listeners to believe something for which there is neither biblical nor scientific proof” (p. 12). I view this work as just another attempt to re-interpret scripture to make it fit “science”. The author identifies his target audience this way, “Our targets are non-creationists and anti-creationists who may be motivated to examine the case for a young geology and biology, literally derived from the Bible, once the stellar age obstacle is resolved” (p. 13). I have serious doubts that this target audience will be moved by this book.

The bottom line can be demonstrated with an evaluation of the following quote: “If the alternative translations of Genesis 1:16 and Exodus 20:11 suggested above prevailed over the past 400 years, the present embarrassment regarding starlight might have been avoided” (Emphasis mine, pp. 15–16). I find it incredible that God would allow His Word to be misinterpreted for 400 years only to correct this mistake with a new “alternative translation” because science demands it.

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New *Zuiyo Maru* Cryptid Observations: Strong Indications It Was a Marine Tetrapod

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Abstract

Inspection of the *Zuiyo Maru* pictures reveals that the aquatic cryptid had a *symmetrical pair* of small upper fins on each side above the anterior flippers. If this observation is correct, then the identification of this animal as a basking shark is false. Previously, the fin of just one side was observed and wrongly identified as a shark's dorsal fin that had slid sideways from the mid-dorsal ridge. Examination of the original scientific report reveals that Yano, along with all the fishermen, observed a *pair* of upper fins. They specifically stated there was not a shark's dorsal fin. That statement caused considerable discussion among the scientists who questioned them.

Besides that, some archaeological representations of marine tetrapods display the small symmetrical upper fin(s). Their appearance is like Yano's pictures, tending to provide confirmation for this feature. Another confirmation for the marine reptile understanding, and falsification of the shark idea, is a picture revealing the nare at the lower front of the skull. It is right where Yano sketched it, though that is not where it should be for sharks. Although this cryptid may not currently be identified with either living creatures or specific known fossils, it possessed characteristics like those of marine reptiles, perhaps similar to the *Sauropterygia*.

Introduction

On the morning of April 25, 1977, about 50 km. east of Christchurch, New Zealand, the Japanese fishing boat *Zuiyo Maru* brought up a large animal from a depth of about 300 meters. Mr. Michihiko Yano, a section chief for the Taiyo Fishery Company, was present. He took pictures, got measurements, and also sketched the cryptid. A team of scientists met later, and their findings were published in July, 1978, by La Societe Franco-Japonaise D'oceanographie, (Tokyo) as *Collected Papers on the Carcass (CPC)*. The committee did *not* reach an unanimous verdict about the identity of the creature, though a significant amount of data was considered (see *CPC*, 1978, Foreword).

Since then some have claimed the cryptid was *Cetorhinus maximus*—a basking shark. The strongest shark proponent has probably been Kuban (1997–98) who said, "Several lines of evidence strongly indicate that the *Zuiyo Maru* carcass was a large shark, and most likely a basking shark." Kuban also suggested that scientists should "refrain from any further suggestions that the carcass was a likely plesiosaur." Kuban likewise (1997-8) criticized the 15 or so scientists who have presented the *Zuiyo Maru* cryptid as a

"living fossil" because Kuban believes with certainty it was a shark. Since then, certain creation scientists have retreated from the marine reptile idea (Jerlstrom, 1998; Jerlstrom and Elliot, 1999). Some prominent cryptozoologists had already decided that the cryptid was a basking shark (e.g., Ellis, 1994, pp. 68-69). That led to Todd Wood's *CRSQ* letter (1997) presenting some arguments for the shark identification. There is no reason for creation scientists to adopt the basking shark hypothesis because evidence is strong that this creature was a tetrapod. The question is directly relevant for creation science since it supports a recent inception for all living kinds, including marine tetrapods possibly still alive.

A Pair of Symmetrical Upper Fins

The primary morphological reasons justifying the basking shark identification for Omura et al., 1978, were 1) the myocommata in the dorsal muscles, and 2) what is thought to be a dorsal fin visible above the front right pectoral flipper. (Myocommata, Figure 3A, also Figure 2, are strong connective tissue embedded between muscle segments present in some sharks, though not in known reptiles.) Figure 2 is a figure looking at the animal from the backside of Figure 1. Figure 3 is an interpretive sketch of Figure 2,

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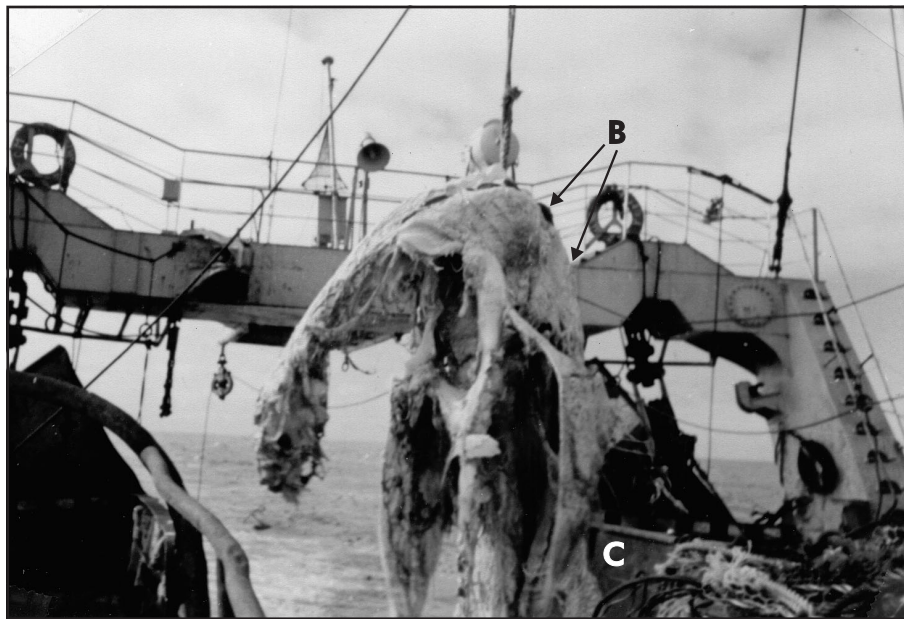


Figure 1. Photograph of the front of the carcass. Taken by Michihiko Yano, April 25, 1977. One of the paired upper fins is visible just above the front flipper (arrows are pointing at the upper fin's edges).

identifying the small upper fin B (or a dorsal fin that slid according to Wood, 1997). Hereafter this object will be referred to as the "upper fin," or simply as "B" (Figure 2B or 3B) however it is to be explained. For Hasegawa and Uyeno (1978, p. 65), this upper fin is to be interpreted as a shark's dorsal fin that slid sideways. This was "the decisive factor" for their conclusion that the cryptid was a shark.

The idea that a dorsal fin existed, however, is disputed by eyewitness testimony as well as the pictorial evidence. M. Yano, who conducted the primary examination of the carcass, insisted that there was no (shark's) dorsal fin (Omura et al., 1978). No one else present on the ship's crew thought there was a (shark's) dorsal fin either (Obata and Tomoda, 1978; Omura et al., 1978). Evidently Yano's testimony (along with that of the other fishermen) was rejected in favor of the dorsal fin theory for item B.

Yano was questioned by Obata and Tomoda (1978, p. 45) regarding the upper fin(s) (B). Obata and Tomoda observed that the fin was considerably smaller than the anterior ventral propulsion flippers, and suggested that it was somehow the broken *posterior ventral flipper* (a hypothetical break accounting for its smaller size; B of

Figures 2 and 3) overlaying an almost complete right anterior ventral flipper (C) of Figures 2 and 3). That judgment was denied by Yano, who stated that the supposed broken posterior ventral flipper of Obata and Tomoda was actually one of the *paired upper fins* which had an unusual array of exposed rays near its base as well as on its edge. This fin (B) is the same fin that other scientists thought was the dorsal fin of a shark that had slid sideways from the center. Those scientists correctly stated that it was located too far forward on the body to be the *posterior ventral flipper*.

As stated earlier, eyewitnesses specified that there was a *pair* of anterior fins on the creature (B of Figures 2 and 3 is the one on the cryptid's right side). Obata and Tomoda (p. 49), referring to the testimony of Yano and the other crew members say, "it is also strange that the carcass had paired fins [B] but

no dorsal fin." Since they had already mentioned the flippers (C), it appears they were speaking of the small symmetrical fins on the anterior dorsal area (B). Yasuda and Taki (1978, p. 62) saw the incompatibility of these observations with the shark identification saying that among other assumptions for the shark idea to be true it had to be as



Figure 2. Photograph of the back of the carcass. Taken by M. Yano, April 25, 1977. One of the paired upper fins is visible along with prominent myocommata.

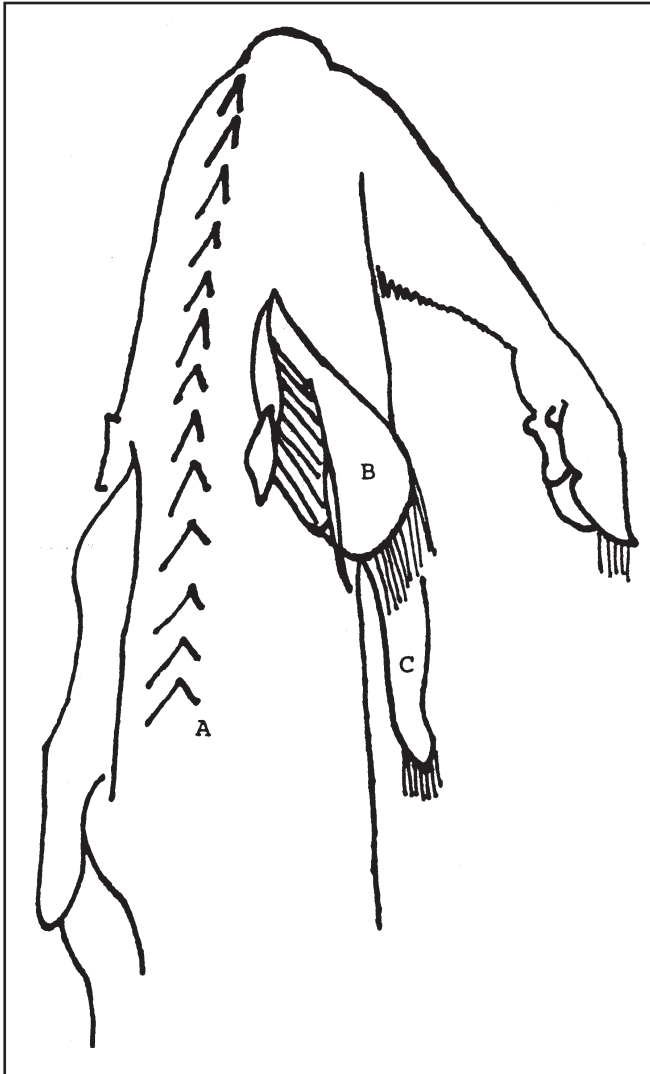


Figure 3. Interpretive sketch of the photograph in Figure 2 (from Wood, 1997). A. Myocommata. B. One of the paired upper fins. C. Front right flipper.

sumed “M. Yano counted by mistake a single lobe of a fin [B] as two.” Therefore the unanimous eyewitness testimony was that there was a pair of upper fins and no dorsal fin. These claims were maintained during the skeptical cross examination by certain scientists. Three ideas were advanced to explain B: a broken posterior flipper, a shark’s dorsal fin that slid, or one of a pair of upper fins.

The pictorial evidence now reveals that M. Yano’s testimony—as well as that of the other fishermen—was correct. A pair of upper fins may be observed in the pictures. A careful look at Figure 1 (a picture taken from the front of the creature) reveals a small triangular fin (B) on the creature’s body above the left anterior flipper (C). (It is easier to observe it on a clear print enlargement, see Taylor, 1987, p. 47. I have prepared Figure 4 as an interpretive sketch of Figure 1 to help the reader.) There is a thicker vertical line at the front edge of the upper fin (see

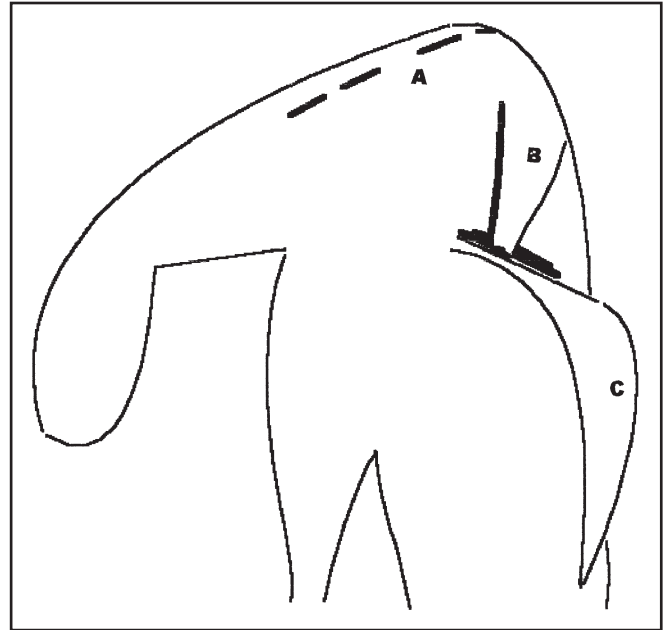


Figure 4. Interpretive sketch of the photograph for Figure 1. A. Myocommata. B. One of the paired upper fins. C. Front left flipper.

B of Figures 1 and 4). A thin line, pointing at 1 o’clock, denotes the trailing edge of the same fin. The fin’s (B’s) front border is thicker since the camera angle is toward its oblique front edge while that angle just passes over the fin’s trailing edge. There is an arrow on Figure 1 pointing in line with each edge of the fin (B) to help the reader see them. This fin, on the creature’s left side, would correspond in size and location to the other fin on its right side, indicating that the tetrapod had a matching symmetrical pair of small fins (B) located above its anterior ventral flippers (C)—see Figures 1, 2, 3, and 4.

Indeed, the symmetrical fin is visible on both pictures Yano took of the front of the creature (Figures 1 and 8) although not as clear for Figure 8 because of the camera angle. While the presence of the extra fin seems fairly certain, it would be good if photography experts could examine the original photographs to verify it. Kuban wrongly said that Yano overlooked the upper fin. In fact, he mentioned both of them.

It appears that Yano outlined the symmetrical upper fin(s) [which is labeled B for Figures 1–4] for his sketch for the cryptid. It is just above the front flipper where it connects to the body (see Figures 5B and 5A). There are three dashed lines on each side of the first rib apparently representing the front and back edges of the fin. For Figure 5A, Yano’s sketch of the fin outline has been filled in. Figure 5B shows the enlargement where Yano’s dashes may be observed. Yano also sketched dashed lines for the cryptid’s lower mandible, that was missing, and the ventral abdominal cavity (between the flippers).

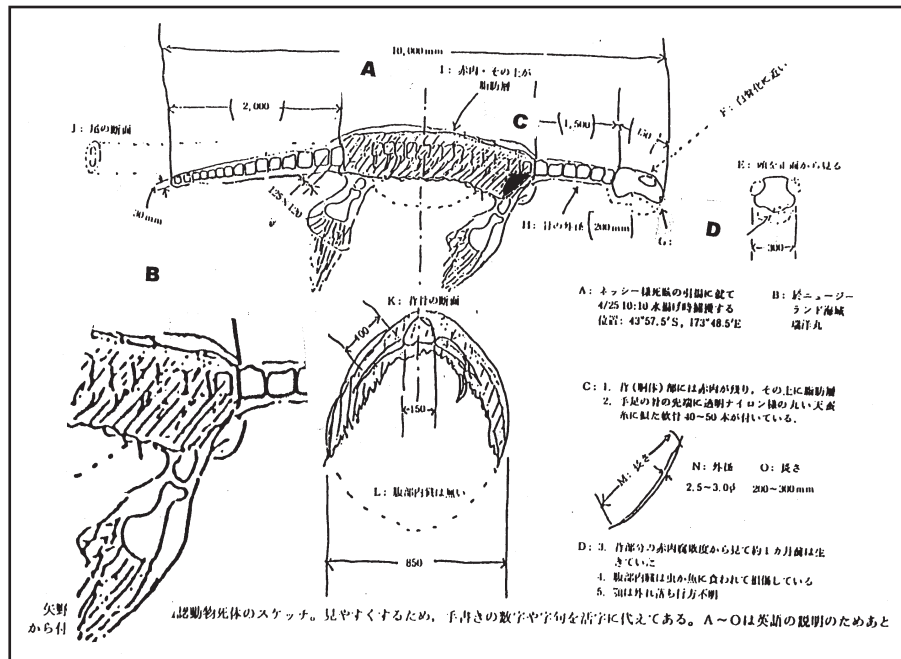


Figure 5. A. Sketch and measurements of the carcass made by M. Yano, April 25, 1977. Upper fin outline filled in. B. Detail for upper fin outline, above front flipper. C. Shoulder hump. D. Nare.

