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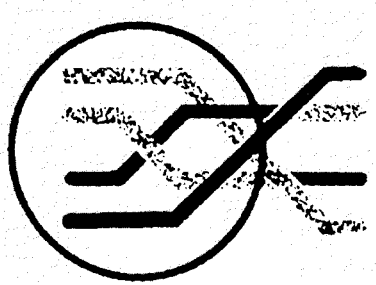

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Issue 37 **Winter 1995**

Articles

About this issue. . .

The subtitle of our journal reminds us that antievolutionism is not limited to creationism or creation "science." The articles and the reviews in this issue deal with the broader perspective described in the second of the NCSE's mission objectives—to promote science "as a way of knowing." It is important whenever we discuss evolutionary studies and concepts to keep in the forefront the principle that the theory and method of modern scientific biology is based on on empirical observation of and falsifiable hypotheses about natural phenomena operating in natural ways in the natural world.

In his commentary on the National Park Service's (NPS) interpretative and education programs, Phillip Johnson argues that the NPS has taken this naturalism too far. This is a familiar critique by Johnson against all the modern sciences that bear on evolutionary biology. The reply to Johnson from Eugenie Scott and Mac West touches on some of the reasons why the NPS is acting responsibly and appropriately in its interpretations of the natural wonders in its stewardship.

On the familiar ground of Bible-based antievolutionism, Brian Alters has contributed a detailed summary and content analysis of the Institute for Creation Research's summer Institute on Scientific Creationism. For two-and-a-half days, ICR faculty present their case for creationism uninterrupted and unchallenged by pesky evolutionists. Alters asks whether they have really presented much of a case *for* creation "science."

Joe Barnhart has contributed a short article in memory of philosopher of science, Karl Popper. Barnhart reflects on Popper's crucial role in redefining science as a way of knowing in our century. Popper is the driving force behind establishing firmly the principles of testability of hypotheses and the process of falsification as the foundation of modern science. We present excerpts from this article with the author's permission.

We finish the theme of science as a way of knowing in three reviews. The first is the review of Periannan Senapathy's recent book

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A Content Analysis of the Institute for Creation Research's Institute on Scientific Creationism

Brian J. Alters

Typically Institute of Creation Research (ICR) personnel have a relatively short amount of time to present their views. Whether in a debate or lecture, they are generally limited to less than a few hours with only one or two speakers. One wonders what would be discussed and what priorities would be given various subjects if ample time and resources were available.

At multiple times during the year ICR conducts 2-3 day *Institute on Scientific Creationism*. These institutes are held at locations throughout the country traditionally with two-to-three ICR speakers sent to conduct the proceeding. Once a year, ICR holds an institute in El Cajon, California, which is 15 minutes from ICR. The result of this close proximity is that many more speakers are available to present; the 1995 institute consisted of nine speakers from the ICR graduate school faculty.

I attended this two and one-half day institute's 13 lectures, spanning 18 hours, to discover: a) the extent to which the ICR Institute on Scientific Creationism is scientific; b) what philosophical/theological underpinnings of ICR might be revealed; and c) topics of the current arguments put forth by ICR personnel against evolution and for creation. In addition, this study was done so others may better understand what ICR currently deems important given ample time and personnel to present its positions.

Brian Alters is a doctoral candidate in science education at the University of Southern California in Los Angeles.

Methods

After attending the institute, I obtained ICR audio tapes of the 13 lectures and coded them as to the amount of time spent on each of the following categories:

SCIENTIFIC RATIONALES: For/Against

Attempts to present scientific data or rationales to support creation or discredit evolution.

SCIENTIFIC STATEMENTS: Neutral

Presentation of science upon which both creationists and evolutionists would agree. Example: the processes of a cell or the complex geometry of a diatom. (Note. For brevity, those who hold creation to be the most accurate explanation of origins will be called *creationists*, and those who hold evolutionary theory to be the most accurate explanation will be called *evolutionists.*)

CHARACTERISTICS OF SCIENCE

Discussion of the characteristics of science including characteristics with which evolutionists might not disagree. Example: advocating that scientific theories must be susceptible to a test of falsification.

BIBLICAL RATIONALES: For/Against

Presentations of biblical rationales or references that directly support creation or discredit evolution. Example: references or rationales concerning the first chapter of Genesis (Note: Although not a part of the Genesis account of creation, arguments supporting or based on the occurrence of a world-wide flood [Noah's] were also coded in this category.)

BIBLICAL RATIONALES: Unrelated

Biblical rationales or references presented that were not directly related to the creation/evolution controversy. Example: rationales or references concerning ones' salvation.[1]

OTHER

This category included all matter in a lecture that did not fall into any of the above categories.

The time devoted to each category was calculated and then converted into a percentage of the total time per lecture. These percentages are presented in the results section by lecture/speaker with summaries and salient quotations. The title of the lecture is given followed by the speaker and his academic position at the ICR graduate school. All quotations are taken from the ICR audio tape of the lecture being reported.

Percent Time by Category by Lecture

Speaker	*Lecture Title*	*Scientific Rationales For/Against*	*Scientific Statements Neutral*	*Characteristics of Science*	*Biblical Rationales For/Against*	*Biblical Rationales Unrelated*	*Other*
Morris, J.	Creation/Evolution: The Basic Issue	20	27	4	16	6	27
Morris, H.	Biblical Creationism	2	0	1	68	29	0
DeYoung, D.	Creation and the Hubble Law	15	55	0	4	0	26
DeYoung, D.	Astronomy and Creation	10	81	0	0	0	9
Cumming, K.	How Life Was Made	28	28	1	28	2	13
Cumming, K.	How Life Has Structure	2	25	0	9	7	57
Humphreys, R.	Evidence for a Young Earth	49	16	0	5	0	30
Lumsden, R.	Evidence for Design	0	76	0	0	4	20
Lumsden, R.	Why Not Evolution?	15	46	0	1	0	38
Austin, S.	Flood Model for Earth History	35	26	0	9	4	26
Austin, S.	Mount St. Helens: Explosive Evidence for Creation	31	58	0	3	3	5
Deckard, S.	Creationists' View of Curriculum Design	0	2	7	0	22	69
Vardiman, L.	The Big Freeze	12	56	0	0	3	29
AVERAGE		17	38	1	11	6	26

Results

Title: Creation/Evolution: The Basic Issue
John Morris, Professor of Geology

This opening institute lecture was designed to cover "the basic issue" of the creation/evolution phenomenon as indicated by the title. The single topic to which the greatest amount of time was devoted (27%) discussed science upon which both evolutionists and creationists would agree. In defining scientific creationism or its most current permutation, Morris revealed its origin:

> The abrupt appearance—stasis model—that's the creation model. We can define creation in scientific terms that might be called scientific creationism, but of course it comes from the Bible—biblical creationism.

Four percent of the time was spent discussing presuppositional differences in interpreting data and the characteristics of science as it relates to evolution:

> It's a scientific idea, maybe, about history. But it's not well supported by the scientific facts, and to tell you the truth, it's really not in the category of things that could be a fact. It's an idea that some people have about the unobservable past, as opposed to the observed present. The observed facts, that's what science is all about—making observations, gathering your data, collecting your facts, running your experiments, making your measurements, that's science.

Twelve percent of the lecture consisted of biblical evidence for creation and examples of evolution's scriptural incompatibility, six percent on biblical issues not directly related to creation/evolution. For example, "The flood [Noah's] and the age of the earth are synonymous concepts."

Twenty percent of the time was spent on scientific evidence that purportedly supported creation and showed that evolution is untenable. This took the form of the traditional ICR attack of organisms' appearing to have design (e.g. the human eye), the lack of transitional fossil forms, the argument of the supposed uselessness of intermediate forms of wings and jaws, misconceptions concerning punctuated equilibrium, and the obligatory Stephen Jay Gould partial quotes.