It is possible that some marine tetrapods could have had soft-tissue, cartilage fins, that were not preserved with the fossil record. If these were not preserved with the fossil record, then the original scientific researchers would not have expected Sauropterygia-like creatures to have “unexpected” fins. Also, the fossil record regarding these creatures may be incomplete.

Another problem for the shark hypothesis is that for sharks the dorsal fin is attached to the body by muscle tissue. But the myocommata are also embedded in the muscle (Obata and Tomoda). It is hard to believe that the myocommata remain perfectly in place on the creature when the dorsal fin has slid somewhat to the side. It appears more reasonable to accept the eyewitness testimony of M. Yano and his colleagues that there was no dorsal fin but instead an upper pair of fins. The pictorial evidence strongly suggests there was a symmetrical pair of fins above the anterior flippers.

Other Possible Evidence for the Paired Fins

Some interesting evidence supporting the upper symmetrical fin idea is found with the *Yarru* painting by the Kuku Yalanji tribes people of North Queensland, Australia (Figure 6 from Driver, 1999, p. 345). In this artwork, a number of hunters with spears flank a long-necked Sauropterygia-like animal. On the creature's lower side there are the anterior and posterior flippers (C) of a Sauropterygian. However, on the top of the creature there is a much narrower

fin (B) not bent in the middle like the flippers (C) on the ventral side. The fin's (B's) position would correspond to those of the symmetrical upper fins of the *Zuiyo Maru* creature, above the anterior flippers. There is no posterior fin illustrated for the right side of the *Yarru* sketch, though it should be there if the ventral flippers for its right side were being considered. Often classical animal depictions display just one feature for a symmetrical pair, like just one horn for an animal with a matching pair of horns. For the *Yarru* sketch it appears the artist's perspective observes the ventral flippers just for the creature's left side, then the upper fin for just the right side.

The *Yarru* painting was done c.1990 by an aboriginal artist who had no knowledge of plesiosaurs or dinosaurs. The picture is based on memories of a past event when a marine reptile swallowed a tribesperson. It was, in fact,

from the *Yarru* picture that I got the idea for where to look for the upper fin on the *Zuiyo Maru* creature. I was not able to determine if any eyewitnesses are still living who observed *Yarru* (Wieland, personal communication 06/20/00; Driver, 1999).

Jerlstrom and Elliot's recent arguments (1999) against *Yarru*'s symmetrical pair of upper fins are not persuasive. Jerlstrom (1998) suggested that the upper fin (B) is “just the matching right pectoral flipper.” He says, “It [B] is at the same angle,” as the left flipper (C) and smaller because it is on the far side of the body. However, both left-side flip-

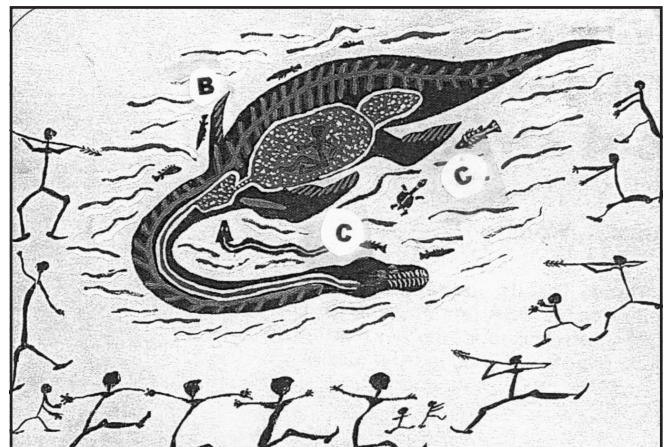


Figure 6. Painting of the plesiosaur-like creature, ‘Yarru,’ by the Kuku Yalanji tribespeople of North Queensland, Australia (from Driver, 1999, used with permission). B. One of the paired upper fins. C. One each of the paired posterior and anterior flippers.

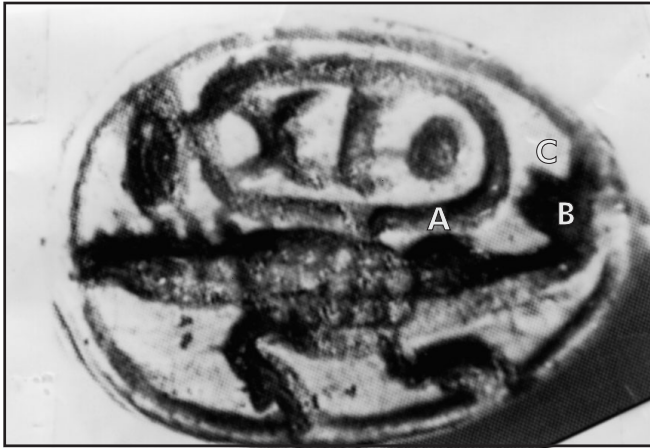


Figure 7. Egyptian seal depicting a plesiosaur-like creature with Tutmosis III's cartouche from the Mitry Collection. A. One of the paired upper fins, above front flipper. B. Creature's head, pointing up. C. Horns on top of creature's head.

pers (C) have a connecting stem, then the wider propulsion area at an angle to that connecting stem. The upper fin is considerably thinner, also shorter, than the flippers. The fin (B) is slightly bent near the distal tip, though it is not bent near the body (the flippers (C) are). Therefore it is not a flipper at a different locomotor angle as Jerlstrom (1998) suggested.

Jerlstrom and Elliot's suggestion (1999) that the body shields the posterior flipper gives no reason why the anterior flipper is not also shielded by the body (Figure 6). An Egyptian seal, for a longneck, Figure 7 mentioned later, also displays just one upper fin with front and back flippers for a long-neck. Since shielding just one flipper for the right side pair is not likely and the fin's (B) morphology is not like the left-side flippers (that are like each other), Jerlstrom's (1998) suggestions are not persuasive.

Jerlstrom and Elliot (1999) suggested that the gray strokes seen on the front and rear flippers (Figure 6C) are bones including phalanges at the extremities of the fins. This is not possible for four reasons. First, the 9–10 thin lines on the flippers do not at all look like a marine reptile's flipper phalanges that actually are parallel. Second, if they were phalanges, there should be only five not nine or ten. Third, the lines are perpendicular to the long edge of the flipper; if they were phalanges they should be parallel to that edge. And fourth, the "bone" for the upper fin (B) (that Jerlstrom (1998) suggests is a flipper) is attached to the center line



Figure 8. Photograph of the front of the carcass. Taken by M. Yano, April 25, 1977. Minimum length of creature's trunk before posterior fins (not pictured) is too great for known big fish species.

(which is the vertebrae if they are bones), unlike those below. Since plesiosaur flippers were not attached to the spine, this is further disproof of the flipper idea. If we are to consider this an upper fin, it is not clear if the line is a stem bone or just a longer transverse process of the vertebrae (if the lines are bones). Another problem for Jerlstrom's flipper idea is that for the left side flippers (C) there are no parallel gray strokes on the connecting stem to the body (see especially the posterior flipper). For the right side fin (B), though, the gray strokes reach right up to where it's attached to the body, unlike the flippers. The light lines are not necessarily bones, but if they are it does not help Jerlstrom's (1998) interpretation.

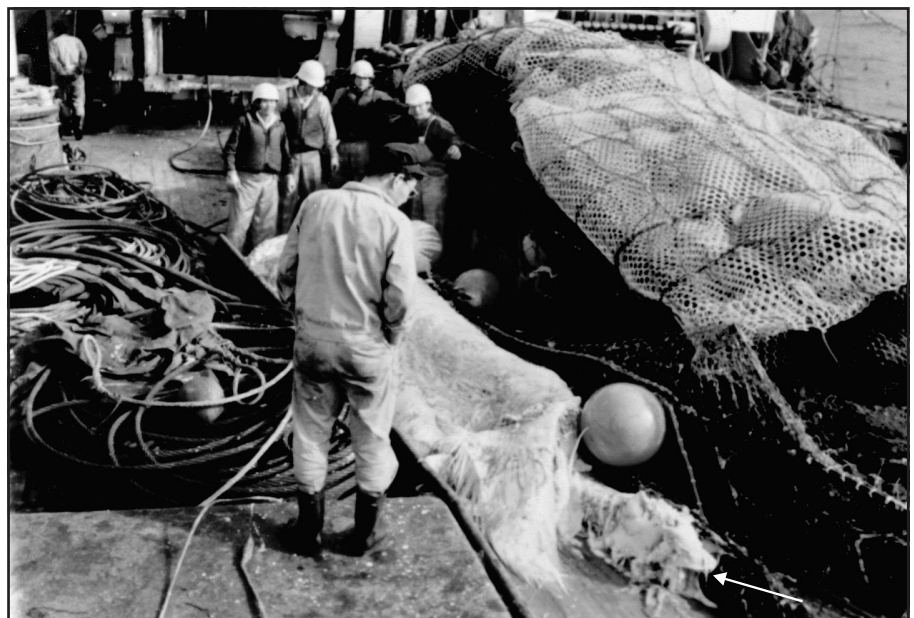


Figure 9. Photograph of the carcass on deck. Taken by M. Yano, April 25, 1977. Arrow points at the circular nare at the front of the head.

There is a good bit of corroborative evidence regarding the matching pair of upper fins which may be found from Loch Ness monster eyewitness observers Mr. & Mrs. George Spicer (Shuker, 1995, pp. 89–90). On July 22, 1933, between 3–4 PM, they observed Nessie on land. The interesting facet of their observation for our purposes is that “something protruded from the area of its shoulder.” That could have been a symmetrical upper fin like the Yano pictures and the *Yarru* sketch. Later the Spicers suggested that the shoulder feature could have been the tip of its tail, curling forwards along the side of its body that was facing away from them. I suspect that idea may have been influenced by the idea that Nessie did not have a shoulder fin so that another explanation for the shoulder feature was sought. The Spicers’ Nessie observation had some verification by William McCulloch, a cyclist whom they had spoken to just after seeing the reptile. He pedaled “back to the spot where the creature had emerged, and confirmed that bushes on both sides of the road and leading down to the Loch were extensively flattened, as if a steam roller had been driven over them” (Shuker, 1995, p. 90).

Bowden (2000) observed that for the full length of the spine, visible in Figure 2, the pattern of red flesh and fat is uniform. There are no tear marks, no remaining flesh around the assumed base of the fin at the mid-dorsal ridge from where it is thought to have slid.

The eyewitness testimony, pictorial evidence, and archaeological data all point to a pair of upper symmetrical fins. Since sharks do not have them, the interpretation of the *Zuiyo Maru* cryptid as a shark is false. It was the incorrect perception of a dorsal fin which led to the shark idea in the first place, therefore there is now no reason to continue with that idea for the cryptid’s identity.

Are Myocommata Inconsistent with a Plesiosaur?

Myocommata are strong connective tissue embedded between muscle segments present in some sharks, though not in known reptiles. The myocommata, appearing as ridges on the dorsal ridge, may be seen in Figures 2 and 3(A), and to some extent in Figure 1. The presence of myocommata suggests a basking shark for some workers. There may be good evidence, however, that Sauropterygians also had myocommata. An Egyptian seal with the cartouche of Tutmosis III (c. 1100–1400 B.C.), depicts a Sauropterygia-like creature with myocommata on the dorsal portion of its tail (Figure 7). A majority of Egyptologists would say c.1400, though I think David Rohl’s new chronology (Pharaohs and Kings), c.1100 is correct. The anterior and posterior flippers for the creature are distinctively represented with the narrow proximal stem connected to the body and the broader area positioned for forward

propulsion. That morphology could not represent a crocodile’s squat legs. The Egyptians knew about the appearance of the crocodile, ably representing it; this seal is not a crocodile. The appearance is somewhat similar to the flippers of Yano’s sketch (Figure 5), also the pictures for Nessie’s flippers taken underwater by the submersible at Loch Ness (Shuker, 1995, p. 89, and p. 96).

The Egyptians are known for their accurate zoological depictions. Although they were occasionally creative, combining human with zoomorphic features, much of their animal artwork may be recognized. Houlihan (1996, p. 129) claims that twenty-six species of Nile fish may be readily identified from Egyptian art/hieroglyphs, not including wonderful exotic species that may also be identified. Swords (1985, p. 18), in a study of the zoological idea for the Egyptian god ‘Set’ says, “All other theriomorphic deities of Set’s antiquity have been clearly associated with known animals. And all of these ‘contemporaries’ of Set display coherent behavioral characteristics of such animals in their myths, a display apparently also true of Set.” Set has probably not been identified because the creature it portrayed is now extinct. The Egyptians clearly had keen powers of observation and their representations were usually accurate.

There are some good parallels between the Egyptian seal and Yano’s sketch (Figure 5). At the distal ventral point of the flippers there are concave indentations, best seen on the posterior flipper on the seal (Figure 7). This is not like the Loch Ness flipper pictures; or similar to known fossils. However, the lower portion of the cryptid’s front right flipper that is seen in Figure 8, with the straight-line front edge, appears to be consistent with Yano’s sketch. There is a small convex bump on the cryptid’s front shoulder on both the seal (Figure 7A) and Yano’s sketch (Figure 5C); there is also on both, a longer convex hump behind it. The body types for the seal and sketch are similar, including the measurements of the neck and tail, as well as the rounded abdomen. The head of the tetrapod on the seal points straight up (see B, Figure 7). There appears to be a pair of ‘horns’ on the top and back of the head (see C, Figure 7).

The N. Queensland (*Yarru*) longneck (Figure 6) also has a sketch of what may be myocommata running down the dorsal line, matching the Egyptian seal and the *Zuiyo Maru* cryptid. Jerlstrom and Elliot (1999) suggested these lines may be the vertebrae. Since the lines on the flippers (and fin) are not bones, however, it is possible that the dorsal lines are soft tissue also. The Egyptian (Figure 7) seal has the upper anterior fin; it is not easy to see since it impinges on Tutmosis’s cartouche just above the creature. Inspection with a magnifying glass revealed that it is a deliberate design feature on the seal (directly above the point where the anterior flipper connects to the body; just behind A of Figure 7).

The seal is from the Mitry collection (1D, 96.351HD); it is unquestionably authentic. It was obtained by Mr. Philip Mitry when working at the Anglo-American bookstore at Cairo, Egypt during the 1920s–1950s. Mitry was licensed by the government to deal with antiquities and often conferred with archaeological experts including professionals at the Cairo Museum. He returned to the United States in the early 1960's, with his seals being sold in the last couple years. The seal could be from later than 1100/1400 B.C. since use of the cartouche may have been remembering a former ruler, not necessarily the current ruler.

Hebrew Mention of a Marine Reptile?

The Bible mentions a marine reptile in connection with Egypt—a *Tannin*. The Hebrew word "*Tannin*" is from a root that means "to extend," perhaps referring to a long neck or reptilian tail. The word could designate any one of a number of marine or terrestrial quadrupeds. Ezekiel 32: 2–8 may be referring to a Sauropterygian, "a monster in the seas" who "bursts forth in your [Egypt's] rivers." What is being mentioned seems to be a marine reptile swimming up the Nile delta from the Mediterranean, who "muddies the water with his feet (or flippers)." The muddying of the water could easily be caused by the powerful flippers of a big marine reptile trying to move in a limited amount of water. It is also reminiscent of the sightings of Champ (the Lake Champlain, NY/Vermont, cryptid) on land. Then "a company of many people catches it in a net," which is not the way a crocodile was/is hunted. Ezekiel was clearly presenting a big animal, perhaps like that pictured on the seal. A scenario like Ezekiel described may also shed light on the question of how the Egyptians knew the appearance of a marine reptile like the *Zuiyo Maru* animal.

In Ezekiel 29:3, there is another reptile allusion: "Behold, I am against you, Pharaoh, king of Egypt, The great *Tannin* that crouches in the midst of his rivers. ... And I shall put hooks in your jaws, and I shall make the fish of your rivers cling to your scales and I shall bring you up out of the midst of your rivers and all the fish of your rivers will cling to your scales." In this passage the creature could be a crocodile with a "crouching" stance on his squat legs that was caught with hooks in the jaws (according to Herodotus, II, 70) and has scales (no scales are mentioned for the Ezekiel 32 *Tannin*). Because the Hebrew word "*Tannin*" is not specific in its meaning, it may be everything from a crocodile to a marine reptile or terrestrial reptile like a *Baryonyx*. It should be understood that the great *Tannin* of Ezekiel 29 does not come from the sea, unlike the Ezekiel 32 marine reptile, permitting the crocodile suggestion.

Rarely, the Hebrew Bible uses the word sea, *Yam*, for a bigger river: like the Nile or Euphrates. However, that could not be true of Ezekiel 32:2, since the creature is in the seas, then bursts into the rivers. (The use of the word for "rivers" stands in apposition to the word for "seas" in the same verse. Also, the *plural* for "seas" is used in Ezekiel 32: 2; that is not used for even the biggest river.) As mentioned, the Hebrews used *Tannin* for a variety of animals. Specifically, the Leviathan is also a *Tannin* (Isaiah 27:1). The Leviathan swam in the open sea, a salt water ecosystem (Psalm 104:26, Is. 27:1). I concur with Shuker (1995, p. 128) that the identity of Leviathan may be "more likely to be a living mosasaur." The mosasaur is an extinct marine tetrapod, within the Sauropterygia, with large jaws.

Reexamination of Evidence Against a Plesiosaur Identification

It is well known that the amino acids of the cryptid's horny fibers were somewhat similar to those of the basking shark (Kimura, et.al., 1978). Therefore, it was concluded that the *Zuiyo Maru* cryptid was a basking shark. However, it should be noted that no one knows for sure the amino acid profile of extinct animals. Another reason the cryptid was identified as a shark was because a special type of protein—elastodin—found only in sharks, was detected. But again, we have no idea whether or not 'extinct' marine reptiles had elastodin. There has been an assumption, perhaps unwarranted, that the marine reptiles did not possess the elastodin or the myocommata which we see in sharks today.

From the evolutionary perspective of descent from common ancestry this reasoning may be valid. An anonymous reviewer from the University of Florida, at Gainesville, wrote:

Marine tetrapods evolved from terrestrial tetrapods, and are therefore not closely related to sharks. Therefore, unless elastodin is so functionally relevant that it is the only protein of its kind that large marine critters are likely to use, then I would expect marine tetrapods to possess proteins derived from those present in their terrestrial ancestors (Anon., 2000).

Another perspective, from Tokio Shikama, a professor of paleontology is, "Even if the tissue contains the same protein as the shark's, it is rash to say that the monster is a shark. The finding is not enough to refute a speculation that the monster is a plesiosaur" (Koster, 1977). The creation perspective is that analogous features suggest a design for a similar purpose. There may be a reason why 'extinct' marine tetrapods were created with elastodin but since they are not known to science as yet, it is impossible to be certain.

The same University of Florida reviewer said, “the anterior fins [of the cryptid] attach to the middle of the elongate pectoral girdle exactly as in every shark I ever cut open. (The pectoral girdles on reptiles were usually large, plate-like structures on the underside of the animal.)” Disputing that, the original researchers Yasuda and Taki (p. 61) observe that “there is a large bone element [for the cryptid] which seems to be the pectoral girdle.” If the vertebrae did not have transverse processes (Yano did not sketch them), then the cryptid would not match any known fossil plesiosaur. However, that may represent a simplification, not an explicit denial for their presence.

Another problem with the plesiosaur-like identification is that the measurements of the cryptid did not match those of fossil plesiosaurs that have been found. The *Zuiyo Maru* cryptid could have been a species not yet found in the fossil record. That could explain the problem of the ‘wrong’ number of neck vertebrae; though Yano’s estimate for them may have been incorrect, especially since he did not directly observe them. Perhaps the distinct morphology pictured for the flippers (that Yano sketched too) could suggest a species unknown from the fossil record. The same phenomenon is found with the Egyptian seal, which also has somewhat equal neck/tail proportions with the Yano sketch (though his measurements are not in precise accordance with his sketch). Professor Ozaki, of Japan’s National Science Museum, said, “if this is a long-necked monster it may be a new kind,” (see Jang, 1998, p. 256). Dr. Douglas Dean, late professor of biology at Pepperdine, had the same idea, (Jang, 1998, p. 257).

There were other problems with the basking shark identification. One of them lay with trying to identify the cryptid’s horny fibers with those of the basking shark. An examination of the original report reveals that the cryptid’s horny fiber had only “1/7 of the specific radioactivity of the [shark’s] elastodin.” Kimura, et. al. (1978, pp. 72–73) explain that this suggests the cryptid had considerably less “reducible cross-links” compared to the shark’s elastodin. They speculate that the effect of “age related changes” or destruction by NaClO “conceivably” could have caused the exceptionally “low content” and particular composition of the cryptid’s horny fibers. However, Bowden (2000) observed that the radioactivity measurement for chemical “E” for the longneck’s horny fibers was higher than that of the shark’s elastodin. Therefore, the idea that sea water or Sodium Chloride caused the lower values for the other chemicals is unlikely. Kimura, et. al. admit their premise, “judging from the present knowledge of comparative biochemistry of collagenous protein,” when they suggest a shark identification for the cryptid because of the amino acids. However, if the cryptid was a creature unknown to science, then their premise—the *present* knowledge of comparative biochemistry—is not a sufficient basis for their conclusion.

Jang (1998, p. 257) had already recognized that problem and observed that “for reptiles, there was not relevant data, even abroad that could be used as a basis for [the CPC] comparison.”

Snelling, the previous editor of the *Creation Ex Nihilo Technical Journal*, had the same idea:

...even though the horny fiber was almost identical to that of a basking shark ... this in no way proves that the carcass was that of a shark, simply because no one has ever studied the horny fibre of a plesiosaur to know whether it too is almost identical to that of a basking shark, etc. In the absence of a proven living plesiosaur for comparison, this carcass found off New Zealand still cannot be discounted as possibly having been that of a recently alive plesiosaur. (1994, p. 103, fn. 71).

Longnecks with “Horns” on the Head

In 1975, an underwater submersible in Loch Ness took pictures of what appears to be an aquatic cryptid. On its head there appear to be something like ‘horns’ (Shuker, 1995, pp. 85, 96). There are also pictures of Nessie’s flippers (mentioned earlier). What look like ‘horns’ are also present on the longneck depictions of the Roman Nodens mosaic at Lydney Park constructed during the second century A.D. (see Costello, 1975, p. 75; Taylor, 1987, p. 38) The ‘horns’ are found at the top posterior portion of the marine reptile’s head on the Egyptian seal also (C of Figure 7).

Reports of big marine cryptids, at Tasek Bera, Malaysia, relate “another strange feature was that the monsters had two horns on the top of the head, very small and soft horns” (Costello, 1975, p. 219). Caddy, the marine cryptid of the Pacific Northwest is also reported to have horns, though some say ears (LeBlond and Bousfield, 1995, pp. 32–35). If the *Zuiyo Maru* cryptid had ‘soft horns,’ they may have been eaten by parasites, as the skin evidently was, or decayed away, as its lower jaw had been.

The use of ancient/tribal art for cryptozoological leads is somewhat new, and has not yet been used to its full potential. Shuker (1995), a well-regarded zoologist, has explored the idea. Classicist Mayor (1989) suggested an interdisciplinary collaboration of classicists (those studying ancient texts), cryptozoologists, and students of archaeological representations of animals. A look at cryptids of Anglo-Saxon records, examining two archaeological representations, may be found in Cooper (1995), chapters 10–11. I presented an enthusiastically received study at the International Conference on Creationism for the form of the cranial crest of the rhamphorhynchoid pterosaur, *Scaphognathus*, utilizing classical depictions of the creature (Goertzen, 1998). LeBlond and Bousfield (1995, pp. 4–7) explore American Indian representations of Caddy. There are undoubtedly additional studies of this type that may be examined.

Additional CPC Data Challenging a Shark Identification

Obata and Tomoda (1978, pp. 46–48) said that the picture of the animal taken on the *Zuiyo Maru* deck, “shows the slender neck part connected to the high, strong built trunk [see Figure 9] and the thin, long tail bending forward. This aspect of the body is somewhat suggestive of the body structure of a tetrapod. ... The actual state of the carcass when it was being laid down is not to be disregarded in studying the character of this animal.” [see Figure 9.] Another observation was that “the putrefactive smell was not like that of teleostean fishes or sharks, but resembled that of marine mammals” (p. 49). Again, “the surface of the body was whitish and covered by dermal fibers which were intersecting each other like whales and other mammals but were not weak like fish.”

Yasuda and Taki state “... the animal has an extraordinarily long trunk. In no fish species attaining a large size is the trunk so elongate.” They are assuming the posterior flippers were on the cryptid, according to testimony. Figure 8 reveals the *minimum* length for the trunk above where the posterior flippers would have been visible. Yasuda and Taki are saying if the cryptid was a known big fish species, the posterior fins should have been placed forward enough to be seen on Figure 8. Since they are not seen, on a trunk that long, the cryptid does not match any known large fish species. Yasuda and Taki also declared (p. 48), “Unlike sharks in which the nares are situated in the lower surface of the skull, the carcass had nares at the front end of what remained of the cranium” and the head was “not shark-like.” In fact, a nare may be seen in Figure 9 (see arrow) at the lower front edge of the skull right where Yano sketched it (D of Figure 5).

Yasuda and Taki (1978, p. 62) indicated that if the cryptid was a basking or whale shark, we must assume three things: (1) that the pectoral fins and the lower lobe of the caudal fin had remained attached to the body, while the two dorsal fins, pelvic fins, anal fin and the upper lobe of the caudal fin had all been lost or otherwise overlooked by the observers, (2) that anterior parts of the skull were lost, and (3) that M. Yano counted by mistake a single lobe of a fin as two [number (3) appears to have reference to the symmetrical pair of anterior upper fins]. They concluded, “We consider it difficult to arrive at a conclusion based on so many assumptions.” They further observe that the *C. maximus* (basking shark) “has a larger head than the [cryptid].” Finally Yasuda and Taki noted that if it is a species of shark, it may represent a species unknown to science.

Prof. Kasuya, Tokyo University, observed that if it were a shark the spine would be smaller. Furthermore the neck is too long, as shown in the picture (Koster, 1977). Koster (1977) said the small size of the examined head does not fit the morphological features of a shark. Obata and Tomoda

(1978) record that another biologist was initially inclined to accept the shark identification. However when he compared the *Zuiyo Maru* photographs with a large specimen of a basking shark he had recently seen, he stated the animal in question was not a basking shark. Thus a number of the experts conducting the initial investigation had doubts about the shark identification for specific reasons, even though some thought it was a shark.

The 300 m. depth the creature was found at may suggest a marine tetrapod, thought to be extinct. Heuvelmans (1968, pp. 213–214) said that “among fossil plesiosaur remains we often find large polished rounded stones. It was thought that, as they have no molars to chew their food, they swallowed these stones to act like those in a birds crop. Crocodiles share this habit with plesiosaurs, and Dr. Hugh Cott, who studied them in Uganda, has shown that crocodiles really swallow stones to ballast themselves and make it easier for them to dive, just as a frogman wears a lead belt. This incidentally proves that sauropterygians would sink as soon as they died.” These observations work well for the idea that the creature found at 300 m. was a sauropterygian. However, it may not be plausible that a dead basking shark sunk to 300 m. especially as they’re occasionally found on the beach. Bowden (2000) hypothesized that density may take such mammalian creatures quickly to the bottom.

Conclusion

The fin on the upper right anterior portion of the cryptid has always been recognized, although it is usually regarded as a displaced dorsal fin of a shark. Now it appears fairly certain that there was also a fin on the upper left anterior portion of the creature. Among two dozen scientists who examined the picture some were initially skeptical and others unbiased. *All of them have concurred that the upper left fin is there*, when looking at the Taylor (1987) enlargement (Figures 1 and 4). Another three dozen non-scientists have observed it too. No one, so far, looking at the Taylor enlargement, has denied the presence of the fin when it was pointed out to them. Therefore the idea that there was a shark’s displaced dorsal fin should be dismissed because known shark species do not have a matching pair of upper anterior fins.

The eyewitness testimony of Yano with all the other fishermen also verified the presence of a pair of upper fins. During their questioning, they explicitly stated there was no dorsal fin such as a shark would have. Archaeological evidence and photographic documentation both support the testimony for the *Zuiyo Maru* fishermen. Additional falsification of the shark identification is the nare at the front of the head (the picture matching Yano’s sketch). Close photographic examination might be able to confirm

or deny its presence. In light of all the evidence, the basking shark identification should be abandoned.

Summary of New Reasons Against a Basking Shark Identification

1. Unanimous eyewitness testimony for a pair of upper fins and against a dorsal fin.
2. Matching pictorial confirmation for the pair of upper fins.
3. Archaeological and cryptozoological support for these upper fins
4. Pictorial confirmation for nares at front of skull, matching eyewitness testimony.
5. Only 1/7 the radiation in the horny fibers that sharks possess suggesting fewer crosslinks.
6. Cryptid's trunk is longer than any known large fish species.

A Sauropterygia identification thus remains viable. Finding this cryptid again, whether alive or as a fossil specimen, would confirm or deny that possibility. At present, it is possible that the cryptid may be unknown from the fossil record, in part because the measurements do not match any known fossil, and in part because of the variant shape of the flippers, corroborated by the matching appearance on the Egyptian seal. The Sauropterygia are usually believed by to have become extinct at the close of the supposed Cretaceous geological era, 63 million years ago. Kuban (1997–1998) criticized creation scientists for suggesting the cryptid may have been a marine reptile. It now appears he was wrong, and that the creation scientists are vindicated.

Perhaps a marine biologist and/or paleobiologist could investigate the function of the upper fins. Based on their placement, it is possible that the upper fins helped stabilize the creature during propulsion by its flippers. Indeed, the right side upper fin was still articulated at a right angle to the body when the creature was found, which would have been a proper position to accomplish such stabilization for the creature (Obata and Tomoda, 1978, p. 46) [see Figures 2 and 3].

Two decades after the discovery, the *Zuiyo Maru* creature still fascinates researchers. Perhaps continued study will reveal further information about this cryptid. If any of the horny fibers remain, a DNA profile would be of considerable value. Considering all the available evidence, it seems that pursuing identification of the creature as a marine tetrapod is the wisest course.

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Book Review

Icons of Evolution: Science or Myth by Jonathan Wells
Regnery Publishing Inc. Washington, DC. 2000, 338 pages, \$28

Reading this volume was an experience I never could forget. I do not recall ever pondering a Darwinism-challenging book that was so authoritative, clear, poignant, and thorough in hitting the center of its target. Even the conclusions of paragraphs whisked me right into their following paragraphs. The central theme was clear throughout—Darwinian evolution usually is supported by 10 pillars (icons) which are faulty.

In the Introduction Wells presents science as “the search for truth”, distinguishing it from myth (non-truth). He emphasizes here and through the book that we must examine Darwinism in the light of the *evidence*. Then Wells shows how the icons of Darwinism are supported by misrepresentation of the evidence. In his own summary he says:

One icon (the Miller-Urey experiment) gives the false impression that scientists have demonstrated an important first step in the origin of life. One (the four-winged fruit fly) is portrayed as though it were raw materials for evolution, but it is actually a hopeless cripple—an evolutionary dead end. Three icons (vertebrate limbs [homology], *Archaeopteryx*, and Darwin’s finches) show actual evidence but are typically used to conceal fundamental problems in its interpretation. Three (the tree of life, fossil horses, and human origins) are incarnations of concepts masquerading as neutral descriptions of nature. And two icons (Haeckel’s

embryos, and peppered moths on tree trunks) are fakes (pp. 229–230).

It is interesting to notice, as Wells reveals at different sections throughout the book, that specialists in various fields recognize the serious problems with supporting evolution in their own disciplines, but they continue to maintain belief in the general theory because they think the facts from other fields are impressive enough to confirm evolution.

Darwin himself though he was not an embryologist considered evidence from embryology second to none in favoring his theory. I, as one formally trained in embryology, judge Well’s chapter on this subject to be the best in the whole book; for he showed in no uncertain ways that developmental pathways do not support an evolutionary interpretation. His point could have been made slightly stronger by emphasizing that human pharyngeal pouches do not normally open and become slits. Regrettably, many recent biology texts continue to uphold evolution using embryological information which specialists have known to be false for more than 100 years. Interestingly, creationists have helped significantly in alerting scientists to correct these misrepresentations.

Wells primarily is writing as a scientist but in a non-technical way so that academicians and non-professionals alike can appreciate the force of his arguments. Step by

step, Wells removes the pillars (icons) upholding evolution, and readers are led to realize why some evolutionists are fighting so hard to retain their icons. Since most fields of biology (including for example medicine, agriculture, embryology, anatomy, physiology, and genetics (p. 246) can do very well without Darwinism, we might expect scientists to be objective in considering evidence for and against evolution. But this usually is not true because for many scientific leaders evolution with its icons fits quite conveniently with their materialistic philosophy of life.

Clearly, biology students are being taught materialistic philosophy in the guise of empirical science. Whatever one may think of materialistic philosophy, there is no doubt that it is being imposed on the evidence rather than inferred from it (p. 207).

The final icon chapter is "From Ape to Human: The Ultimate Icon." This section is more conceptual and without discussions of anatomic details of for example neanderthals or australopithecines. Author Wells emphasizes the mythical nature of so much of the literature written by scientists dealing with physical anthropology.