Title: Biblical Creationism
Henry Morris, Professor of Hydrogeology

Sixty-nine percent of the lecture concentrated on biblical "proofs" for creation and against evolution, twenty-nine percent on biblical issues not

directly related to creationism's veracity, two percent purported scientific evidences against evolution, and one percent on characteristics of science. The biblical discussion centered around answering "how," "when," and "why" God created the universe. The respective answers were: a) "By special fiat, completed, mature, harmonious, perfect creation;" b) "in six literal days, several thousand years ago;" and c) "because He [God] loved us, it was His will to do so, because we somehow glorify Him, so He can show the exceeding riches of his grace towards us in the ages to come."

As the father of the modern U.S. creationist movement and founder and president of ICR, one can assume that Morris spoke for at least the Institute's supernatural presuppositionalism when he made the admission that:

> The approach we try to take here [ICR] is to assume that the word of God is the word of God and that God is able to say what He means and means what He says, and that's in the Bible and that is our basis. And then we interpret the scientific data within that framework.

Concerning Christians who do not share the creationist position, Morris stated:

> You can be a Christian evolutionist. You can be a Christian liar. You can be a Christian thief. You can be a Christian adulterer. Christians can be lots of things they ought not to be, but that doesn't make them right. It isn't right to be a Christian evolutionist.

Then, concerning evolutionists and evolution, Morris stated, "not all evolutionists are atheistic, but evolution itself is atheistic. . . . The leaders of modern science, almost without exception, hold to atheistic evolutionary theory whatever their particular personal religious views might be."

When biblically making a case for a young earth, Morris used the mechanism of a world-wide cataclysm (Noah's flood) for the fossilization explanation, as opposed to long periods of time. He explained that the flood was a supernatural event causing waters to rise "fifteen cubits above the highest mountains in the world [as described in the Bible]. . . . And Mount Ararat is 17,000 feet high." However, when Morris addressed common attacks to a global flood, that is, that the Bible teaches a local flood, he counters with naturalistic science stating that to have a 17,000-foot high local flood "you've got to have some sort of an egg-shaped flood or something, and that can't be; hydraulically that just won't work."

Title: Creation and the Hubble Law
Donald DeYoung, Professor of Astrophysics

This, the first of two lectures by DeYoung, commenced with a discussion of life's need for water. Approximately 55% of the lecture consisted of this type of basic science about which both evolutionists and creationists would agree; 4% of the lecture concerned biblical support of creation and/or denial of evolution. DeYoung spent a significant amount of time talking about how science might explain why God created things the way He did. For example, when DeYoung addressed whether the universe is expanding and that the galaxies are moving outward, he stated:

> I expect that they are; I believe that when the Creator spoke this universe into existence, especially the fourth day when He made the sun moon and stars, He made the creation in an expanding mode. He made the galaxies spreading out. And I believe He did that for stability, because if he just parked the galaxies out there and they weren't moving at all, then gravity would take over and they would all start to fall inward and we would have the Big Crunch.

However, he did not extrapolate this expansion back to the Big Bang, but instead, suggested problems with the Big Bang itself. In addition, the audience was reminded multiple times that "In our minds, especially this weekend, we have to keep separate big distance from big time, they're not the same."

Much time was spent discussing basic astronomy, such as Hubble's Law and history. A few sample calculations were performed to illustrate the function of variables and constants with relation to how astronomers determine star distances. This was done to show that when various astronomers' values are placed into the Hubble equation the result is differing ages for the universe (e.g. 2-20 billion years), therefore showing that evolutionary astronomers have great disagreements as to the age of the universe. Another example of age disagreements was given in which scientists reported varying ages for a particular Arizona meteorite crater. In all, approximately 15% of the lecture consisted of attempts to weaken evolutionary theory and support creation using scientific rationales.

DeYoung gave three reasons why he and ICR reject a universe that is billions of years old: a) "I react against the arrogance of so much of the science establishment today when they talk about long time scales;" b) "the science data;" c) "scripture very clearly points out a recent creation."

Title: Astronomy and Creation
Donald DeYoung, Professor of Astrophysics

The majority (81%) of DeYoung's second lecture on astronomy and creation consisted of discussing basic facts about astronomy about which both evolutionists and creationists would agree, and ten percent was the presentation of scientific reasons why evolutionary concepts about astronomy are incorrect.

Four conclusions were put forth from studying space. a) The earth is unique and is perfectly protected from solar wind, UV light, X-rays, and space sound (e.g. pressure waves from explosions on the sun's surface that cannot reach the earth due to space's vacuum). This is evidence of design that "the Creator set up for our very protection." b) "Creation makes good sense." The Big Bang has difficulties explaining the origin of the initial substance; it would not explode but gravity would keep the whole thing small. If it did explode how did the various plants and stars form? And why is the composition of moon rocks different from that of earth rocks?

> There are no answers to these basic questions. . . . If we don't know where the moon came from, I think a little bit of humility is in order when you talk about the whole universe and where that came from. We have not even gotten to first base in the whole thing.

c) There is orderliness to the universe such as gravitational forces' being consistent and star trails' having great usefulness for humans (evidence of purpose). d) Everything wears out as evidenced by the death of stars (de-evolution).

Title: How Life Was Made
Kenneth Cumming, Professor of Biology

In Cumming's first lecture concerning how life was made, equal amounts of time (28% of the lecture each) were spent on science that both evolutionists and creationists would agree, biblical support for creation, and scientific rationales that purportedly demonstrate that evolutionary theory is false. The latter 28% consisted of pointing out "hurdles" that evolutionists must get over to explain the origin of life, such as how energy was captured, how polymerization took place, how small organic molecules evolved into RNA and DNA, how plasma membranes evolved, and how chemical evolution took place.

Each of these mechanisms was considered scientifically unexplained and, therefore, they were characterized as nothing but a "giant leap of faith." If anything, it was contended, the early molecules of life would degenerate because "if nature had its way it would build molecules that are not life

sustaining. You need something to override the natural tendency and produce the life-giving tendency." Cumming went on to explain the high specificity components of living systems must have in order to operate, attempting to equate specificity with intelligent design. When discussing the evolution of genes from atoms he stated, "It defies your imagination to get to that level of complexity per chance."

Two percent of the lecture was spent on biblical issues not directly related to evolution/creation and one percent concerned characteristics of science. The conclusion Cumming derived from the information presented in the lecture is that "all life was made." He called this the "First Biological Law."

Title: How Life Has Structure
Kenneth Cumming, Professor of Biology

At the beginning of the second lecture, concerning the structure of life, Cumming equated the purported lack of evolutionary explanations for life's evolving from non-life discussed in his first lecture, as "evidences (sic) that seem to indicate that life does not come from non-life." Twenty-five percent of the time was spent on discussing some aspects of science and the history of science about which neither creationist nor evolutionist would disagree, such as some components of the Wallace/Darwin model of natural selection.

Some creationist inferences were made concerning these components, which constituted of two percent of the lecture: a) "variations exist in form, function, and numbers to support complexity;" b) "variations exist within populations but within limits of types;" c) "variations ensure continuance of the types;" d) "mutation is decreasing the genetic variability," and e) "revelation supplements science." In addition, Cumming stated that we don't see a struggle for existence, but rather, "a cooperative maintenance."

Various creationist positions were advocated without reference to scientific data, comprising 57% of the total lecture, such as: a) essentialism—purpose and intent in the types of organisms; b) vitalism—"something inherent in life that is not material;" c) the role of selection—"normative . . . regulatory rather than creative;" d) the role of the individual "is very important;" and e) "design, both structural and functional, is apparent."

Nine percent of the lecture consisted of biblical support of creationism while seven percent concerned biblical issues not directly related to creation/evolution. The lecture concluded with Cumming's stating that the "Second Law of Biology" holds that "all things consist of cells and those cells represent a basic plan that tells us about the Creator Himself; and all organisms display that very fundamental plan."