References to "religious" literature are lacking in the icons book, except possibly that of the naturalists - who arguably could be considered "religious." We learn little about the explicitly religious persuasion of Wells except that on a pre-title page "About the Author" we read that he has a Ph.D. in religious studies from Yale University. I think on the basis of the text of "icons" that readers at least should expect that Wells would share some consonance with supernaturalists. His second Ph. D. is in molecular and cell biology from the University of California at Berkeley.

The book mostly is negative against evolution without supporting alternative views except by implication or inference. Chapter 12, which is the end chapter, is titled "Science or Myth," and it continues with the theme of the myth of materialism in western thought, including how citizens involuntarily are paying for evolutionary indoctrination in tax-supported schools and through government-supplied research grants from NIH, NSF, and NASA, support amounting to many billions of dollars each year. Also, Wells makes some suggestions regarding what we can do about this condition. Further suggestions are found in two Appendixes with analyses of 10 recent biology texts.

A copious 71 pages of Research Notes have comments and references for the sections in each of the 12 chapters. I found this material easy to use and very helpful. Six pages of Index conclude Wells' book.

On page 104 there is a minor error which should be corrected in future printings. Wells refers to the November 1996 issue of *Life* magazine which contains an article on embryology written by Kenneth Miller from Brown University. Wells is correct in exposing factual errors in the *Life* writeup, but that article was written by a different person than the Kenneth R. Miller who is a biologist at Brown.

In a discussion of *Archaeopteryx* on page 115 there is reference to transient development of wing claws in "a few modern birds". It seems to me that this could be expanded indicating that a number of modern birds including the touraco, hoatzin, and ostrich also have wing claws.

After a discussion I had with my colleague, Glen Wolfrom, about the icons book, I decided to add two more suggestions for subsequent printings, firstly, for six of the figures part or all of the legends are on the following page. We feel that readers' comprehension would be enhanced if adjustments could be made to have each figure along with its legend on the same page. Secondly, the statement that no one ever questioned "modification within a species" (p. 55, pp. 4-5) certainly is generally true, but it does appear to convey a disregard for those scientists and others who have held to fixity of species. We think that Wells could clarify this by including perhaps a brief explanation of the way "species" is being used in his statements.

The thrust of this icons text is encapsulated in the affirmation that "nothing in biology makes sense except in the light of the evidence" (p. 248). Subjects dealt with throughout Wells' book are up-to-date with many references from the year 2000. Not only is the work current, but also it is pertinent for all those concerned about fairness in science and education throughout the United States. The book should be read by all science students and scholars of science; also it should be in every high school, college, and public library.

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Martin Luther on the Garden of Eden

"...paradise, which was very soon closed against man on account of sin, and by the Flood, left no trace or vestige of its original state remaining, which can now be discovered. . . Who can doubt, therefore, that the fountains of those rivers [the rivers of Eden] were also broken up and confounded?" Martin Luther. 1483-1546. *Commentary on Genesis*, as quoted in Byron C. Nelson. 1931. *The Deluge Story in Stone*, p. 10. Augsburg Press, Minneapolis, MN.

Influential Darwinists Supported the Nazi Holocaust

Jerry Bergman*

Abstract

The writings of leading early twentieth-century, German biologists reveal that most of them actively supported Nazi race policies. They believed that the human gene pool could be improved by using selective breeding similar to the manner in which farmers breed superior cattle. In formulating their racial policies, Hitler's government relied heavily upon the works of Darwinists, including such prominent

spokesmen as Chamberlain, Spencer, and Haeckel. Consequently, the development and implementation of government policies designed to evolve a "superior race" had widespread support from the scientific community. This philosophy culminated in the extermination of approximately six million Jews and four million other people who belonged to what German scientists labeled as "inferior races."

Introduction

The critical influence of the replacement of the Judeo-Christian-Islam creationist worldview by Darwinism on Nazi race policies has been well documented (Bergman, 1999; Jones, 1988; Chase, 1980). Riley called Hitler's Nazism "nothing other than the philosophy of evolution in action" (1941, p. 3). It is known widely that the Nazis were influenced profoundly by Darwinism, but it is somewhat less well known that the Nazis enjoyed widespread support from most of the scientific community, especially biologists (Stein, 1988; Tobach et al., 1974; Jackel, 1972; Haas, 1995; Haller, 1971; Clark 1958; Beyerchen, 1977; Sime, 1996). Darwin's heavy influence on Nazi policy can be evaluated by an examination of the writings of leading early twentieth-century German biologists and scientists. Keith (1946, p. 230) concluded that the Nazi treatment of Jews and other "races" then believed to be "inferior" was largely a result of the widespread belief among biologists that Darwinism provided profound insight which could be used to improve humankind significantly. In short, Nazism

was based on Charles Darwin's doctrine of the survival of the fittest, following which Herbert Spencer argued that those better adapted to the conditions of life prevailed not only in nature but in human society as well. Thus, from Darwin's doctrine, the racists concluded that the strong and victorious were also in the right (Yahil, 1990, p. 37).

The core of the philosophy driving the Nazis holocaust was that just as breeders could raise superior strains of horses and dogs,

so it would be possible to enhance the human race by attaining a fine breed of "Aryans." According to this ideology race was the factor that governed men's lives. It was because of their race that they acted for good or bad and tended toward survival or extinction. When citizens were corrupted by the rule of an inferior race, government was corrupted. When they were governed by a positive and lofty race—endowed with the right, the will, and the ability to rule—they enhanced humankind, its society, and its culture. Hence, the reform of government was possible only by improving the race (Yahil, 1990, p. 37).

As Stein (1988) shows, this view was shared widely by Darwinists of the time.

The first language into which Darwin's writings were translated—only a year after *The Origin* was published—was German (Tenenbaum, 1956). Darwinism was championed not just in Germany, but it did have more influence on German state policy than in any other country (Bergman, 1999; Lifton, 1986). As Gasman noted: "In no other country...did the ideas of Darwinism develop as...the total explanation of the world as in Germany..." and as a result the "literal transfer of the laws of biology" as interpreted by evolution was applied to the social realm (1971, xiii). So important was evolution that the Nazi goal was a vision of absolute control over the evolutionary process, over the biological human future. Making widespread use of the Darwinian term "selection," the Nazis sought to take over the functions of nature (natural selection) and God (the Lord giveth and the

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Lord taketh away) in orchestrating their own “selections,” their own version of human evolution. In these visions the Nazis embraced ... a newer (nineteenth- and twentieth-century) claim to “scientific racism.” Dangerous Jewish characteristics could be linked with alleged data of scientific disciplines, so that a “mainstream of racism” formed from “the fusion of anthropology, eugenics, and social thought.” The resulting “racial and social biology” could make vicious forms of anti-Semitism seem intellectually respectable to learned men and women (Lifton, 1986 p. 17).

So pervasive was biological evolution in the Nazi ideology that Lifton suggested the Nazi state could be called a “biocracy.”

In the case of the Nazi biocracy, the divine prerogative was that of cure through purification and revitalization of the Aryan race.... Just as in a theocracy, the state itself is no more than a vehicle for the divine purpose, so in the Nazi biocracy was the state no more than a ... means to achieve “*a mission of the German people on earth*”: that of “*assembling and preserving the most valuable stocks of basic racial elements in this [Aryan] people?*” (Lifton, 1986, p. 17 emphasis in original).

A major effect that Darwinian evolution had upon German society was a thorough “destructiveness of cosmic purpose” which was so revolutionary that it “heralded a break with teleological, anthropomorphic, and religious explanations in the organic sciences” (Gasman, 1971, p. xxi). No longer could the universe be seen as created, and existing according to Divine plan. But now, according to “Darwin’s theory, nature changed and sometimes ‘progressed’ by accidental and wholly unprepared random variations—which, of course, implied that there is neither finality nor purpose in nature” (Gasman, 1971, p. xxi). Although Adolf Hitler and his associates, and not the biological theorists were the Nazi rulers, in Lifton’s opinion the difference was “far from absolute” because among the biological authorities recruited

to articulate and implement “scientific racism”—including physical anthropologists, geneticists, and racial theorists of every variety—doctors inevitably found a unique place. It is they who work at the border of life and death, who are most associated with the awesome, death-defying, and sometimes death-dealing aura of the primitive shaman and medicine man. As bearers of this shamanistic legacy and contemporary practitioners of mysterious healing arts, it is they who are likely to be called upon to become biological activists (Lifton, 1986, p. 17).

The inequality doctrine—although an integral part of German philosophy for years—reached its apex only under the Hitler regime, obtaining its chief intellectual sup-

port from Darwinism and especially from Darwin’s major disciple, Ernst Haeckel (Weiss 1988; Aycoberry 1981).

Ernst Haeckel

Ernst Haeckel (1834–1919), “a respected professor of zoology” at the University of Jena, was one of Darwin’s leading proponents. Haeckel was trained as a physician and graduated in 1859, shortly before the publication of Darwin’s *Origin of Species*, a book

that dramatically changed his life. Here, he thought, was the answer to everything he had been seeking in science, philosophy, ethics, religion, politics—a unified, or monist, view of the world. His own fanaticized version of evolution became an obsession and guiding passion, with Darwin his greatest hero (Milner, 1990, p. 205).

Haeckel was a committed Christian and creationist until he was exposed to Darwinism. After studying Darwin, however, he came to “detest” organized religion and adopted “quasi-mystical” naturalistic beliefs (Simmons, 1997, p. 424). Haeckel first forcefully presented his Darwinian views at the 1863 Congress of German Naturalists where his speech commenced his four-decade-long role as “Darwin’s chief apostle” (Stein, 1988, p. 54). Haeckel soon became a pivotal scientist who helped shape German biological research along Darwinian lines, expanding its range into

embryology, morphology, and cell theory. He also raised and discussed many issues which are still alive today and coined the term *ecology*, which he defined as the scientific investigation of the relationship between organism and environment. Stephen Jay Gould has recently documented his extensive historical significance, and some years ago Erik Nordenskiöld could write that “there are not many personalities who have so powerfully influenced the development of human culture—and that, too, in many different spheres—as Haeckel” (Simmons, 1997, pp. 421–422).

Haeckel was especially active and successful in promoting the application of Darwinian theory to social policy. He felt “social Darwinism” explained why some civilizations advanced while others remained primitive (Haeckel 1900; 1916; 1925). As Gould has concluded, Haeckel made important contributions in many areas of science but his

greatest influence was, ultimately, in another, tragic direction—national socialism [Nazism]. His evolutionary racism; his call to the German people for racial purity and unflinching devotion to...his belief that harsh, inexorable laws of evolution ruled human civilization and nature alike, conferring upon fa-

vored races the right to dominate others.... His brave words about objective science—all contributed to the rise of Nazism. The Monist League that he had founded and led...made a comfortable transition to active support for Hitler (Gould, 1977, pp. 77–78).

Ernst Haeckel was so important to Darwinism that he was referred to as the father of German evolution (Norden-skiöld, 1935). It was he who eventually convinced his influential countrymen that

they must accept their evolutionary destiny as a “master race” and “outcompete” inferior peoples, since it was right and natural that only the “fittest” should survive. His version of Darwinism was incorporated in Adolf Hitler’s *Mein Kampf* (1925), which means “My Struggle,” taken from Haeckel’s translation of Darwin’s phrase, “the struggle for existence” (Milner, 1990, p. 207).

Haeckel’s conclusions from his study of evolution of races soon became German policy. And “the morphological differences between two generally recognized species—for example sheep and goats—are much less important than those...between a Hottentot and a man of the Teutonic race” (Haeckel, 1876, p. 434). Especially important in Nazi policy was the belief that the Germans had evolved the “furthest from the common form of apelike men [and outstripped]...all others in the career of civilization” and would be the race to raise humankind to a “new period of higher mental development” (1876, p. 332). Haeckel’s beliefs expanded on the widely held nineteenth-century theme (found in the English naturalist Alfred Wallace, though not as specifically in Darwin) that each of the major races of humanity can be considered a separate species. Haeckel believed the various

races of mankind are endowed with differing hereditary characteristics not only of color but, more important, of intelligence, and that external physical characteristics are a sign of innate intellectual and moral capacity. He, for instance, considered “wooly-haired” Negroes to be “incapable of a true inner culture and of a higher mental development.” And the “difference between the reason of a Goethe, a Kant, a Lamarck, or a Darwin, and that of the lowest savage...is much greater than the graduated difference between the reason of the latter and that of the most ‘rational’ mammals, the anthropoid apes.” Haeckel went so far as to say, concerning these “lower races,” that since they are “psychologically nearer to the mammals (apes and dogs) than to civilized Europeans, we must, therefore, *assign a totally different value to their lives*” (italics added). The Auschwitz self could feel a certain national-scientific tradition behind its harsh, apocalyptic, deadly rationality (Lifton, 1986, pp. 441–442).

This superiority of civilized Europeans was assumed to be true not only mentally, but also physically, because evolution achieves a “symmetry of all parts, and equal development which we call the type of perfect human beauty” (Haeckel 1876, p. 321). Haeckel also concluded that “no woolly-haired nation has ever had an important history” (1876, p. 10). The races that he believed were inferior and worthless included “the lower races—such as the Veddahs or Australian Negroes” (1905, p. 390). Haeckel also concluded that the most evolved “race” was “the Indo-Germanic race, which has far surpassed all the other races of men in mental development.” He concluded from his research that this race separated at a very early period in evolution into “two diverging branches” (1925, p. 431).

Stein noted that these views were **not** minority or extreme; rather Haeckel was viewed as a mainline “respected scientist.” The views of his followers, however, often were more extreme (Stein, 1988, p. 56). Haeckel also fought hard to convince the world that his former belief, the Jewish creation legend, was wrong. His reasoning for its rejection was partly because creationism taught that all races came from an original human couple, and therefore all races were equal.

[The]...five races of men, according to the Jewish legend of creation, are said to have been descended from “a single pair”—Adam and Eve—and in accordance with this are said to be varieties of one kind or species. If, however, we compare them without prejudice, *there can be no doubt that the differences of these five races are as great and even greater than the “specific differences” by which zoologists and botanists distinguish recognized “good” animal and vegetable species....* The excellent palaeontologist Quenstedt is right in maintaining that, “*if Negroes and Caucasians were snails, zoologists would universally agree that they represented two very distinct species, which could never have originated from one pair by gradual divergence*” (Haeckel, 1925, pp. 412–413, emphasis mine).

Lifton concluded that the contribution of the quintessentially German Ernst Haeckel to biology was great, and that after his conversion to Darwinism he ardently advocated romantic nationalism, racial regeneration, and anti-Semitism. He was to become what Daniel Gasman has called the recognized spokesman of Darwinism in Germany, Germany’s major prophet of political biology, and his name is synonymous with materialism, naturalism, and, of course, Darwinism (1971, p. xiv, xxii). Simmons (1997, p. 424) claimed Haeckel’s last years were not happy and that he was especially upset by the war between his country, Germany, and Darwin’s home, England.

Houston Chamberlain

The next most influential person responsible for spreading Darwin's ideas in Germany was Houston Chamberlain, son of a British admiral and a German woman. Chamberlain was one of the first popular German writers to use Darwinism to argue that the Germans were innately *biologically* superior to all other races and peoples, including the Persians, Greeks, and especially the "parasitic Semites" whom he branded as a "race of inferior peoples." In 1899 he published a book, *The Foundations of the 19th Century*, in which he concluded that Darwinism had proved the Germans superior to all other peoples (Weinding, 1989).

Chamberlain believed Germans were the "foundation" of modern society because they led the industrial revolution and the enlightenment. Chamberlain quoted extensively from Darwin, who stressed that the brain is of far more importance than any other body structure in measuring human evolutionary progress. It was widely believed at the time that the larger the brain, the higher the person's intelligence.

Darwin himself interpreted the evolutionary success of *Homo sapiens* as being the result principally of brain improvements, as shown by the much larger brain case typical of higher primates (and especially by the apex of brain evolution found in humans). Chamberlain seized upon this idea and concluded that human racial differences were reflected in the skull (primarily its shape and size), but also in all of those traits that historically have been used to identify human races (skin color, nose, lip, and eye shape, among others). He utilized as evidence for his theory not only the findings and assumptions of physical anthropology and Darwinian evolution theory, but also the then-fashionable "science" of phrenology (Davies, 1955).

Phrenology is the now-discredited science of determining personality traits by measuring the shape and size of various skull bumps and contours (Jacquard, 1984). The phrenologists reasoned that certain traits were located in specific parts of the brain, and if one had developed some trait to an exceptional degree, a "bump" would exist in the appropriate location on the skull. Lastly, they concluded that the brain configuration and other physical traits could be used both to distinguish humans from monkeys and to rank the human races from less to more advanced. This idea received widespread support from the German academic and scientific communities and helped to

prepare the way for national socialist biopolitics.... Beginning in the 1890s with the work of Otto Ammon on cephalic indexes and other such scientific proof of Aryan superiority, much German anthropology, especially the most scientific branch, physical anthropology... [concluded] if humankind evolved through natural selection ... then it was obvious that the races of

humankind must be arranged hierarchically along the ladder of evolution. ...there is little doubt that the anthropologists who discovered all the measurable divergent physical, psychological, and mental characteristics of the various races thought they were scientific. And so did the general public (Stein, 1988, p. 57).

Chamberlain's work (and that of his contemporaries) still is influential today.

Chamberlain's racial explanation for human history was only one of the many intellectual syntheses produced in the latter half of the nineteenth century. Most of the isms which have profoundly influenced the twentieth century have their genesis in these decades (Schleunes, 1970, p. 30).

Joseph Mengele

The scientist who presided over the race program at Auschwitz, Josef Mengele, was a highly respected and published researcher who earned a Ph.D. from the prestigious University of Munich and an M.D. from the University of Frankfurt (Astor, 1985). While still in his residency for his medical degree, Mengele read an article by Otmar von Verschuer which claimed that "Hitler is the first statesman who has come to recognize hereditary biological and race hygiene and make it a leading principle" of statesmanship. Von Verschuer and others who advocated incorporating Darwinism into social policy concluded: "specialists of race hygiene are happy to have witnessed that the work normally associated with the scientific laboratories or the academic study room has extended into the life of our people" (as quoted in Astor, 1985, p. 23). These ideas had a profound influence on Mengele—the man who later became one of the chief architects of Nazi policy.

Mengele's zeal in implementing the holocaust was based squarely on accepted mainline Darwinism, not on sadistic or psychopathic impulsiveness as often alleged (Posner and Ware, 1986). His biographer concluded that:

Race purity and the contaminant threat of Jews became gospel in lower and higher education. When Mengele began his college studies at the University of Munich, anti-Semitism had already sprouted in the sciences.... The impressionable young man....soaked up writings like those of a German oriental scholar, Paul de Lagarde, who despised "those who out of humanity defend these Jews, or who are too cowardly to trample these usurious vermin to death.... With trichinae and bacilli one does not negotiate, nor are trichinae and bacilli to be educated. They are exterminated as quickly and thoroughly as possible" (Astor, 1985, p. 21).

Posner and Ware added that when Mengele was in college, one of his major interests was anthropology and pale-

ontology, specifically genetics and evolution which “a growing number of German academics found so attractive” and which coincided with the developing belief in academia that “some human beings afflicted by disorders were unfit to reproduce, even to live.... *His consummate ambition was to succeed in this fashionable new field of evolutionary research*” (1986, p. 29, emphasis mine). The goal of the Nazis eventually became to totally exterminate all inferior peoples, especially Jews “in all lands,” so that “no germ-cell would remain...” and consequently they could never again pollute the pure Aryan race (Goldhagen, 1966, p. 414).

The Level of Support for Nazi Policies

Gould, in a discussion of a book on German biology and the war by biologist and president of Stanford University, Dr. Kellogg, said that Kellogg was appalled, above all, at the justification for war and German supremacy advanced by “[the high level] officers, many of whom had been university professors before the war.” They not only proposed an evolutionary rationale, but advocated a particularly crude form of natural selection that was defined as an inexorable, bloody battle (Gould, 1991, p. 424). Kellogg’s report of the beliefs of these German generals follows:

Professor von Flussen is Neo-Darwinian, as are most German biologists and natural philosophers. The creed of the *Allmacht* [“all might”] of a natural selection based on violent and fatal competitive struggle is the gospel of the German intellectuals; all else is illusion and anathema.... This struggle not only must go on, for that is the natural law, but it should go on, so that this natural law may work out in its cruel, inevitable way the salvation of the human species. By its salvation is meant its desirable natural evolution. That human group which is in the most advanced evolutionary stage... should win in the struggle for existence, and this struggle should occur precisely that the various types may be tested, and the best not only preserved, but put into position to impose its kind of social organization—its *Kultur*—on the others, or, alternatively, to destroy and replace them. This is the disheartening kind of argument that I faced at Headquarters.... Add ... the additional assumption that the Germans are the chosen race, and German social and political organization the chosen type of human community life, and you have a wall of logic and conviction that you can break your head against but can never shatter... (Kellogg, 1917, p. 28–30).

The schools also taught and used evolution in developing social policy. Grunberger noted:

Since Nazi ideology leaned heavily on Darwinist notions, the Party’s educational pioneers—like

Baldur von Schirach or Robert Ley—liked to talk of the Adolf Hitler Schools institutionalizing the principle of continuous selection. Having been pre-selected during their second year in the *Jungvolk*, potential Adolf Hitler pupils were racially examined and sent to a fortnight’s youth camp for a final sifting. A main criterion of selection was physical appearance; after acceptance, Adolf Hitler scholars were largely evaluated according to qualities of leadership (1971, p. 298).

Support of Academic Journals for Nazi Programs

German scientists were not superficial in their science that became known as “racial hygiene.” Prior to 1933, German scientists published 13 scientific journals devoted primarily to racial hygiene and established over 30 institutions, many of which were connected with universities or research centers devoted to “racial science” (Proctor, 1988). In the Nazi era, close to 150 scientific journals, many of which still are highly respected today, covered racial hygiene and allied fields (Weinding, 1989). Enormous files of data were kept on the races, many of which were analyzed and used for research papers published in various German and other scientific journals. The Kaiser Wilhelm Institute for Anthropology, Human Genetics, and Eugenics was established in 1927.

German eugenicists relied heavily upon work completed in Britain and America. Franz Bumm, president of the Reich Health Office, noted that “the value of eugenics research had been convincingly demonstrated in the United States, where anthropological statistics had been gathered from two-million men recruited for the American Armed Forces” (Proctor, 1988, p. 40).

The various eugenic institutes also researched the “persistence” of various “primitive racial traits” in certain races in and outside of Germany. Eugenicists soon found much evidence of the “Cro-Magnon racial type in certain races, and presumably also Neanderthal.” Like their American and British counterparts, the various German racial hygiene institutes, and the researchers at various universities, began to discover genetic evidence for virtually every human trait from criminality to hernias, including even divorce and “loving to sail on water.” The scientists saw their work as a noble effort to continue “Darwin’s attempts to elucidate the origin of species” (Proctor, 1988, p. 291).

Beliefs of Scientists Influenced Nazi Leaders

Many of Hitler's top aides, including Bormann and Hoess, held similar Darwinian beliefs. Hoess read extensively about racial theories, heredity, and ethnology. His racial views guided his policy in the concentration camps that he administered, including Auschwitz (Hoess, 1960). The result was that he converted this former forced-labor camp into an evolution laboratory where inmates were no longer persons but "simply goods to be processed in the gigantic death-factory he had organized" (Rudorff, 1969, p. 240). Heinrich Himmler, the head of the SS and the architect of the final solution, believed (in harmony with Darwinism) that history has consisted of "a constant, merciless struggle among races for survival" and that as a result of this struggle German and Nordic races were "above all others" (Breitman, 1991, p. 35).

Caring for the weak, sick, lame, old, or poor ran counter to the chief driving force of evolution—the survival of the fittest and non-survival of the unfit. This meant that the weak must be eradicated for the benefit of the race as a whole. The Nazi regime did not view these policies as wrong, or even inhumane, but instead openly prided itself on its advanced scientific ideology and modern view of the world (Gasman, 1971). Given the Nazis' wholesale acceptance of Darwinism, their race and determinism ideas may well have been inescapable (Barzun, 1958, p. xx).

The Nazis reasoned that race pollution reduces the caliber of the potential leaders, and should thus be condemned. The writings and work of many anthropologists including those in America supported this conclusion. Examples include Dr. Hooton of Harvard, one of the first physical anthropologist who trained virtually every physical anthropologist in America for generations, and Carlton Coon, whose books openly advocated a polycentric view of evolution, the view that the races evolved separately (Wolpoff and Caspari, 1997; Hooton, 1941). From this idea it was logical to conclude that the races are not equal, and that some are more primitive than others. Consequently interbreeding has the potential of mixing races to the detriment of the offspring.

The justification for these programs was that the "leading biologists and professors" advocated these programs. According to Wertham (1966, p. 160), Carl Brandt felt that since the learned professors were in support, the program must be valid, and who "could there be who was better qualified [to judge it] than they?"

Support for Darwinism by Medical Doctors

The negative influence of Darwinism on German physicians also is well documented (Kershaw, 1999; Röder, et

al., 1995). One German doctor, who was from a medical family traceable back to the early seventeenth century, was involved as a child with all forms of animal life and was most interested in biology. As he grew older, he began to read

Bölsche and Haeckel. Ernst Haeckel, a towering figure in German biology and an early Darwinian, was also a racist, a believer in a mystical *Volk*, and a strong advocate of eugenics who "can be claimed as direct ancestor" of the Nazi "euthanasia" project. Wilhelm Bölsche was a literary critic who became a disciple and biographer of Haeckel and was known to have provided Hitler with "direct access to major ideas of Haeckelian social Darwinism" (Lifton, 1986, p. 125).

After an extensive study of the "natural selection" homicides committed in German institutions, Wertham (1966) concluded that the psychiatric and medical professions were among the most enthusiastic supporters of Nazi race programs. They not only implemented Nazi policy willingly, but often went well beyond what the law required. Wertham also related the activities of numerous eminent psychiatrists and physicians who were teaching in leading German universities (many still are quoted today in the literature as experts) and who not only supported the Nazi policy of "artificial evolution," but eagerly put it into effect. Highly respected scientific works published in Nazi Germany and elsewhere openly advocated elimination of those judged "below the level of beasts" or a "foreign body in human [meaning Aryan] society."

One of the authors of a work titled *Destruction of Life Devoid of Value* (Leipzig, 1920) was a psychiatrist who argued in favor of killing persons "whose death is urgently necessary [namely]...those who are below the level of beasts [such as Jews and Negroes]." Hans F. K. Gunther, a professor of "race science" at the University of Jena, wrote numerous books on racism which espoused various policies that later were adopted by the Nazis. His books sold extremely well and were generally favorably reviewed by biologists (Gallagher, 1999).

Although the justification for extermination programs included a desire to eliminate "hereditary diseases" that were a drain on the German resources, most of those murdered did not have hereditary conditions (Stein, 1988, p. 56). Nazism believed that the state had a duty to provide "redemption from evil" in the form of a quick and painless drug to those judged inferior (Haeckel, 1905, pp. 118–119).

These ideas were not opposed by the scientists, but rather ...most members of the scientific and academic communities... did very little to oppose the rise of Hitler and national socialism, and in many cases lent their considerable prestige as scientists to the support of the ideas of the national socialist

movement [the Nazis]. It is simply true historically that German academics and scientists did, in fact, contribute to the development and eventual success of national socialism, both directly through their efforts as scientists and indirectly through the popularization or vulgarization of their scientific work (Stein, 1988, p. 57).

The support of doctors was critically important in allowing what occurred in the camps to occur to the extent that:

In Auschwitz, Nazi doctors presided over the murder of most of the one million victims of that camp. Doctors performed selections—both on the ramp among arriving transports of prisoners and later in the camps and on the medical blocks. Doctors supervised the killing in the gas chambers and decided when the victims were dead. Doctors conducted a murderous epidemiology, sending to the gas chamber groups of people with contagious diseases and sometimes including everyone else who might be on the medical block. Doctors ordered and supervised, and at times carried out, direct killing of debilitated patients on the medical blocks by means of phenol injections into the bloodstream or the heart (Lifton, 1986, p. 18).

Lifton added that doctors were actively consulted about how best to carry out the process of selecting inmates for various tasks such as

how to burn the enormous numbers of bodies that strained the facilities of the crematoria. In sum, we may say that doctors were given much of the responsibility for the murderous ecology of Auschwitz—the choosing of victims, the carrying through of the physical and psychological mechanics of killing, and the balancing of killing and work functions in the camp.... As one survivor who closely observed the process put the matter, “Auschwitz was like a medical operation,” and “the killing program was led by doctors from beginning to end” (Lifton, 1986, p. 18).

In the late 1970s, Lifton interviewed a German doctor who was a fierce anti-Semite during the Nazi era. Note how the doctor used Darwinism to explain both the failure of Nazi beliefs about Jews and the enormous success of Jews in the West. The doctor, upon learning that Lifton was Jewish, declared unctuously:

The Jewish question became our tragedy and your tragedy.” He explained that it was initiated “by the flood [of Jews] from the East, and by Darwinian principles enabling Jews to become especially able “through such a hard selection during these two thousand years” to take so many medical positions that German doctors were excluded from; but he added, “Nowadays we know that all of us, Jews and Germans, belong to the same cultural community”

and must stand together against the “adverse cultural community,” including China and Russia but especially the expanding numbers of the people of Islam ... Except for rearranging his cast of characters, Dr. S. had not changed much. Racially, he practiced what he preached, and had an enormous family: “I have always believed that those who are fit should have as many children as possible, and those who are unfit should have as few ...as possible” (1986 p. 131).

Conclusions

Even though Germany had been the leader both in the Protestant and enlightenment reformations, Darwinian ideas advocated by its leading scientists rapidly replaced this world view (Kershaw, 1999). German society rapidly adopted a thoroughly secular world view, relying on science and materialistic philosophy for values and morals. Ironically, the churches, Bonhoeffer wrote, “lost their heads and their entire Bible” including Genesis and even

before Hitler came to power, as his ascendancy became increasingly probable, the editors of....[many] Christian papers brought their already virulently antisemitic rhetoric into closer concord with that of the Nazis. They did so unbidden, entirely voluntarily, and with unmistakable passion and alacrity (Goldhagen, 1996, p. 108).

They felt that forcing Jews and other “inferior races” into concentration camps was not cruel punishment, or even punishment at all, but was similar to quarantining the sick to prevent them from spreading their disease to the healthy. Conditions in the camps later deteriorated, but the main concern at first was simply to quarantine inferiors in order to prevent contamination of the Aryan gene pool.

Relatively few scientific studies exist that deal directly with Darwinism and Nazism—and many evolutionists today avoid the subject because evolution is inescapably selectionist. One of the best reviews of Darwinism and Nazism documents concluded that the Nazis felt confident that their extermination programs were based firmly on science (Mueller-Hill, 1988). Recently several popular magazines have published surprisingly candid and honest accounts of this topic (for example, see Gray, 1999). The source of the worst of Nazism was a result of Darwinism. To prevent a repeat performance, we must understand history because those who ignore the lessons of history are condemned to repeat them (Santayana, 1944).

Firmly convinced that Darwinian evolution was true, the German Darwinian scientists saw themselves as modern saviors of humankind believing that society someday would acknowledge that their work was responsible for bringing humanity to a higher level of evolutionary development. If eugenics is true, the Darwinists were our sav-

ior, and we have rejected good science and as a result, they believed, the human race will suffer grievously. If eugenics is not true, what the Darwinists attempted to do must be ranked among the most heinous crimes ever committed, and Darwinism must be considered as the source of one of the most destructive philosophies ever foisted on humankind.

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Book Reviews

The Day Behemoth & Leviathan Died by David Allen Deal Kherem YaYah Press, Vista, CA. 1999, 315 pages, \$20

Author Deal has pulled together a bizarre collection of ideas and claims. Among them are these: The earth once orbited the sun between Mars and Jupiter. An asteroid knocked the earth to its present location, where it captured the moon. At this time, dinosaurs living on the earth were destroyed. Deal also boasts his 1997 discovery of Noah's lost city Naxuan (not mentioned in scripture).

This book has many professionally done illustrations and charts, including two beautiful color foldouts of the ancient super-continent splitting apart. It lacks an index

and contains numerous spelling mistakes and other typographical/layout problems. This reviewer believes some of the evidence Deal uncovers merits further examination (i.e. Deep Sea Drilling Project) even if his scientific theories and Biblical interpretations are highly suspect, if not outrageous.

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Creation Rediscovered by Gerard J. Keane Tan Books and Publishers, Rockford, IL. 398 pages, \$18

This is a refreshing book from a Catholic author and publisher. There is much creationist scholarship within conservative Catholicism that is less familiar to CRSQ readers. One example is the Catholic Origins Society which publishes *Watchmaker* magazine, named for William Paley.

This book is a clear overview of the creation position. It includes details such as pleochoric halos, black holes, living fossils, and Mount St. Helens events. A recent creation and a global Genesis Flood are promoted, including descriptions of the catastrophic plate tectonic and hydroplate theories. Author Keane has little patience with the progressive creation view of Hugh Ross (p. 270).