Title: Evidence for a Young Earth
Russell Humphreys, Associate Professor of Physics

Forty-nine percent of the lecture consisted of describing five scientific phenomena that purportedly indicate maximum possible ages too short for evolutionary mechanisms to operate, while sixteen percent of the lecture involved science about which both evolutionists and creationists would agree, and five percent concerned biblical support for creation.

The natural phenomena presented as conflicting evidence to evolutionary time scales were: a) galaxies wind themselves up too fast; b) comets disintegrate too quickly; c) there is not enough sediment on the sea floor; d) there is not enough sodium in the sea; and e) there are not enough buried humans (population extrapolations). After presenting these phenomena, Humphreys stated, "These data imply that the whole creation is young. Galaxies and comets imply that the heavens are young; sediments and sea salts imply that the earth is young; and people imply that mankind is young." Humphreys argued further that only approximately 10% of all dating methods allow enough time for evolution to have occurred.

Title: Evidence for Design
Richard Lumsden, Professor of Biology

The lecture began with a discussion concerning how one would recognize design.

> Systems that are of high complexity, that is, functionally integrated multicomponent systems, systems that are of high specificity where only one or very few of many possible arrangements of these components works, and systems which are of low probability, at least spontaneous occurrence . . . these are the hallmarks of purposefully designed engineered systems.

The blind watchmaker argument was given to summarize that order, precision, complexity, and high specificity could not arise stochastically. Planktonic geometry (primarily diatoms), a butterfly-ant symbiotic relationship, and the locomotion and navigation system of a bacterium were offered as examples of design. The latter utilizes a wheel mechanism in flagella movement which prompted Lumsden to contend that "the wheel is the antithesis of mindless stochastic random chance and perhaps the epitome of purposeful utilitarian design."

Seventy-six percent of the lecture consisted of science data with which both creationists and evolutionists would agree. This included a discussion pointing out that organisms' functions are precise, complex, and specific, which was coded as Scientific Statements: Neutral, because evolutionists

would agree. Another 4% contained biblical issues not directly related to creation and evolution.

Title: Why Not Evolution?
Richard Lumsden, Professor of Biology

In Lumsden's second lecture, 15% of the time was spent purportedly refuting evolution with scientific evidence, 46% presenting science upon which both evolutionists and creationists would agree, and 1% on biblical support for creation. Lumsden purported that a lack of discovered intermediate fossil forms, which included discussions of *Archaeopteryx* and Coelacanths, leads to the conclusion that no evidence of macroevolution exists: "All the observational evidence we have for evolution is evidence for microevolution and speciation. Then evolutionists extrapolate to macroevolution that fish become philosophers."

In addition, various examples were discussed that did not constitute evolution according to Lumsden. These included variation within a species (e.g. peppered moth), drug resistance in microorganisms, natural selection (due to its lack of creative ability), and mutations (mostly deleterious). His conclusion was that no change past the species level has occurred, and, therefore, no evidence of macroevolution exists. Moreover, he questioned whether it even seemed reasonable that microevolution could drive macroevolution.

> Since the Cambrian we are seeing a decrease in the fundamentally different kinds of life; fewer phyla exist today than did, purportedly, 550 million years ago. But there are more species today than there were 550 million years ago. Disparity was maximal in the Cambrian; diversity was minimal. Today diversity is maximal; disparity is minimal. Now, how from that do you draw the conclusion that speciation and microevolution can drive macroevolution?

Title: Flood Model for Earth History
Steve Austin, Professor of Geology

The first of Austin's two lectures concerned a flood model for Earth history. For 35% of the time, Austin presented science data purporting to support creation and/or weaken evolution. Another 26% was devoted to science about which both creationists and evolutionists would agree, with 9% more to biblical references supporting creation, and 4% to biblical references not directly related to creation/evolution.

Austin stated that he agreed with the science of plate tectonics, however, he did not agree with the current theory of continental drift. He then provided a rationale that a relatively recent catastrophic event (Noah's flood) better

explains scientific data than does a long history of uniformitarian processes. "Our model explains not only what the evolutionists explain but it explains more and it fits within a scriptural framework." Much of this rationale was provided as computer-generated models of plate tectonics.

Austin contended that the flood was initiated by subduction of oceanic crust into the earth's mantle and then the

> flood terminated when all of the pre-flood ocean floor was gone. Essentially 70% of the planet was resurfaced; as the old ocean floor was subducted its potential energy was converted to kinetic energy as new ocean floor formed. That new ocean floor had lower density so it didn't have potential energy for subduction, so it stopped.

Multiple cases of rapid erosion were offered to illustrate that catastrophic events purportedly cause uniformitarian-looking results.

Title: Mount St. Helens: Explosive Evidence for Creation
Steve Austin, Professor of Geology

Austin's second lecture concerned what bearing the explosion of Mount St. Helens has on uniformitarian geology. Most of the time (58%) was spent giving the historical facts of the explosion about which both creationists and evolutionists would agree. Another 31% involved presenting science data purporting to support catastrophic interpretation of geology. Only 3% supported creation via biblical references, and another 3% involved biblical references not directly related to creation/evolution.

It was presented that as a result of the explosion, rapid erosions giving the appearance of long periods of time were formed and thick strata sequences were formed rapidly by catastrophic flow processes. In addition, some of the approximately one million logs floating on a lake at the side of the volcano (prior to the explosion there were living trees on the side of, or near, the volcano) sunk root end first to the bottom at differing rates. The large amount of sediments that went into the lake caused the logs to be buried vertically in differing strata layers resulting in the appearance of having once been multiple forests. Austin concluded his talk by stating,

> I believe that the eruption of Mount St. Helens will be remembered as one of the most significant geologic events of our century. When people look back on the twentieth century and ask "What was going on geologically to challenge the dogmatic teaching of evolution and provide evidence of creation?" I believe that people will remember this event, the eruption of Mount St. Helens. It's a miniature laboratory for catastrophe theory, if you will, a scale model of Noah's Flood.

Title: Creationists' View of Curriculum Design
Steve Deckard, Assistant Professor of Education

The primary purpose of this lecture was to illustrate the pervasiveness of evolutionary theory in most, if not all areas of life, therefore causing a change in world view. Twenty-two percent of the time was spent on biblical issues not directly related to evolution/creation, 7% on characteristics of science, and 2% on science about which both creationists and evolutionists would agree.

Deckard held the view that "truth comes from an objective source outside of man, and that source is God and His word." He then pointed out that creationists are not the only ones to have faith; evolutionary scientists must have faith also—faith in their senses, faith in the consistency of the natural universe (laws), and faith in human ability to understand. He understands that both creationists and evolutionists utilize reason in performing science functions, however,

> It is not an issue in the origin discussions of whether I can reason out how God created or whether or not I can empirically prove somehow, measure it, how God created. It's a faith issue; it's a supernatural issue; it's a spiritual issue.

Deckard presented a series of statistics regarding problems with today's youth, such as high rates of pregnancies, abortions, suicides, lying, cheating, and violence. Because evolutionary theory has crept into every major area of thought, he argued the resulting wide-spread relativism was a contributing cause, if not the major cause, of problems in those statistics. Deckard concluded that evolutionary theory has achieved a status of a "world view."

Title: The Big Freeze
Larry Vardiman, Professor of Atmospheric Science

All popular theories of the cause of the ice ages require millions of years; therefore, young earth creationists must explain *the* ice age (ICR contends only *one* ice age occurred) in catastrophic theories. Fifty-six percent of this lecture consisted of explaining science about which both creationists and evolutionists would agree, such as the effects of ice sheet and glacier movements. Twelve percent of the time was devoted to science that purportedly supported a catastrophic cause of the ice age and that did not lend support to uniformitarianism causes of multiple ice ages. Three percent involved biblical issues related to Noah's flood.

Multiple existing uniformitarian theories were discussed and summarily dismissed. Therefore, it was concluded that "no one, right now, has a fully acceptable theory for the explanation of the ice age." Vardiman then used

computer simulation models to illustrate a catastrophic theory for the cause of the ice age, summarizing that the ice age basically occurred because "the oceans were warm after the flood; they produced a tremendous amount of evaporation into the atmosphere which could produce tremendous precipitation for several hundreds of years after the flood in the polar regions."

Discussion

Creationists frequently contend that in public forums they have just a few hours or less to present their views. In the 1995 Summer Institute on Scientific Creationism, the creationists at ICR presented their views over two and one-half days, consisting of 13 lectures, spanning more than 18 hours with nine speakers and at least four assistants.

Consider the following: a) The institute was titled the "ICR Institute on *Scientific* Creationism" (emphasis added); b) ICR's brochure for the institute stated that the speakers were to present how evolution is "scientifically untenable" and that "the creation model is the only credible model of origins;" c) At the beginning of the first talk of the institute John Morris stated, "What you'll learn here this weekend is that the scientific evidence does not support evolution." As such, it seems more than reasonable to assume that 70-100% of the institute's time would be spent on scientific rationales for creationism and against evolution. However, this was not the case. Taking into account all the institute's lectures, the average time spent on these issues was a mere 17%!

On average, 38% of the time was spent on science upon which both creationists and evolutionists would agree. For example, the geometry of diatoms or how bacterial flagella operate is not creation science. If it is, then, contrary to what creationists contend, public schools are teaching creationism. Therefore, the data suggest that ICR's advertising of an "Institute on Scientific Creationism" might be considered inaccurate at best and deceptive at worst.

One of the reasons why creationists lost the 1981 Arkansas trial decision was due to creation science's not being considered science. Judge Overton (1982) stated that science has "essential characteristics" and that "creation science . . . fails to meet these essential characteristics" (p. 318). As such, one would expect that ICR would respond by spending a significant amount of time on their view of what the characteristics of science are in order to advocate that ICR's methods *are* scientific. It is surprising that only 1% of the average lecture's time concerned characteristics of science!

Just as 17% of the average lecture's time was spent on scientific rationales for creation and against evolution, it is telling that an equal amount of time (17%) was allocated to biblically related issues. Eleven percent of this time involved the presentation of biblical rationales and references that directly support creation or discredit evolution, and six percent involved biblical

rationales unrelated to creation/evolution. It seems that, given this biblical equal-time treatment, that a better name for similar ICR proceedings would be something like the "Institute on Biblical-Science Creationism." The reason for the use of pseudonyms such as "abrupt appearance theory" and "stasis theory" during the institutes is to give a secular veneer to creation science that is admittedly inexplicably biblically intertwined.

The results also indicate that ICR creationists use biblical history to defend their *scientific* models, and they also use established scientific laws and theories to defend their biblical interpretations, when needed. For example, to support a young-Earth position, ICR creationists call to supernatural means for a global Noah's flood to explain fossilization. However, when rival biblical scholars challenge a global Noah's flood, and suggest that the flood was local, the ICR creationists respond with hydraulic reasons why the flood could not be local. Furthermore, in many cases, the creationists use science to explain why God created things the way He did, professing at least implicitly, that natural processes explain supernatural acts. It appears that many of the institute's arguments are guilty of internal inconsistency.

ICR uses the following forms of "logic" in its institute's arguments for creation and against evolution: a) The more evolutionists disagree on a matter (e.g. the age of the universe), the more credible the creationist position on the matter. b) The greater the difficulty in explaining the complexity of a mechanism, the greater the probability the mechanism was created. c) The lower the statistical probability of a mechanism's evolving by chance, the greater the probability the mechanism was created. d) High specificity correlates with high probability of intelligent design.

The overall conclusions suggested by this case analysis are that, contrary to what many may think and creationists may want others to believe, when given sufficient time and resources, the vast majority of time at an ICR Institute on Scientific Creationism, has nothing to do with alleged scientific rationales for the support of creation or the discrediting of evolution. Instead, the institute spends most of its time on three topics: a) basic science upon which evolutionists agree; b) biblical support for creation and Christianity; and c) logic that is fundamentally based on and intertwined with literalist biblical theology.

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Note

1. It is understood that many biblical creationists contend that all biblical rationales and references are directly related to the discussion of creation because of the view that the Bible has its foundation upon the Genesis creation account. However, for the purposes of this study, a demarcation will exist as an operational definition.

Karl Popper: Philosopher of Critical Realism

Joe Barnhart

Sir Karl R. Popper who died in September 1994 at the age of 92 will be remembered as one of the most influential philosophers of the Twentieth Century. Many regard him as the century's most prominent philosopher of science. An advocate of critical realism, he gained an early reputation as the chief expounder of the principle of falsification rather than verification. In the early 1930s, he set forth powerful criticisms of logical positivism's attempt to label as meaningless all talk of ethics and metaphysics. But for almost two decades, Popper's criticisms went either ignored or misinterpreted by all except a few careful readers. By contrast, in the past four decades, an increasing appreciation of his critique has helped us better to understand the phenomenal growth of scientific theories and the close relationship between the sciences and the humanities.

Myth and Metaphysics

In both *Objective Knowledge* and *Conjectures and Refutations*, Popper demonstrates brilliantly the roles of myth and metaphysics in the scientific enterprise. Myths represent our human need to expand the horizon of explanations and to find our place in the vast scheme of things. Popper suggests that Democritus's early theory of atoms began as a myth born of a daring imagination. Myths sometimes graduate to the status of metaphysics when subjected to sustained and rigorous criticism. Metaphysics is the work we do when we carry out comparative analysis of our cosmological myths and theories. It is our drive to eliminate inconsistencies, to broaden the scope of our explanations, and to provide depth of detail.

Joe Barnhart is professor of philosophy and religious studies at the University of North Texas and has recently coauthored a historical novel based on the lives of Roger Williams, John Winthrop, and John Milton.

Critical metaphysics and cosmology provide the cognitive background for the growth of scientific theories. Logical positivists failed to see that without metaphysics to work upon and to refine, science would stagnate. In some ways, science is the metaphysics that succeeded in spawning bold theories that are not only well articulated and critically debated, but also observably testable. By testable, Popper means *falsifiable.*

Falsification

Perhaps the major contribution that Popper has made to science emerges from his arguments that the job of scientific experiments is to seek not evidence to support the proposed theory, but evidence to refute it. He contends that science becomes mere ritual, making only meager progress, when it settles for running tests to verify the favored hypothesis. The real task of experimental testing is that of trying to find the weaknesses and flaws of the hypotheses.

One way to put a hypothesis to the test is to draw from it predictions about observable events in space and time. A theory becomes a candidate for being a scientific theory when its hypotheses are falsifiable and made to cover specified events observable in space and time. It ceases to be scientific when it hides behind vagueness or is so protected that it risks no bold and daring predictions going beyond the general consensus. Instead of claiming that we can pile up sufficient positive evidence to prove or verify a belief, Popper offers an entirely new way to think about testing our beliefs and corroborating them. Popper's epistemology makes no fetish of either skepticism or faith, but offers a heuristic for science as a way of knowing.

According to Popper the whole point of seeking to shoot down our scientific theories is not simply to increase our supply of skepticism. Rather, the goal is to generate better theories, ones that are both bold and able to stand up under rigorous criticism without resorting to verbal tricks and vagueness. Intellectual courage and honesty in uncovering contradictions are thus essential to the search for both better explanations and better plans of action.

Popper's philosophy regards all learning as trial and error. Our mistakes in solving problems need not be viewed as failures but as a means for spawning still better solutions. This is especially true both when we try to learn where our mistakes went wrong and when we free our imagination to try out new conjectures. The beauty of Popper's theory of knowledge lies in its insistence that imagination and speculation are essential ingredients of the thinking process. Intuitions become a part of every variety of genuine thinking, including science, just because they are accepted as trials rather than dogmas.