Keane exposes the theistic evolution errors of French priest and paleontologist Teilhard de Chardin (1881–1955) in seven pages. Helpful comments also appear regarding Augustine, Thomas Aquinas, Eugene Dubois, etc. With obvious deep respect for Pope John Paul II, Keane describes the Pope's apparent 1996 acceptance of evolution details. Keane suggests that Pope John was misled and

misinformed by his Pontifical Academy of Sciences, established in 1936 (pp. 202–205). This advisory Academy currently has 86 members, 20 of whom are Nobel prize winners, all favorable to evolution. One member is astrophysicist Stephen Hawking, some of whose writings promote non-Christian views. Keane explains that in Catholic belief, a Pope can be mistaken when expressing private, non ex cathedra opinions (p. 199).

In contrast, the author promotes the Catechism of the Catholic Church, officially adopted for Church teaching purposes in 1992. This strongly pro-creation document does not mention the word "evolution." Hopefully, the voice of Gerard Keane and others will have a growing impact in the Catholic world.

This is an excellent book to share with a Catholic friend. It contains an index and many further references.

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Does the Collapse of a Gas Cloud to Form a Star Violate the Second Law of Thermodynamics?

Danny R. Faulkner*

Abstract

I propose that the answer to the title question is “no.” I show that the change in entropy of a self-gravitating gas cloud as it contracts is negative. This general result is applied to the specific cases of a contracting pre-stellar cloud and to the Kelvin-Helmholtz mechanism. However, I argue that this does not violate the second law of thermodynamics, because both processes involve heat losses. By definition, a heat loss has a negative entropy change. In any heat transfer problem it is necessary to consider both the emission and absorption of

heat in calculating the total entropy change to properly evaluate whether the process violates the second law of thermodynamics. Thus it appears that the theoretical contraction of a gas cloud to form a star does not violate the second law of thermodynamics. It is recommended that creationists do not use this argument to critique the theory of stellar evolution. However, there remains a long-standing problem with how the alleged initial contraction of a gas cloud can commence. This is a valid criticism of star formation.

Introduction

In a classic *Creation Research Society Quarterly* article Mulfinger (1970) detailed a number of objections to the theories of stellar evolution. Some discussion was given to the collapse of a gas cloud to become a star. This theoretical stage of a star’s development is called the pre-stellar phase of stellar evolution (a recent non-creationist treatment of star formation is that of Phillips, 1994). Using parameters of the collapsing gas cloud (size, density, temperature, etc.) taken from the astronomical literature and a thermodynamic relation, Mulfinger showed that the entropy of the cloud would decrease as it collapsed. Because this appears to violate the second law of thermodynamics, Mulfinger concluded that the process is impossible.

In the ensuing years speakers have often referred to this calculation to argue that stellar evolution is impossible. I recently challenged this assessment (Faulkner, 1998). A more detailed reevaluation of the entropy calculation and its meaning are presented in this paper. It will be argued that when all factors are considered the overall change in entropy is positive, in agreement with the second law of thermodynamics. This is not to be construed as an endorsement of the theory of pre-stellar collapse, for there is another devastating problem that Mulfinger noted and which will be discussed briefly here as well.

Calculation of Entropy Change

While Mulfinger’s calculation of the entropy change of a collapsing gas cloud is approximately correct, Mulfinger unfortunately did not consider the total entropy change of the universe. Ultimately the temperature of space is about 2.7K, quite a bit cooler than any gas cloud. To a very good approximation space represents a 2.7K thermal reservoir that completely surrounds the cloud in question. Therefore a gas cloud and surrounding space define a thermodynamic system in which heat flow can be analyzed. In this fashion all gas clouds are capable of losing energy to space.

First, let us examine Mulfinger’s calculation of the entropy change of the collapsing gas cloud. Assume that the gas in the cloud can be adequately described by an ideal gas and that the cloud represents a thermodynamic system. Let T be the temperature of the thermodynamic system and let dQ be the heat flow into the system. Note that heat flow into the system is defined to be positive, while heat flow out of the system is negative. A heat flow is accompanied by a change of entropy dS , defined as

$$dS = dQ/T. \quad (1)$$

Mulfinger attempted a detailed calculation by using a relation derived from the first law of thermodynamics:

$$dQ = dU + dW, \quad (2)$$

where dU is the change in internal energy and dW is the work done by the gas. The work can be expressed in terms of the change in volume as the gas cloud collapses. The internal energy usually can be expressed as the product of

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C_V , the specific heat at constant volume, and the temperature. Since the specific heat is a constant, the change in internal energy can be written as the product of the specific heat and the change in temperature. In a footnote Mulfinger argued for the replacement of C_P for C_V , because the volume of the collapsing cloud is not constant, while the ambient pressure is. This is incorrect; C_V should be used. It is easy to understand the confusion on this point, because the volume does change tremendously, but the pressure remains virtually constant in this stage of alleged evolution. However, recall that the C_V term in this equation is from the change in internal energy ($dU = C_V dT$), not because it represents heat flow. In either case, whether C_V or C_P is used, the result will be the same as will be shown shortly.

The relation resulting from these substitutions (Mulfinger's equation 1) can be found in any thermodynamics text. This equation works well in the lab, but cannot be used in this case, however, because the cloud has enough mass for gravity also to be important. Hence the potential energy must include a term involving gravitational potential energy. Properly writing the gravitational potential energy requires knowledge of the cloud's density structure. This structure is a function of distance from the center, which makes the correct entropy calculation more complicated than Mulfinger assumed.

Assuming a polytropic model for the gas cloud probably can best solve the problem. On the other hand, if one desires merely the sign of the entropy change rather than a numerical value of the entropy, the problem can be solved very simply. As the cloud collapses, gravitational potential energy is released which partly heats the gas and partly is radiated away. By the virial theorem the change in gravitational potential energy is evenly split between the two (Clayton, 1968). The heat radiated away is a heat flow, and it would be represented by dQ in equations 1 and 2. Because dQ is a heat loss, its sign must be negative, and since temperature is always positive, dQ/T must be negative at all times for the collapsing cloud. Thus integration of equation 1 will always produce a negative answer. This qualitative assessment agrees with the quantitative result of Mulfinger. Does this violate the second law of thermodynamics? No, as the following example will illustrate.

Let us apply Mulfinger's approach to the Kelvin-Helmholtz contraction as the mechanism to power the sun. A century ago, before the discovery of modern physics, this was considered to be the source of the sun's energy. For the evolutionist, the Kelvin-Helmholtz theory is untenable, because it could only operate over a few tens of millions of years instead of the billions thought necessary. Many recent creationists reject thermonuclear reactions as the source of the sun's energy, concluding that the sun is powered by this mechanism instead (Hinderliter, 1983 [note: while Hinderliter is no longer a recent creationist and

would now disavow this paper, he was a recent creationist when he wrote the paper, and this is a commonly quoted source on this matter]; Davies, 1996). The sun is a spherical cloud of gas, so its gravitational potential energy in proportional form is given by:

$$U_g \propto 1/r, \quad (3)$$

where r is the radius of the sphere. Taking the differential,

$$dU_g \propto dr/r^2. \quad (4)$$

From the virial theorem, half the liberated gravitational potential energy heats the gas, while the other half is radiated. Therefore the change in thermal energy

$$dU_T \propto dU_g. \quad (5)$$

Notice that even if the virial theorem only approximately holds, the above proportionality is still valid. For an ideal gas the change in thermal energy is proportional to the change in temperature, from which we conclude

$$dT \propto dU_T \propto dU_g \propto dr/r^2. \quad (6)$$

Inspection reveals that

$$T \propto 1/r. \quad (7)$$

With this, Mulfinger's equation 2 can be written

$$dS = C_P \ln(T_2/T_1) + R \ln(V_2/V_1), \quad (8)$$

where S is the entropy, C_P is the specific heat at constant pressure, R is the ideal gas constant, and T and V are the temperatures and volumes at two different times subscripted in order as 1 and 2. Since $C_P = 5/2 R$, $T \propto 1/r$, and $V \propto r^3$ we find that:

$$dS = -5/2 R \ln(r_2/r_1) + 3R \ln(r_2/r_1) \text{ and} \quad (9)$$

$$dS = 1/2 \ln(r_2/r_1). \quad (10)$$

Because the sphere of gas is contracting, $r_2 < r_1$, so that $\Delta S < 0$. Earlier it was argued that C_V should have been used rather than C_P . Either way the result is not changed, because $C_V = 3/2 R$, and use of that value makes dS even more negative.

Thus using Mulfinger's approach one would conclude that the Kelvin-Helmholtz mechanism violates the second law of thermodynamics. No one doubts that the Kelvin-Helmholtz mechanism could explain the sun's luminosity on the time scale of thousands of years. Indeed, as mentioned before, this is the preferred mechanism of some recent creationists. The fact that Lord Kelvin was the co-discoverer of this model of possible solar energy generation as well as perhaps the most influential person in the development of thermodynamics should cause us to question the conclusion that the Kelvin-Helmholtz mechanism violates the second law. Thus we are forced to consider the possibility that the approach used by Mulfinger to show

that the contraction of a self-gravitating gas cloud to form a star violates the second law of thermodynamics is itself flawed.

Virtually all thermodynamics textbooks ignore the affects of gravitational potential energy, or suggest that any changes be accounted for separately from changes in the internal energy of the gas and any work performed on or by the gas. The reason for this is that in the relatively small parcels of gas in nearly all situations envisioned and treated in the textbooks, the amount of gas is far too small to have self-gravity. The only gravity in these situations would be the force of gravity due to the earth, the energy of which has the form mgh . Changing the altitude of the gas does not have a direct effect upon the internal energy of the gas. Thus any changes in gravitational potential energy in this circumstance would be separable from the other energy terms.

In the case of a self-gravitating cloud, the internal energy due to self-gravity cannot be ignored. What would be the result if the internal energy were properly written to include gravitational potential energy? From equation 3 the gravitational potential energy varies as $1/r$. To be included in equation 8 it must be expressed as dU_g/T . From equation 6,

$$dU_g/T \propto dT/T. \quad (11)$$

Integration as before yields $\ln(T_2/T_1)$, which is positive because $T_2 > T_1$. The question is if this positive term is greater than the negative term of equation (10). Because equation 11 is a proportionality, it lacks the units of equations 8, 9, and 10. Conversion to the molar values of those three equations would require a model of the density structure of the cloud. This greatly complicates the problem, and the result would be subject to the criticism that it is model specific. However, there is a strong argument that when this term is evaluated, the resultant entropy change will still be negative. That argument will now be pursued.

Consideration of Heat Flow

What is the physical reason for the negative entropy change calculated from equation 10? Recall that entropy change is defined to be the heat flow divided by the temperature (equation 1). Since all temperatures are greater than zero, all heat losses cause negative entropy changes and all energy gains represent entropy increases. When looking at equations such as 8 and 9 it is very easy to lose sight of that fact. As the cloud contracts it liberates gravitational potential energy, which must go somewhere. The virial theorem dictates that half the liberated energy goes into heating the gas, and the other half is radiated away. This latter term represents a heat loss, which by equation 1 must be negative. So it is not surprising that a self-gravitat-

ing contracting cloud experiences a negative entropy change. To do otherwise would require that the cloud would hoard all of the released gravitational potential energy plus absorb energy from an external source.

Does a self-gravitating and radiating cloud violate the second law of thermodynamics? Not any more than any object that cools by radiation. Consider a cup of hot coffee that is allowed to cool slowly in a room. The heat flow out of the coffee is negative and so its entropy change, dS_1 , by equation 1 must be negative. This sort of process is observed every day, so it must not violate the second law of thermodynamics. How is this resolved? The surroundings (the room and its contents) absorb all of the energy lost by the cup of coffee. The immediate environment is also a thermodynamic system, and the heat that it absorbs is a positive heat flow that results in a positive entropy change, dS_2 . Because the temperature of the environment is less than the temperature of the coffee, $|dS_2| > |dS_1|$. If the cup of coffee and its environment are combined into a single system, the total change in entropy, $dS = dS_1 + dS_2$, is positive. Indeed, the whole point of entropy is that it indicates the direction in which processes proceed. The coffee, because it is warmer, must shed heat to its surrounding. Entropy is defined so that it ensures that heat never flows "uphill," against a temperature gradient.

In the same fashion it should not be surprising that the entropy of a collapsing pre-stellar cloud when it is considered alone decreases. But this is only half the story: the interstellar environment at a temperature much lower than the cloud's temperature absorbs the energy radiated by the cloud. Early in the process much of the energy will be radiated at long wavelengths. If the local environment is sufficiently dusty, some of the radiated energy will be absorbed locally, but much of it could escape to great distances. Wherever the absorption occurs, this equal but opposite heat flow at a lower temperature results in a positive entropy change that exceeds in magnitude the entropy loss of the cloud so that the entropy of the universe increases.

Discussion of Possible Objections

One may anticipate a few objections that some may offer to the thoughts presented here. One objection is to question the use of the virial theorem. There are two answers to this objection. First, many recent creationists believe that the sun derives at least part of its energy from gravitational contraction. The virial theorem is essential to this process and must be assumed to obtain the Kelvin-Helmholtz time-scale of a few tens of millions of years as the maximum age of the sun. Denial of the validity of the virial theorem amounts to denial of the Kelvin-Helmholtz mechanism. Second, note that in the considerations here it was never assumed that the virial theorem is exactly true. All that was

necessary was to assume that the virial theorem is only crudely correct, that is, that only some portion of energy liberated by gravitational contraction be radiated (or otherwise lost to the gas cloud, whether by radiation, magnetic affects, or other processes). If a portion of energy liberated is not shed, then all energy liberated must heat the gas, with no radiation losses. What mechanism could constrain this?

Another objection may be to point out that the model that Mulfinger used from the literature was surrounded by a much hotter gas than the contracting gas cloud itself. Even today this is a common scenario for collapse to form a star. Williams (2000) recently raised this issue and asked how a cooler object may radiate heat to a hotter one. The answer is that it does not. Instead, the material in the hotter outer cloud may be dispersed enough that it is transparent to infrared radiation, so that the radiation passes through the hotter gas to be absorbed in a more distant, cooler region. A similar process occurs on any calm, clear night. Objects near the ground emit infrared radiation that passes through the air above so that those objects cool to temperatures quite a bit below the temperature of the air. Williams' analysis would seem to prohibit this. Even in a dense interstellar cloud the gas is about fourteen orders of magnitude less dense than air at STP.

Williams went on to quote the thermodynamics expert Prigogine (1967) to the effect that entropy "absorption" in one part of system cannot be compensated by entropy "production" in another part of the system. No one is suggesting that the entropy decrease of the collapsing gas cloud is magically cancelled elsewhere in the universe. Every photon that is emitted results in an entropy decrease for the gas cloud, but each photon must be absorbed somewhere else, which results in an entropy increase. The two events are causally and thermodynamically related, so there is no appeal to connect two unrelated entropy changes, which is what I think that Prigogine is referring to. At any rate, Sommerfeld (1956) makes it clear that heat leaving an open system can reduce its entropy without violating the second law.

Conclusion

The calculations presented here show that contrary to common belief among recent creationists, the collapse of a pre-stellar cloud does not violate the second law of thermodynamics. Creationist speakers are urged to discontinue use of this argument. Does this mean that the process of stellar formation from clouds of gas is possible? There is still a seemingly insurmountable problem remaining (Cox and Giuli, 1967; Mulfinger, 1970; Novotny, 1973; Shklovskii, 1978). A large, tenuous cloud of gas and dust typically found in the interstellar medium simply lacks the

gravitational attraction necessary to overcome the thermal motion of the gas. If a portion of the gas is contracted the temperature and pressure of the gas increases enough to expand the gas. Thus virtually all clouds are stable against collapse.

Only if the gas cloud is collapsed to a critical size (called the Jean's length) by some other mechanism can gravitational collapse work. Several mechanisms have been suggested, but each suffers from serious difficulties. One mechanism is the explosion of a nearby supernova to compress the gas sufficiently to start gravitational collapse. This obviously encounters the chicken and egg problem: how did the star that experienced the supernova form? Another suggested mechanism to initiate the collapse is a spiral density wave traveling around the galaxy. The spiral density wave may explain spiral structure of the galaxy and some other related phenomena from an evolutionary viewpoint, but its origin is not clear. One scenario for the origin of density waves is many nearly simultaneous supernovae explosions from the earliest generations of stars. Again the objection can be raised of how the first generations of stars were formed. Another popular starting mechanism for pre-stellar cloud collapse is cooling of the deep interiors of clouds by molecules and dust. Production of molecules in the interstellar medium can only be accomplished in an environment that contains dust, which can only be formed in the outer layers of red giant stars. Furthermore, with the exception of H₂, all interstellar molecules involve elements heavier than helium. According to the standard cosmology, elements heavier than helium are not primordial, and so must have been manufactured through nucleosynthesis in earlier generations of stars. Therefore both molecules and dust require that some stars must first exist.

All of the suggested mechanisms for initiating the collapse of a gas cloud into a star require the pre-existence of some stars. How the very first stars formed is probably the greatest problem for stellar evolution, and in recent years much theoretical work has addressed this. The issue of how a cloud is supposed to commence collapse down to the Jean's length is still a very fruitful pursuit for creationists, and a future detailed article devoted entirely to recent developments would be most desirable.

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Book Review

God's Equation by Amir D. Aczel
Dell Publishing, New York. 2000, 236 pages, \$10.95

This is the latest book by the internationally known mathematician Amir Aczel whose best known book is *Fermat's Last Theorem* (1997). Aczel uses mathematics and its history to explain in layman's terms how the original solution of a specific mathematical problem was developed. The problem he addresses in this book is Einstein's attempt to explain all the known physical laws within the universe with one equation and therefore the title *God's Equation*. Aczel reveals that his concept of God is not the personal God of the Bible. He uses both the words create and evolve almost interchangeably, and believes in a Big Bang (p. xi) and the evolution of life (p. 10). Aczel believes there is a God who created the universe: "When the final equation is constructed, we should be able to use it to solve the wonderful riddle of creation. And perhaps that's why God sent us here in the first place" (p. 220).

The book subtitle is "Einstein, Relativity, and the Expanding Universe." It tells the story of how Einstein first developed his special theory of relativity (ch. 2), and then went on to the general theory of relativity (ch. 3) and his famous field equation of gravitation (chs. 4 and 8). In parallel and sometimes redundantly he brings in the history of the mathematics that Einstein used to take the next step (chs. 4, 5 and 7). He also brings in the history of the experiments that have been performed to verify Einstein's theories (chs. 6, 9, 10 and 12). Aczel begins with a preface which tells the background of why he started the project and how he did the research to write this book. He reports the latest evidence from astronomers which was presented at 1998 meeting of leading cosmologists and astronomers at Fermilab near Chicago. The conclusion reached at this conference (p. 11) is that the new data requires the reintroduction of a cosmological constant which even Einstein had denounced in his later years as his "greatest blunder." The evidence astronomers Saul Perlmutter, Neta Bahcall,

Erick Guerra and others have discovered is that the universe is expanding and actually is doing so at an ever-increasing rate. This discovery requires a new force in nature that has not been detected and which counteracts gravity (p. 203). In the final chapter Aczel shows how the equation Einstein developed with the cosmological constant comes close but does not completely describe what astronomers see. Aczel believes Einstein hinted at one of the missing pieces in his book *Out of My Later Years* (1950) where he wrote about his theory applying to gravitational fields only but not to the total field in space (p. 219).

I would highly recommend this book to anyone interested in astronomy or cosmology. The book has footnotes, references and an index. The general reader should conclude from this book that mankind still does not understand how this universe came into existence or how it works even with all the evolutionists' proclamations to the contrary. The young earth creationist reader can be encouraged that there is strong evidence for the Creator. And He has revealed in His Word how and why this awesomely complex universe was created which mankind is still striving to understand.

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Notes from the Panorama of Science

Star Formation: Faulkner and Mulfinger—II

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Readers are urged to consult earlier papers on this subject (Mulfinger 1970; Faulkner, 1998; Williams 2000; Faulkner 2001) so that they may understand the direction the discussion has assumed. I do not share Faulkner's concern over Mulfinger's entropy calculations since Mulfinger's careful discussion of these calculations was technically correct (see Williams, 2000). I suggest that what Mulfinger wrote and what Faulkner is arguing are two different matters.

Thermodynamic Systems

Examining Faulkner's most recent treatise (2001) on the subject, he indicated that Mulfinger should have included the total entropy of the universe—in other words, expand his system to include the entire physical world. I discussed the danger of enlarging a system to include entropy producing processes that do not affect the “smaller” system under study (Williams, 2000, p. 48). Thus the surroundings of the system to Faulkner are the entire universe. This may satisfy certain astrophysical schools of thought, but it is not thermodynamic reasoning. For instance, consider these remarks by King (1962, p. 1):

Thermophysics deals with transfers of energy between a system and its surroundings and with transformations of energy from one form to another. In thermophysics a system is a limited and clearly recognized region of the universe which is singled out for study. The adjoining regions with which a system exchanges energy and matter are called near-surround; more remote regions which are not affected by the system are called far-surround.

In a section entitled Surroundings in their book, Kestin and Dorfman (1971, p. 5) claim: “Matter which affects the phenomena occurring in the system constitutes its immediate *surroundings*.” In Mulfinger's analysis, the system was the cold (100°K) ideal gas cloud, whereas the near or immediate surroundings were the enclosing hot (10,000°K) cloud. In the star formation model which Mulfinger criticized, the hot cloud surrounded the cold cloud and the pressure from this hot substance supposedly compressed the cold cloud until a star formed naturalistically. Mulfinger felt that the star formation model would not work. He made entropy change (dS) calculations and

found the change would be negative ($dS < 0$). Since ideal gases do not spontaneously contract, they must be constrained to contract, thus $dS < 0$. Was the mechanism “forcing” the cold cloud to contract realistic? Mulfinger concluded that it was not. (The so-called natural process would not accomplish the compaction.) All that is necessary to reach this conclusion is to consider the system and the near surroundings not the entire universe which is sound thermodynamic reasoning.

“The Rest of the Universe” As a Scientific Concept

Attempts to define the universe *scientifically* run into trouble (See Williams, 1970 for a creationist discussion about our ignorance of the content or extent of the universe). In 1957, DeSitter (p. 318) flatly stated that the universe as far as science is concerned, is just a hypothesis. Mulfinger (1967 p. 67) noted that, “Scientists are thoroughly stymied by the nature of the *present* world... we don't even know what it is.” We may know more about the universe in 2000, but not much more. As the idea of using the rest of the universe in a thermodynamic system, Kestin (1966, p. 23) commented as follows:

The material objects not included in the system inside its boundary constitute its surroundings. We may be inclined to say at this point that the surroundings of a system therefore include “the rest of the universe.” In order to avoid speculation about the nature of the universe on whether it is contracting, expanding, or oscillating it is not necessary to succumb to such an impulse. It is known from experience that the effect on whose analysis we may wish to concentrate our attention decays with distance. At a sufficiently large distance from any system under consideration, the processes which occur within it cease to exert any measureable influence and may be ignored for all practical purposes. Consequently, experience shows that even in the surroundings of a system it is only necessary to include a limited number of material objects, namely, those present in its *immediate surroundings*.

What happens when you allow the universe to be your surroundings, as Faulkner suggests, is that you introduce philosophical questions into the discussion such as what you view the universe as being, how big you consider the universe to be, what processes occur *all over* the universe, how the universe was started (its origin), etc. The rest of the universe is *not* completely scientifically knowable. This is

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the problem when you employ it as infinitely extended surroundings. There is nothing wrong with devising scientific models of the universe, but they inevitably include assumptions about what the universe is.

The Universe as an Energy and Entropy Sink

There have been past suggestions by certain astrophysicists that all thermodynamics should be keyed to the expansion of the universe! The leader of this movement was Benjamin Gal-Or who called the movement the new astrophysical revolutionary school of thermodynamics. He noted (1972, p. 305) that:

...the new revolutionary view that cosmology generates thermodynamics (i.e., the origin of the second “law” of thermodynamics can be traced back to the present expansion of the universe).

In question particularly is the concept of irreversibility of natural processes—the “one wayness” of natural processes (King, 1962, p. 78). Spontaneous natural processes proceed in one direction only. The second law of thermodynamics was developed to reflect this observed direction of natural processes. Involved with these fundamentals is the so-called “arrow of time” (time is not reversible).

Making cosmology more fundamental than thermodynamics (astrophysical revolutionary school) allows the universe to become a huge thermodynamic sink (Gal-Or, 1972, p. 313). Among some of the consequences of this radical shift in thought is that any energy released finds its way out into expanding space (p. 314) which of course, never reaches equilibrium since it is always expanding. Likewise “...A new entropy-free thermodynamics can thus be constructed...” (p. 315). Can you hear millions of former students who were tortured by thermodynamic terminology cheering such a move?!

If the expansion of space is taken as the most fundamental time asymmetry then, the formulation of a unified (and entropy-free) thermodynamic theory can be started directly from the proper field equations that govern the very expansion of the universe as a whole (most likely those of general relativity). [Gal-Or, 1972, p. 315]

Thus speculation supersedes thermodynamic principles and some of Faulkner’s arguments agree with this revolutionary astrophysical school. The 2.7K space of the expanding universe becomes an energy sink. Any process becomes viable including naturalistic star formation as long as the entropy content of the universe increases. With the great energy sink in the sky, anything goes. The fundamental reality in physics becomes the expansion of space on which to base all other phenomena.

Obviously most, if not all, of those in this school of astrophysics believe in the Big Bang model for the initiation of the physical world. The search for the 2.7K temperature of

space was model-driven. The expansion of the universe, after initial explosion everywhere, is a model-driven necessity. We know little if anything about deep space and we do not know much about what we can observe in near space yet some physicists are willing to base all of physics on the speculative concept of a model-required expansion of space as the fundamental reality.

It may sound logical and many speculations have been quite logical, but not scientific. We cannot demonstrate that space is an energy sink, it is a philosophic concept. What about space as an entropy sink? The concept of entropy was developed based on the irreversibility of natural processes. Entropy is neither a fluid nor can it be observed moving from place to place. Thus you cannot demonstrate that entropy increases in space or even “goes out” into space. Also a large entropy increase in one region cannot cancel a supposed entropy decrease in a far distant location. These entropy changes are not additive (from system to far surroundings). Entropy must increase in *all* realistic natural processes. See Prigogine, 1967, p. 17.

Use of C_p or C_v

Faulkner indicated that Mulfinger should not have employed C_p in his thermodynamic equation for the shrinkage of the ideal gas cloud into a supposed star. Mulfinger assumed a constant pressure, but if one assumes a variable pressure and volume, C_p can be used as noted below. Either equation (1) or (2) can be used to calculate entropy change (ΔS) including the introduction of C_p for an ideal gas in equation 2. For one mole of gas:

$$\Delta S = S_f - S_i = \int_{T_i}^{T_f} C_v \frac{dT}{T} + R \ln \left(\frac{V_f}{V_i} \right) \quad (1)$$

$$\Delta S = S_f - S_i = \int_{T_i}^{T_f} C_p \frac{dT}{T} + R \ln \left(\frac{P_f}{P_i} \right) \quad (2)$$

$$= C_p \ln \left(\frac{T_f}{T_i} \right) - R \ln \left(\frac{\frac{RT_f}{V_f}}{\frac{RT_i}{V_i}} \right)$$

where S_f and S_i = final and initial entropies, T_f and T_i = final and initial temperature in (K), V_f and V_i = final and initial volume in liters, and P_f and P_i = final and initial pressures in atm.

Substituting the proper values in the Spitzer model for the inner gas cloud, you arrive at an entropy change of -46 entropy units/mole in either equation (1) or (2).

Generally one will always obtain a negative entropy value in the contraction of an ideal gas. Again I repeat, gases, including ideal gases do not *spontaneously* contract. Thus they must be constrained to cause contraction which

is reflected by a negative entropy change. The normal natural irreversible process with a positive entropy increase is the spontaneous expansion of a gas.

Gravitation

Faulkner (2001) discussed a self-gravitating, radiating cloud and suggested that Mulfinger should have included gravity potential considerations in his paper. Mulfinger covered gravitational effects in the massive cloud (pp. 11–12). This is a major misunderstanding of Mulfinger's work. First of all, the cloud is not self-gravitating in the initial phase of supposed contraction. This is where Mulfinger centers his study. No star has formed to be self-gravitating. No critical mass has been reached where self-gravitation can occur.

Mulfinger calculated the outward force or pressure (Phillips, 1994, p. 7) from the random thermal motion of the gaseous particles at 100K. Then he figured the inward force of gravitational attraction. He found that the outward force was 64 times greater than the inward force. He noted (p. 12): "The cloud has 64 times as much outward force as inward; it therefore has a greater tendency to expand than to contract." If the cloud is condensed to a radius of slightly less than the radius of the earth's orbit then "... gravitation is in fact causing the material to contract..." (p. 12). He then noted that how the gaseous matter was reduced to that volume "...is impossible to understand, short of direct creation" (p. 12).

Radiation

Radiation of energy from a protostar at 100K through a surrounding 10,000K cloud if the latter was sufficiently transparent to infrared radiation was suggested by Faulkner (2001). All an astrophysicist has to do is choose an opacity of the outer cloud that would aid his case and make the process work beautifully on paper. The ability of an object to emit radiant energy is proportional to the fourth power of its temperature in (K). If a 100K cloud is capable of such radiation, the outer cloud at 10,000K would radiate its heat away at several magnitudes of intensity greater than the 100K inner cloud. Likely what would actually happen in a natural situation is that the outer cloud would cool rapidly as the inner cloud heated and both clouds would reach thermal equilibrium with each other and interdiffuse so that we have the happy result that natural star formation would not occur. Is it possible that in the beginning God created physical matter and designed the temperature differences and mass variations within the universe that resulted in stars and various other stellar objects and that natural processes are incapable of doing the same?

Conclusions

Mulfinger's analysis of the Spitzer model reflects valid classical thermodynamic reasoning in my opinion. Faulkner adopts astrophysical reasoning where cosmogony overrules observable science. Mechanics can always be manipulated to fit the requirements of a naturalistic model, but not the known directional tendencies (degeneration) in the universe. In the world of secular science, it can be seen over and over again that naturalistic dogma must supersede observable science where necessary. Regularly evolutionary biologists tell me that since entropy increases enormously as the sun spews out energy, entropy can decrease on the earth with a resulting increase in order and complexity. Furthermore, I am informed by these biologists that the additive entropy change is positive and the second law is not violated. They cannot be convinced that these supposed entropy changes occurring at great distances apart are not additive. Entropy always increases in every irreversible (natural) process anyway.

Evolution from molecules to man must always triumph over any objections to it since "nature" acted in this manner and there is no other "scientific" way possible to generate a physical world! Naturalistic dogma supported by very intelligent reasoning resulting in beautifully logical origins models can be quite convincing. The second law just does not work or is overcome by circumstances when it opposes evolutionary development. The law may work in the laboratory, but not in nature when it "gets in the way" of secular needs.

If the universe is defined as a mammoth energy sink, it allows any conceivable process to work on paper as long as the waste energy radiates outward into the big sink. (Entropy decreases will always be additively less than the supposed massive entropy increase in the huge sink.) Not good thermodynamics, but a great evolutionary concept. It would be possible on paper to have heat move from a 100K object to a 10,000K object, then onward to the 2.7K sink. After all, heat eventually goes from a hot object to a cold object. Any imaginable entropy decrease can be produced on paper since the sink has an abundant entropy increase to allow for it! The second law has been negated and entropy becomes an unnecessary concept. I hope that creationists reject such reasoning and naturalistic assumptions.

I believe that God created the original matter, order and complexity which was made into a fully-functional physical world. The Creator initiated preservation processes such as reproduction in living organisms that oppose or slow degeneration processes in nature (Williams, 1976). He created an intelligent being, man, who with his ability of reasoning can hold back the effects of degeneration and develop many magnificent devices, but in the end he (individually) goes back to dust and the physical world

continues in a spiral of degeneration ever opposed by preservation processes designed by the Creator.

I do not agree with the revolutionary school of astrophysics and their burial of entropy. A more reasonable approach to the "entropy problem" was attempted by Frautchi (1982) who suggested that:

An expanding "causal" region is defined in which the entropy, though increasing, tends to fall further and further behind its maximum possible value, thus allowing for the development of order (p. 593).

Of course the assumptions behind the work are all purely naturalistic and the author admits that his efforts are highly speculative, but at least he faced the issue of increasing entropy and did not define it out of existence. As a creationist, I believe even this reasoning does not solve the problem.

I urge readers to make up their own minds about the relationship of the second law of thermodynamics concerning evolutionary star formation and other naturalistic concepts. Do not accept the assumptions of naturalism because of the difficulties in understanding thermodynamic terminology and methods and its application to the origins debate.

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The Production of Form, Hox Genes, and Symmetric Variation

Colin Brown*

In my letter (Brown, 1999) I explained how symmetric variation works and I offer a number of recent examples which support the idea that genes produce form. Symmetric variation is at the heart of why life forms remain within their respective kinds and it also governs the outcome of genetic change and the types of change that can occur. The way amino acids are coded by their bases ensures that some mutations will produce no change, hence the term "symmetric". I prefer the term symmetric because the term "silent" implies that nothing has happened whereas something has happened, but the result remains the same. Other DNA changes produce changes within the same amino acid groups and yet other mutations can produce a

broader form of the gene by mutating outside the amino acid group to which the original amino acid belonged.