Most of our scientific institutions and conjectures have proved to be unsatisfactory. But Popper argues that some falsified theories have contributed more to the growth of science than have safe, shallow theories that no

one has bothered to falsify. Science needs fruitful and falsifiable hypotheses that venture into new territory, but seem to defy common sense.

Creationism and Evolution

Creationists who insists on classifying their views as "scientific creationism" may not know what they are in for. Do they really want to assert that creationism is falsifiable? Do they want to try to expose its weaknesses and flaws? Do they seek to correct and revise the doctrine? As is well known, creationists take great delight in pointing out that the theory of evolution is, after all, a theory. But this should pose no problem. All scientific theories are theories. Do creationists want to say that creationism is a theory? Do they want to say that the notion of the Bible as inerrant revelation is a theory?

If Popper's analysis is correct, then both evolution and creationism are theories. The real question has to do with how well they are articulated, how well they serve to advance further research, and how well they survive rigorous criticisms. The overwhelming majority of scientists over the past two centuries have found creationism to be a poor rival to evolution in the attempt to expand our knowledge. Contrary to what some creationists claim, scientists tend to favor evolution as an explanatory theory, not because of some presupposition that blinds them to the truth, but because it is scientifically more fruitful than creationism and enjoys greater explanatory power.

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C/E

VOICES FOR EVOLUTION

ADDENDUM

VOICES FOR EVOLUTION

ADDENDUM

The following selections from the first edition are an addendum to

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CONTENTS

ADDENDUM TO VOICES FOR EVOLUTION

Following are statements from the first edition of *Voices for Evolution* which were omitted from the second edition due to an electronic error.

MICHIGAN STATE BOARD OF EDUCATION

Whereas, the United States Constitution provides for the separation of church and state; and

Whereas, the Constitution of the State of Michigan establishes the same doctrine of separation of church and state; and

Whereas, the State Board of Education is concerned that the laws pertaining to this subject matter be vigorously enforced with regard to the public schools of this state; and

Whereas, the Michigan Attorney General has opined on this matter in Michigan Attorney General Opinion 4405; now, therefore, be it

Resolved, that the State Board of Education oppose the teaching of any course in religion in any public institution which is outside of the realm of a secular program of education.

Resolved, further that the State Board of Education recommend that any school district currently teaching creationism or any course in religion in an attempt to indoctrinate toward any particular belief or disbelief cease and desist such teaching.

Resolved, that the State Board of Education recommend to the Michigan Attorney General that the full force and effect of the Constitutions of the United States and Michigan and the Attorney General Opinion No. 4405 be vigorously supported and enforced with regard to the separation of church and state in all respects

Unanimously approved by the Michigan State Board of Education on 10 March 1982.

National Association of Biology Teachers (1980)

The procedures and processes of science are well defined within the discipline. The facts and theories of science have been established through experiment and synthesis of subject, peer review, and acceptance for validity within the scientific community. Materials that do not meet the test of science or are not directly derivative from the accepted norms for the discipline should not be a part of the science curriculum.

Science deals with material things and the consequences of their application. As such, it is not in conflict with other means of knowing about the universe. There are those who see the facts and theories of science as a threat either to their belief systems or to their interpretations which may be at variance with scientific data. While science is moot on these issues, attempts are made to intercalate into the scientific enterprise conclusions neither based on scientific data nor verified by the scientific process. These conclusions, arising outside the field of science and resulting from ignoring or misinterpreting scientific data, have no place in the science classroom as a part of the body of scientific knowledge.

The NABT, through its obligation to biological education, will make every effort to educate the public as to the unscientific nature of efforts to equate non-science with the scientific enterprise. NABT will resist attempts to place non-scientific dogma into the classroom as science. Wherever such efforts are attempted, NABT should correct the record and provide adequate scientific evidence designed to allow decision-makers full access to the facts by means of which to judge the efforts to intercalate non-scientific material into science classrooms or to remove or change the data of science to accommodate a given set of conclusions derived from outside the scientific enterprise.

The credibility and usability of science depends on maintenance of the integrity of science as a discipline. While no feature in this policy is to be construed as preventing the full range of applications of science and the elucidation of its social and humanistic implications, there is an obligation to insure that the scientific data thus used is both accurate and derived within the accepted procedures of the discipline. Without the maintenance of

the integrity of the initial data with which one works, any subsequent applications or derivations may be ill-conceived and of little service to the human enterprise.

NABT has an obligation to maintain the integrity of biology as a scientific discipline. To this end it must act to resist efforts to include in the science classroom materials derived outside the scientific process. It must insist that the data and concepts of science as presented to students meet the accepted standards of the discipline, and data which can best be described as para-scientific (creationism, astrology, anti-germ theory, etc.) cannot be condoned as science within classrooms

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Adopted 23 October 1980. Published in The American Biology Teacher *14:445 (October 1982).*

National Council for the Social Studies

Resolution Regarding Pressure Groups, submitted by Religion in Schools Committee and supported by Science and Society Committee

Whereas public schools and legislatures nationwide are being pressured to give "equal time" to the scientific creationism interpretation of creation in science and social studies courses; and

Whereas the pressures are perceived as part of a much larger problem;

Be it resolved that the NCSS affirms that, although community values should be an integral consideration in the establishment of the goals of education, curriculum decision-making regarding instructional method and specific content ultimately should be the responsibility of certificated personnel; and

Be it further resolved that NCSS affirms that throughout the curriculum, educators should make explicit the foundations from which conclusions about the world are drawn, including religious, philosophical, and other ideological systems, as well as the basic assumption underlying the academic disciplines themselves; and

Be it further resolved that the NCSS reaffirms that social studies is a logical curricular area in which to examine the societal issues which arise when persons have different world views and sets of assumptions about life; and

Be it further resolved that NCSS commit itself to use existing programming and publishing vehicles to provide professional development opportunities to better enable social studies educators to deal with these issues.

November 1981

National Science Supervisors Association

Position Paper on the Teaching of Creationism in the Science Curriculum

The National Science Supervisors Association is opposed to the teaching of "creationism" in the science curricula of the nation's schools. Creationism, and other pseudo-sciences, are premised upon supernatural explanations of natural phenomena and therefore are outside the realm of science.

We therefore stand with such organizations as the National Association of Biology Teachers, the Council of State Science Supervisors, the National Science Teachers Association, the National Academy of Sciences, and the American Association for the Advancement of Science in opposing the inclusion of such pseudo-sciences in the science curricula of the schools of the nation.

Adopted 5 April, 1990. The National Science Supervisors Association has since changed its name to National Science Education Leadership Association

National Science Teachers Association (1973, 1982)

Inclusion of Nonscience Theories in Science Instruction

Throughout recorded history, man has been vitally concerned in finding out all that he can about his universe. He has explored it in many ways, raised questions about it, designed methods by which he could increase and organize his knowledge, and developed systems to aid him in understanding and explaining his origin, and nature, and his place in the universe. Among these systems are philosophy, religion, folklore, the arts, and science.

Science is the system of knowing the universe through data collected by observation and controlled experimentation. As data are collected, theories are advanced to explain and account for what has been observed. The true test of a theory in science is threefold: (1) its ability to explain what has been observed; (2) its ability to predict what has not yet been observed; and (3) its ability to be tested by further experimentation and to be modified as required by the acquisition of new data.

The National Science Teachers Association upholds the right and recognizes the obligation of each individual to become informed about man's many endeavors, to understand and explain what each endeavor has contributed to mankind, and to draw his own conclusions in each area.

The National Science Teachers Association also recognizes its great obligation to that area of education dealing with science. Science education cannot treat, as science, those things not in the domain of science. It cannot deal with, as science, concepts that have been developed in other than scientific ways. Moreover, the National Science Teachers Association vigorously opposes all actions that would legislate, mandate, or coerce the inclusion in the corpus of science, including textbooks, of any theories that do not meet the threefold criteria given above.

National Science Teachers Association (1985)

Inclusion of Nonscience Tenets in Science Instruction

People have always been curious about the universe and their place in it. They have questioned, explored, probed, and conjectured. In an effort to organized their understandings, people have developed various systems that help them explain their origin, e.g., philosophy, religion, folklore, the arts, and science.

Science is the system of exploring the universe through data collected and controlled by experimentation. As data are collected, theories are advanced to explain and account for what has been observed. Before a theory can be included in the system of science, it must meet all of the following criteria: (1) its ability to explain what has been observed, (2) its ability to predict what has not yet been observed, and (3) its ability to be tested by further experimentation and to be modified as required by the acquisition of new data.

NSTA recognizes that only certain tenets are appropriate to science education. Specific guidelines must be followed to determine what does belong in science education. NSTA endorses the following tenets:

1. Respect the right of any person to learn the history and content of all systems and to decide what can contribute to an individual understanding of our universe and our place in it.

2. In explaining natural phenomena, science instruction should only include those theories that can properly be called science.

3. To ascertain whether a particular theory is properly in the realm of science education, apply the criteria stated above, i.e., (1) the theory can explain what has been observed, (2) the theory can predict that which has not yet been observed, (3) the theory can be tested by further experimentation and be modified as new data are acquired.

4. Oppose any action that attempts to legislate, mandate, or coerce the inclusion in the body of science education, including textbooks, of any tenets which cannot meet the above stated criteria.

New York State Education Department

There are several views regarding origins and changes that have occurred on the earth over time. Six-day creation, gap creation, progressive creation, theistic evolution, creationism, evolution, and planetary seeding are terms used to describe some of these views. The contrasts among these ideas, especially between creationism and evolution, have been discussed publicly.

During the process of revising the Regents Biology Syllabus, suggestions for including creationism as part of this course of study were forwarded to the New York State Education Department. It was suggested that the topic Modern Evolution be replaced by a two-model approach involving creationism and evolution.

The State Education Department requested expert scientific examination of this suggestion in terms of its bases in modern science and its appropriateness for the state high school biology curriculum. The American Association for the Advancement of Science, the American Institute for Biological Sciences, the National Association of Biology Teachers, and the New York Academy of Sciences reviewed the creationism materials and made recommendations as to their inclusion in the science curriculum. Department staff members met with representatives from these scientific associations to review their expert opinion concerning the use of creationism materials in high school science courses.

Their opinion was that creationism does not qualify as information generated by scientific processes and is not part of the body of scientific knowledge accepted by most scientists. Also expressed was the view that creationism can neither be verified nor refuted through scientific investigation and that models or theories which involve the supernatural are not within the domain of science. Accordingly, the following are recommended:

1. Contrasting religion with scientific theories is not the role of the science teacher. Students should be informed, however, that there are supernatural accounts of origins outside the domain of science. These accounts are derived mainly

from scripture and religious authority and are beyond the scope of scientific investigation. The personal religious beliefs of an individual are safeguarded by the Constitution, and should be respected.

2. It should be understood that "scientific creationism" is not accepted as science by the majority of experts working in those fields of science related to origins. It is considered by these experts to be a field of study more closely related to religion than to science.

3. Evolution should be taught, not as a fact, but as a scientific theory which has substantial support from the scientific community. The concept of modern evolution incorporates the work of many scientists. Current dialogues among scientists are indicative of possible modifications in evolutionary theory.

4. Teachers should respect the personal beliefs of students and recognize that in a pluralistic society, the personal beliefs of some may not be compatible with all aspects of evolutionary theory.

The teaching of supernatural accounts of origins by science teachers in science classrooms as part of the science curriculum is not a recommended procedure. Science teachers should acknowledge the personal validity of their students' beliefs and direct the student to the most appropriate counsel for assistance in questions outside the scope of the science classroom. Technical questions beyond the training and background of the science teacher about the fossil record, homology, biochemistry, etc., should be directed to specialists in those fields. Questions related to scripture, revelation and the supernatural should be directed to the religious authorities on those topics.

1980: Also ratified by the Parent-Teachers Association of Ithaca, NY, and by the Parent-Teacher Students Association of Syosset High School, Syosset, NY.

New York State Science Supervisors Association (1981)

Position Statement

The New York State Science Supervisors Association concurs with the position taken by the Science Bureau of the State Education Department concerning the teaching of evolution. The study of supernatural accounts of origins by science teachers in science classrooms as part of the science curriculum is not a recommended procedure. Questions related to scripture, revelation and the supernatural should be directed to the religious authorities.

Published in the NYSSSA Newsletter, VI:3, Summer 1981.

North Carolina Science Teachers Association

The North Carolina Science Teachers Association stands for and supports the cause of science education. It opposes attempts by individuals or groups to offer, advocate, or require non-scientific explanations of natural phenomena in science classes in North Carolina Public Schools.

The primary goal of science teaching is to produce scientifically literate citizens. Science is both a process and a body of knowledge. It is pragmatic, observational, experimental and replicable. To be acceptable as science, explanations, statements, and theories must be capable of test by observation and experiment. Science is used in an attempt to explain the world about us. Courses in science should be concerned only with scientific knowledge and theories.

Attempts are being made by individuals and groups to have included in the public school science curriculum non-scientific explanations of the origin and development of living organisms. Efforts are being made to have special creation (Biblical accounts) presented in science classes as scientific accounts of creation. These efforts are an attempt to counteract or replace the teaching of the evolutionary theory of the origin and development of living organisms.

In general, creationism is a religious concept. Religion is based on one's belief or faith, not on scientific evidence. Evolution is a scientific theory based on scientific data accumulated over many years and organized, by logic and reason, into a unifying idea. The theory of evolution is, as all theories are, tentative in that it cannot produce a conclusive answer.

Religion and science are two important and exclusive realms of human thought. Efforts to present both in the same context lead to misunderstanding of both. Therefore, science instruction and materials in our public schools should be limited to matters of science.

The NCSTA recommends that the theory of evolution be taught as a scientific theory — not a fact — in our public schools by teachers certified in science. The NCSTA is sensitive to, and understanding of, the various religious beliefs of students and in

no way wishes to change their religious beliefs. The theory of evolution should be taught, primarily, for awareness and understanding and for use in further scientific study — not for acceptance.

September 1981.

SCIENCE TEACHERS ASSOCIATION OF NEW YORK STATE (1980)

Move that we reject the proposal made by the Scientific Creationist movement that creationism be taught in our schools as a scientific alternative to Darwinian evolution. This clearly oversteps the separation of church and state as outlined in the Constitution of the United States. Another reason we must reject this proposal is that creationism is not science and therefore has no place in the science classroom.

The Science Teachers Association of New York State supports the theory of evolution as outlined in the New York State Biology Syllabus (September 1968, pages 86-90: Unit 6, Parts II B and C), and the evidence for evolution as outlined in the New York State Biology Syllabus (September 1968, pages 84-85; Unit 6, Part I A, B, C, D, and E).

May, 1980.