Over the years, some 30 genes have been discovered that are active in producing the pattern of the embryo of the fruit fly (*Drosophila melanogaster*). Three of these are involved with the production of the head to tail pattern of the organism (Nusslein-Volhard, 1996). By injecting a protein called bicoid at what would have been the tail-end, a head and thorax are produced instead. With the bicoid protein a head can be produced at either end if desired (St. Johnston and Nüsslein-Volhard, 1992). An even more recent paper has shown that a new family of secreted proteins cause head induction in *Xenopus* (Glinka, Wu, Delius, Monaghan, Blumenstock and Niehrs, 1998, pp. 357–362).

A recent science program in the B. B. C. Horizon series presents a history of the Homeobox genes (Hopeful

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Monsters, 1998). In this program, a Hox gene that was involved in the guidance of eye production in a mouse was put into a fruit fly and the eye of a fruit fly was produced. A Hox gene known as Hedgehog was taken out of a fruit fly and put into a developing chick and as a result a mirror image of the chick wing was produced. This gene in the fly is used to guide the production of the limbs. In a remarkable case a woman in the U. S. A. had this same gene used to induce the production of new bone in her damaged leg. This shows that these genes are like switches that control other genes that guide the production of specific organs such as wings. What type of organ goes where is determined by the Homeobox genes like turning on the production of an eye. But the nature of the eye which is built will be governed by many target genes which produce an eye that is typical of the particular kind of life form. Bony fish have a number of mammalian Hox genes, but do not produce anything beyond fish structures. Likewise horseshoe crabs have Hox genes belonging to higher forms of life but do not produce anything beyond crab organs (Carroll, 1995, p. 484). These phenomena fit well with the creation view. The list could be extended but space does not permit us to go further. There is enough here to show that there is a very strong genetic connection to form.

The genetic mutations hoped for by evolutionists to change life forms beyond their kinds will not come about. But any mutations that do occur will only produce changes within the genetic potential of the kind.

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Book Reviews

The Age of the Universe: What are the Biblical Limits? by Gorman Gray
Morningstar Publications, Washougal, WA. 2000, 192 pages, \$9.99

Evolutionists claim that the geological record represents millions of years of earth history. Creationists insist that God created everything in six solar days less than 10,000 years ago. And so the two groups have been at loggerheads for years, with little prospect of solving the controversy.

One recent book which attempts to clarify some of the problems involved is this biblical study by Gorman Gray. His thesis is that both groups have erred, evolutionists by trying to deny the plain evidence of earth's surface shaped by catastrophe, and creationists by misreading the very first sentence of Genesis. Many believers skim the first verses of the creation account rather quickly. But according to Gray, we should pause to examine "In the beginning God created the heavens and the Earth." In his opinion this is not a summary as is so often assumed. It is a description of an event.

It is not stated when the heavens and earth were created, and up to this point there has been no identification of their creation with day one. There has

been an assumption (that heaven and earth were created as part of day one) but that idea is ill founded... (p.58).

The universe radiated its enormous energy as soon as God created the heavens in verse 1, but the surface of the earth... lay in total darkness under a thick cloud according to verses 2 and 6 as well as Job 38 where the Lord Himself describes the conditions (p. 59).

The planet continued "barren, waste, and dark," and may have been that way for multiple ages before a first day took place (p.60).

Day one begins the work of conditioning a deserted and empty planet for life... So, about 6,000 or perhaps 7,500 years ago, God commanded light to shine on the earth... Light was not created on the first day. Light coexists with matter and had been beaming throughout the universe since the beginning creative fiat (pp. 61-62).

Beginning with the first day, the biblical text focuses on the local biosphere. A rotating planet existed and a light source of fixed orientation created day and night. The light became diffusely visible at first; later on day 4, the remaining clouds were parted and God “brought forth” the sun, moon, and stars, making them fully visible to provide signs and seasons for man (p.59).

The author points out that the Hebrew word *asah*, usually translated “made” expresses many shades of meaning, so that in verse 16 “brought forth” expresses God’s action when he made the heavenly bodies fully visible on earth. The noun “heavens” may refer to the atmosphere, or to the visible universe depending on context.

Mr. Gray makes his arguments in a most irenic way, giving great detail in attempting to make these ideas clear. He rightly assigns responsibility for human error in biblical interpretation to our ancient enemy, Satan, who loves to see us in controversy over God’s word.

This is a scholarly book, with a number of chapters devoted to methods of Bible interpretation and to answering various viewpoints in origins theory. There are several appendices, a bibliography, and subject and scripture indexes. The ideas herein expressed merit careful consideration by those engaged in the study of origins.

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***Climbing Mount Improbable* by Richard Dawkins
W.W. Norton, New York. 1996, 326 pages, \$25**

Oxford University professor Dawkins argues that Darwinism produced humans from simple organic molecules. Johnson (2000, p. 105) claims that Dawkins “is the world’s most prominent exponent of Darwinism and scientific atheism.” With this in mind, I anxiously read the 326-page work, but was very disappointed. Actually, the book was misnamed: It should have been titled *The Wonders of God’s Creation Described in its Exciting Details*. Much information is presented, especially about invertebrates and the complexity of life, but there is little information to demonstrate how life could have climbed mount improbable (more accurately *mount impossible*) starting with molecules and culminating in humans.

Where Dawkins endeavored to *Climb Mount Improbable*, a creationist would recognize most of his arguments. He has a fairly well argued chapter on how the eye could have evolved, basically assuming that it did evolve. Otherwise, he raises many more questions than he answers, and gives many examples of microevolution and much speculation about possible macroevolution scenarios. I repeatedly asked myself “How can evolution explain this or that?” expecting Dawkins to attempt an explanation, which he rarely does.

I obtained my copy of the book at a remainder sale for \$4.98 only two years after it was published. Evidently the publishers were much more optimistic about the book’s sales than the public, possibly because it was not a tightly woven argument for evolutionary naturalism, but more a lively discussion about the wonders of nature written in a friendly conversational style.

His philosophy—some might say his religion—comes through loud and clear in several chapters. He tells of an experience when his daughter, Juliette, was six years old. Juliette pointed to some wild flowers, and when Dawkins asked her what she thought they were for, she responded,

“to make the world pretty and to help the bees make honey for us.” Dawkins responded “I was touched by this and sorry I had to tell her that it wasn’t true.” The truth was, Dawkins explains, creation is not here for our benefit, but is simply a result of the natural selection of mutations—only the fittest survive in the long run, and flowers that attract more bees are more fit, and thus exist today.

Dawkins admits that what he dogmatically concludes is a “false” belief, that living things were placed here for our benefit, still dominates our culture, and he believes that it is his obligation to inform the world that this conclusion is false. Dawkins claims to see dogmatism everywhere in others, but often fails to see it in himself. Dawkins argues in this and his other books that life has no purpose or meaning except that which we give it, and religious people who argue otherwise are wrong. One might wonder about the long term consequences of teaching young children that we live in a cruel and merciless dog-eat-dog world, and that the key to survival is to be more ruthless and smarter than your competitors so you can outwit and outsmart them (or, in Darwinism, destroy them).

An example Dawkins gives as evidence for his view is “how should I have answered” if his daughter had asked “what are viruses for?” He then uses a reverse of the design argument to prove that the world could not have been designed because much evil exists in it. It would not require much research to learn that the vast majority of viruses are beneficial, or at least not harmful, and they all evidently were at one time beneficial. Viruses now serve a critical role in biochemistry, as well as in the whole field of molecular and cell biology.

A parallel is asking “why would God create fire which destroys property and kills people every day, and ignore the fact that humans need fire to cook their food, warm their houses or run their cars?” A few years ago one could state

without too much disagreement that viruses only seem to exist for the purpose of making people sick, but virology has come a long way since then. Viruses are turning out to be a wonder drug in the area of gene therapy and cancer. They may turn out to be more important than penicillin. One could equally ask before Alexander Fleming's discovery, "why would God create penicillin," a mold which was once believed to have no other purpose than to ruin bread and other food. As knowledge progresses, more and more

of the evidence accumulates proving Darwinism and Naturalism false.

Reference

Johnson, Phillip. 2000. *The wedge of truth; splitting the foundations of naturalism*. InterVarsity Press. Downers Grove, IL.

Jerry Bergman

***Creation Science Made Easy* by Elizabeth J. Ridlon and Robert W. Ridlon Jordan Hall Research Associates, Troy, IL. 1997, 136 pages, \$8.00 paperback**

This book is recommended both for those who are not familiar with the basic arguments in support of the creation world view, as well as those who have read extensively in this area. In this work the Ridlons review much general introductory biology, but also provide insight into several areas related to the creation controversy, especially in biology.

Elizabeth Ridlon has taught biology and human anatomy and physiology at several colleges including the University of Maryland. Her B.S. degree is in microbiology from Indiana State University and her M.A. is in biology from the University of Nebraska. Her Master's thesis was on a study of seasonal changes of the blood biochemistry of the western plains garter snake. Robert Ridlon, who has a B.A. in biology from Indiana University and an M.A. from the Air Force Institute of Technology, has also taught at the college level. His professional publications

are in the areas of chemistry, cell biology, and information systems.

The authors discuss the events that occur on each day of creation, which they attempt to understand from a scientific standpoint. They also list four pages of selected Old Testament references to creation. Other topics discussed include the theory that life originated on Mars, the dinosaurs, the problems with the fossil evidence for evolution (especially the human fossil record), and the various problems connected to radiocarbon dating. The chapters on genetics, cell division, and cell physiology are especially useful. The book presents much basic knowledge, and is ideal as an introduction to these topics for high school students.

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***Humanist Manifesto 2000* by Paul Kurtz Prometheus Books, Amherst, NY. 2000, 76 pages, \$10**

This is the latest of several documents stating the official humanist worldview of the Humanist Society. Humanism itself is not a negative term. Generically it concerns the values, interests, needs, and welfare of humanity (Soukhanov, 1999). However this new manifesto emphasizes the defense of abortion, divorce, euthanasia, (p.10) and abolition of moral absolutes (p.34). Ironically, at the same time is expressed the wish to enhance human life for all people on the planet (p.13).

True science is defined in this book as naturalism only (p.24). Author Kurtz declares that there is insufficient evidence for intelligent design (p.26), and he discounts the supernatural as superstition. This is not the historic view of science, described simply as the experimental investigation and theoretical explanation of phenomena (Soukhanov, 1999). And if this activity leads to recognition

of the Creator, which it surely does according to Romans 1:20, so be it. The book is just plain wrong in stating that "Modern humanism...led to the development of modern science" (p.7). Instead, it was conservative Christianity which motivated pioneer scientists to formalize scientific methodology (Kaiser 1991). Creation convinced these pioneers that nature was both designed and understandable.

Humanists often have been challenged to produce a natural basis for ethics. This is difficult when life itself is based on an evolutionary, chance origin. The best that author Kurtz can do is quote the golden rule, and also to suggest ask that we "accept the aliens in our midst" (p.32) Does he realize that both ideas come directly from scripture (Lev. 19:34, Matt. 7:12)?

Creationists would agree when the manifesto rejects New Age quackery and post modernism (p.61). One can

also admire the lofty but impossible goals stated for every person on the planet: health care, education, free income, and security (p.49). Toward this end, the manifesto calls for a new global income tax to be collected and redistributed by the United Nations. When will the lesson be learned that money does not solve societal problems, but rather adds to them? The humanist optimism for global brotherly love surely will have to wait for a future millennial day.

The manifesto carries over 100 signatures. Included are Steve Allen, Alan Cranston, Edwin O. Wilson, and ten Nobel Laureates. So much knowledge, so little wisdom.

Reference

- Kaiser, Christopher. 1991. *Creation and the History of Science*. William B. Eerdmans Pub. Co., Grand Rapids.
Soukhanov, Anne. 1999. *The American Heritage Dictionary*. Houghton Mifflin Company, NY.

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The Great New England Sea Serpent: An Account of Unknown Creatures Sighted by Many Respectable Persons Between 1638 and the Present Day by J. P. O'Neill Down East Books, Camden, ME. 1999, 256 pp., \$15.95

O'Neill catalogs hundreds of sightings of unknown creatures, 15 meters or more in length, seen by ship captains, judges, naturalists, experienced fisherman, clergy, etc. Some sketches are presented, prepared by eyewitnesses, and now being published for the first time. On occasions, there were a number of eyewitnesses, for example the more than three dozen at Gloucester, MA, during August, 1817. Native American legends and petroglyphs for similar North Atlantic aquatic creatures (p. 17) pre-date European settlement.

The majority of the observations do not match any known living creature, though there is fairly good consistency among them. Most often the head is held out of the water with the body looping in and out of the water about four times. The author suggests that there are many other sightings that are not known. In fact, Kent Hovind interviewed a Nova Scotia fisherman who had observed an unusual creature with a half-dozen others in 1976. Though that sighting had been published in the local newspapers, the author did not know it when the book was written.

The author believes the evolutionary paradigm for the great antiquity of the earth, a belief that has caused a majority of scientists to discount the survival of "ancient" creatures today. One cryptid, the Lake Erie sea serpent (a marine tetrapod), isn't just a "fish story." A specimen has been obtained by the Creation Evidences Museum (TX). It is being examined in preparation for classification. A picture of it may be seen online at (Kent Hovind's website).

An appendix enumerates the known sightings in chronological order. The bibliography provides a good number of sources, current and past, for the North Atlantic Sea Serpent and cryptozoology. *The Great New England Sea Serpent* is recommended for all those that enjoy cryptozoology.

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Hallmarks of Design by Stuart Burgess Day One Publications, Surrey, England. 2000, 200 pages, \$14

Author Stuart Burgess lectures in Engineering Design at Bristol University. This book has been popular reading for creationists across England. It is filled with examples of intricate design in nature. Extra emphasis is given to birds (migration, song, feather design) and also human anatomy. An entire chapter discusses the human knee joint from the viewpoint of mechanical engineering. Anyone who has suffered a knee injury would be fascinated by the details. Topics seldom found in creationist literature in-

clude fruit and farm animals (pp.120-124). There is an appendix of quotes from creation and evolution sources. A list of creation organizations does not include the Creation Research Society or the Institute for Creation Research.

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An original plus two copies shall be submitted to the editor of the *Quarterly*. Due to the expense involved, manuscripts and illustrations will not be returned to authors.

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After the peer review is finished and all changes have been made to the article, a final copy will be requested. This should be accompanied by a computer disk containing a copy of the article in Rich Text Format (.rtf). Authors who provide either an email address or fax number will receive a proof copy of their article just prior to publication.

Authors are requested to supply a list of key words for subjects covered in their articles.

The *Quarterly* is a journal of original writings. Only under unusual circumstances will we reprint previously published manuscripts. Never submit an article to two or three journals, including ours, hoping all of them will publish your work. When submitting an article, please state if the material has been published previously or has been submitted to other journals.

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Although it is nicer to be positive, there seem to be a lot of important negatives:

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- Do not use multiple spaces for tables and similar material. Use tabs instead.

- Do not use dashes (—) for definitions, but use colons instead, e.g., “NR: Not recorded.” Where dashes are appropriate, to indicate a pause in thought, please use *two hyphens* (with no spaces on either side) if your word processor does not offer an actual dash.

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References and Book Reviews

References should be in the current *Quarterly* style. Additional references with *identical* authorship should be preceded by three underline characters in place of the name(s). The examples below should cover most possibilities.

CRSQ: *Creation Research Society Quarterly*. [for multiple *Quarterly* references]

Cockman, Joneen. 1988. Collecting plants for the Creation Research Society Herbarium. *CRSQ* 24:187–193.

Margulis, Lynn. 1971a. The origin of plant and animal cells. *American Scientist* 59:230–235.

———. 1971b. *Origin of eukaryotic cells*. Yale University Press, New Haven, CT.

Hitchcock, A. S. 1971. *Manual of grasses of the United States*. Dover Publications, New York.

Walker, Tasman B. 1994. A biblical geologic model. In Walsh, R.E. (editor), *Proceedings of the third International Conference on Creationism* (technical symposium sessions), pp. 581–592. Creation Science Fellowship, Pittsburgh, PA.

Book review headings, like references, have a particular style which should be followed. This issue of the *Quarterly* will provide examples.

Length

Manuscripts containing more than 25 pages are discouraged. If a topic cannot be covered to the author's satisfaction in this number of pages, the author should divide his material into separate papers that can be serialized in the *Quarterly*. Book reviews should be limited to 1000 words.

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High quality papers for the Fifth International Conference on Creationism (ICC), Summer 2003, Pittsburgh, PA, are now invited for submission. In continuation of the Fourth ICC, the theme of the Fifth ICC is "Developing and Systematizing the Creation Model of Origins," making the Fifth ICC a "working" conference.

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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.

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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.