SYRACUSE PARENT-TEACHER ASSOCIATION (1984)

Whereas minimum standards for curriculum in the public school system are set by the New York State Board of Regents; and

Whereas the board of education or such body or officer as performs the functions of such boards shall designate textbooks to be used; and

Whereas textbook publishers are under continuous pressure by special interest groups to alter textbooks to specific beliefs and/or religious points of view; and

Whereas such pressure has led to a remarkable reduction in the amount of information on evolution, biology, and related sciences in the textbooks; and

Whereas some groups have organized a sophisticated propaganda campaign to influence school boards and textbook publishers that scientific creationism should be included in the science curriculum of the public school system; and

Whereas creationism is a belief and not a science and will blur the distinction between science and religious beliefs; and

Whereas the teaching of creationism amounts to establishing the practices and beliefs of particular religious groups under the aegis of the government which is a violation of the First Amendment; therefore be it

Resolved that the Syracuse Parent-Teacher Association agrees with the New York State Board of Regents Biology Syllabus that evolution should be taught not as fact, but as a scientific theory which has substantial support from the scientific community, and be it further

Resolved that the Syracuse Parent-Teacher Association strongly opposes any attempts to insert in the science curriculum any philosophical theories not substantiated by scientific data, and be it further

Resolved that the Syracuse Parent-Teacher Association recommends that Districts, Councils, and Local Units urge School Boards and teachers' organizations to discourage any such materials in a science curriculum, and redirect it to its appropriate discipline, thereby maintaining freedom of information in textbooks; and be it further

Resolved that the Syracuse Parent-Teacher Association urge Boards of Education to establish procedures for dealing with challenges to curriculum and content of school textbooks, and be it further

Resolved that this resolution be forwarded to the New York State Congress of Parents and Teachers for consideration at its next convention.

University of Alabama at Huntsville Faculty Senate (1981)

Whereas we understand that the Alabama legislature is considering a requirement that "Scientific Creationism" be included as an alternative to evolutionary theory during discussions in Alabama public schools of the origin and development of life; and

Whereas we consider the theory of scientific creationism to be neither scientifically based nor capable of performing the roles required of a scientific theory; and

Whereas we agree with the statement of the National Academy of Sciences that "religion and science are separate and mutually exclusive realms of human thought whose presentation in the same context leads to misunderstanding of both scientific theory and religious belief"; and

Whereas the proposed action would impair the proper segregation of teaching of science and religion to the detriment of both; and

Whereas we favor the continued observance of the First Amendment to the U.S. Constitution guaranteeing freedom of religion by assuming separation of Church and State; and

Whereas the inclusion of the theory of creation represents dictation by a lay body of what shall be included within science;

Therefore, The University of Alabama in Huntsville Faculty Senate resolves both that:

1. It is opposed to the requirement of teaching of special creation in Alabama public schools and to its presentation as a scientific theory; and
2. It is opposed to the passage of the scientific creationism bills (H-526 and S-353) before the Alabama legislature.

UNIVERSITY OF CALIFORNIA ACADEMIC SENATE

It is our understanding that within the next few months the California State Board of Education will be approving many science textbooks for use in California public schools, grades K through 8. The text of the Science Framework for California Schools, prepared in 1969, suggests that one criterion for the board's approval of a text may be the extent to which, in the discussion of the origins of life, a "special theory of creation" is treated as a scientific theory in a manner parallel to an account of evolution. We believe that a description of special creation as a scientific theory is a gross misunderstanding of the nature of scientific inquiry.

To provide the basis of a scientific theory, an hypothesis must make testable predictions. Our ideas of biological evolution are continually being tested in the process of an enormous amount of investigation by thousands of professional biological scientists throughout the world. As in all sciences, there are many facets of the evolution picture that are not yet thoroughly understood, and researchers at the frontier of knowledge, often in disagreement with each other concerning details, continually revise their thinking. Thus, evolutionary theory itself has evolved considerably since the time of Darwin. But virtually all biological scientists are agreed on the broad features of the theory of evolution of life forms, the evidence for which is completely overwhelming.

Approved by the Academic Council of the University of California Academic Senate on 27 October 1972

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION

EVOLUTION, CREATION AND THE SCIENCE CURRICULUM

The incorporation of creation science within the science curriculum raises serious legal issues in light of the constitutional doctrine requiring separation of the church and state and sec. 115.28(2), Wis. Stats. This statute requires the State Superintendent to exclude all sectarian instruction and materials from the public schools of this state. In the context of science teaching, the only federal court to consider the question has ruled that the creation science view is inherently religious in character and, accordingly, cannot constitutionally be presented as a scientific explanation of origins in public schools. Under the circumstances, the rationale behind the Arkansas Creation Science Case (*McLean vs Arkansas Board of Education*) cannot be ignored in approaching science curriculum development and organization at the local school district level.

The primary goal of the public schools is the transmission of knowledge from one generation to the next through disciplined study. On the specific issue of science teaching and its relation to creation science and evolution, it should be recognized that science and religion have different theoretical bases; that is, that they are two different areas of knowledge which address different questions in different ways.

SCIENCE

Science is concerned with studying nature and the world of which we are a part and yields testable hypotheses. It is both an investigatory process and a body of knowledge which can be subjected to verification by investigation, observation and logical analysis. Science is fundamentally non-dogmatic and is self-correcting. The process is ongoing and developmental. Science is also calculated to encourage the development of new propositions and ideas about nature and to lead ad infinitum toward new vistas and frontiers of further scientific inquiry.

The formulation of theories, or generalizations based upon

substantial evidence which explain phenomena occurring in the natural world, is a fundamental component of scientific inquiry. The "answers" to questions which scientists address must be confirmed by evidence, and these answers are always tentative, awaiting new interpretations which can better explain the evidence. Where a significant body of contrary evidence appears as a result of this process, a scientific theory is subject to revision or replacement by a new theory which offers a better explanation of that evidence. The strength of science is that it is a systematic process for developing the most logical and plausible explanations of known facts, principles, concepts and probabilities relating to any phenomenon. For these reasons, no scientific theory, including evolution, should be presented to students as absolute and unchanging fact. Indeed, dogma and indoctrination are incompatible with an understanding of science; accordingly, the tentative and theoretical nature of the subject matter must be stressed by science instructors. Proper teaching requires presentation of science as open-ended and without preset conclusions.

Religion

Religion is based upon knowledge and wisdom believed to be revealed by a divine creator or through a supernatural order. Unlike tentative scientific knowledge, religious knowledge remains customarily unchallengeable by observable evidence. Religion deals with meanings of life and death and is based ultimately upon faith. Faith precedes prediction and explanation. Because science and religion have different structural bases, one cannot replace the other, for they serve different functions. Due to the fundamental differences in these areas of knowledge, the presentation of religious concepts is inappropriate to the science curriculum. While science instructors should respect and recognize the personal validity of alternative religious beliefs, their responsibility in this regard should be limited to directing student inquiries to the appropriate institutions, including church and family, for further explanation and clarification of religious alternatives. The exclusion of religious explanations from the science class does not amount to telling students that they should not maintain those beliefs — only that those beliefs are not acceptable as science. Giving comparable emphasis in science, which are advanced as alternatives to evolution would be in direct opposition to understanding the nature and purpose of science.

1. Alternate scientific theories may be compared in the science classroom, but only those that best explain evidence which has been validated by repeated scientific testing should be accepted, and that only tentatively.

2. Years of intensive geological, biological and other scientific studies have provided the most acceptable explanations of the origin and development of the earth and life on the earth. The theory of evolution has the general consensus of the scientific community because it integrates and clarifies many otherwise isolated scientific facts, principles and concepts in a manner which is consistent with known evidence and

3. Like any scientific theory, evolution remains subject to modification and revision as new evidence is discovered. Therefore, evolution should never be presented to students as absolute fact. Good teaching dictates that students be reminded of the tentative nature of conclusions resulting from scientific inquiry.

Science can only answer certain kinds of questions. If questions are posed outside of the scientific domain, then other disciplines must be employed but not in the guise of science. Science is not superior in explanatory power to religion...only different. Educators should be certain that science is not asked to deal with ideas which are beyond its domain and processes. If attempts are made to force all knowledge, including religious doctrine, into a scientific mode, a great part of our cultural heritage may be lost.

Religious beliefs and writings, including accounts of creation, comprise a body of human knowledge and may properly be addressed in their own right in other areas of the public school curriculum. There is no legal prohibition against the non-sectarian academic study of such matters where appropriate to locally established curricular goals in such disciplines as literature, philosophy, history or religious studies.

In Wisconsin, the decisions regarding the goals of the science curriculum and its more specific teaching objectives, as well as the goals and objectives for religious studies in the curriculum, are legally and properly a responsibility of local boards of education.

However, local districts dealing with these decisions may wish to consult the Department of Public Instruction for technical assistance relative to both legal and curricular problems and issues.

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14 January 1982.

Teaching the Public to Believe in Evolution: The National Park Service Experience

Phillip Johnson

As the author of a widely discussed critique of Darwinism, I receive many speaking invitations, particularly from universities and churches. One of the more unusual invitations in 1995 was to address the Rocky Mountain Interpretive Training Seminar in June at Mesa State College in Grand Junction, Colorado. The seminar is a joint venture for the state and federal park and land agencies in the region, to provide a training program for their interpretive guides who give nature talks to the public. When the interpreters' presentations attribute the adaptations of plants and animals to a naturalistic evolutionary process, members of the public who view naturalism with a skeptical eye sometimes object to what they see as gratuitous propaganda.

The park and forest agencies want to present good science in these talks, but also to avoid giving the impression that they are misusing their position to further a controversial philosophical agenda. Accordingly, the theme of the seminar was "Are We Presenting the Best Science?" and I was invited to address the opening session. When I arrived in Grand Junction I was given the loose-leaf binder distributed to all participants, containing the materials for discussion in the seminar. The materials included a "case study" from the National Park Service (NPS) that was so fascinating that I devoted most of my lecture to analyzing it. Here, for the benefit of a wider audience, is a summary of the case study and my thoughts about it.

Phillip Johnson is professor of law at the Boalt Hall College of Law University of California-Berkeley.

The Case Study

The case study consisted of 7 documents.

1. A letter from "Marcia" representing a typical visitor's complaint. Marcia identified herself as a B.S. in Biology and Chemistry with an M.A. in Science Education. She is head of the Science Department at the Midland, Texas, Christian School. She and her family visited Guadalupe Mountains National Park in 1992 and were generally pleased, with one exception. A ranger had invited her family to a program "about the park." To her surprise the program turned out to be a talk about "the evolutionary characteristics of the animals in the park" which the ranger attributed to "a mistake of chemical information" rather than to God. Naturalistic evolution was presented as fact rather than "someone's idea of what might have happened." Marcia concluded her letter by observing that "The evidence for evolution does not exist in the rock record nor in the chemical makeup of the organisms involved and I resent the credit for our existence in this world being given to an absurd idea that undermines our very nature and purpose in this life."
2. A form letter that is used by the NPS regional office to answer such complaints. The operative paragraph is: "The National Park Service does not endorse any particular philosophical or religious position regarding the creation of the world. The content of all interpretation and visitor services programs is based on information obtained from current and/or highly respected scientific research. It has been carefully scrutinized in order to eliminate all religious, cultural, and ethnic biases. The staff is prepared to document the validity of all facts, interpretations, and conclusions."
3. A commentary in *Legacy* (the staff journal of the NPS) by Glen Kaye, Chief of Interpretation and Visitor Services for the NPS Southwest Region. After quoting Marcia's letter, Kaye asked "How can one respond to such correspondence?" For guidance he turned to a book called *The Aquarian Conspiracy*, by Marilyn Ferguson. I recognized this book as a well-known "New Age" manifesto of the 1980s. Kaye quoted Ferguson as an authority for the proposition that it is a waste of time to try to reason with critics like Marcia: "Rational arguments alone cannot penetrate the layers of fear and conditioning that comprise our crippling belief systems. . . . From our earliest years, we are seduced into a system of beliefs that becomes so inextricably braided into our experience that we cannot tell culture from nature." Kaye went on to observe that many persons come to the parks just to confirm their prejudiced ideas, and to them the NPS should "promote—and warn and champion and shout—the idea that parks, museums, nature centers, and

historic sites are places where dangerous ideas abound. We can announce to the world that provocative ideas, even disturbing ones, may be present— not to do capricious violence to the stories the places hold, but because learning demands it."

4. A letter published in *Legacy* in response to Kaye's essay. It was from Kathy Freeburger, a long-time naturalist for various federal and state agencies and a Christian. She said that her skepticism about evolution was based on facts and logic, not fear and conditioning. She had studied evolution in high school and her state university, graduating from both with a 4.0 GPA at the top of her class. "After studying the issue of evolution, I have seen nothing to convince me that the world evolved by chance, slowly changing over time. The fossil records support the appearance of fully developed species, not an evolution from primitive to more advanced species." Freeburger went on to quote from Kaye's commentary the sentence, "Our brains can censor what we see and hear, we can filter reality to suit our level of courage." To this she replied: "Are you courageous enough to study creation objectively? I recently read a book that may be useful. While it does not speak of God as the creator, it does present the theory of intelligent design. The title of the book is *Of Pandas and People.* I have enclosed a couple of articles about creation and evolution you might want to read. My challenge to you is to expand your horizons and read this literature."
5. A letter published in Legacy by Glen Kaye. Although Kaye's letter was occasioned by Freeburger's letter, he did not address her specific points. Instead he made the following general statement: "In interpretation, the ability to disseminate scientific information is basic to professional performance. I am concerned because of the habits of some, who profess to be interpreters. Such performance is characterized by daily acts of omission, rather than commission. In conducted walks and talks, in trail guides, in exhibits, in publications, and in audiovisual programs, creationists systematically avoid discussions of the geological dating of events, of competition and speciation, of adaptation, of natural selection, or of the basics of physics, chemistry, cosmology, geology, or biology upon which our understanding of life and its development is founded. Nor do they pursue an acquisition of the latest finding of scientific research. All the while, they are convinced they are performing well. . . . Under such situations, performance standards become the tools of change. Where evolutionary biology and geology is a substantive part of the story to be told, performance standards should specify how these will be incorporated in an employee's work. Employee actions can then be reviewed and evaluated accordingly. Non-performing employees need to understand

that the performance called for is critical; failure to do so is cause for dismissal."

6. A letter dated Feb 16, 1994, from Glen Kaye to Professor Stephen Jay Gould of Harvard University. Kaye explained to Gould that the NPS "can handle" criticism from visitors about programs presenting evolution, but he is concerned with the "systematic acts of omission" by "employees who are entering the field of interpretation carrying creationist 'world views.' " Kaye enclosed with the letter a draft of a policy to deal with this situation and asked Gould's opinion about whether the policy was consistent with intellectual freedom. "We wish to invite consideration of alternative points of view. We wish to nurture critical thinking skills. We wish to have learning environments that promote emancipation of thinking. Is that compatible with calling for interpretive treatment in parks 'based upon the best scientific evidence . . . that ha[s] stood the test of scientific peer review and criticism?' Can we [do] this without entering the arena of self-serving mythology? As drafted, the enclosed policy seems tainted by the dogmatism you so frequently warn against. Is there a way to reconcile expected performance with continuing rethinking of the way the world works?" The policy statement sent to Gould was not included in the case study distributed to us, but the context implies that the policy was substantially that announced in the preceding document, Kaye's letter to *Legacy*.
7. A letter from Professor Stephen Jay Gould dated August 18, 1994, providing the requested advice and support. Gould acknowledged that the sentence about evidence tested by peer review "does veer a bit too close to the notion of a priesthood in science," but Gould didn't see what else Kaye could say to make the point. Gould supported dismissal of park interpreters who were reluctant to present evolution: "I don't want to sound dogmatic either, but I guess at this point I would question the competence of such an employee and consider dismissal. After all, this is not a free speech issue of what one has a right to say on a soapbox in Union Square— for here I am a First Amendment absolutist. But people who are explicitly hired to teach definite curricula really are pledging to do this as a criterion for accepting the job in the first place. Therefore, not doing it should be grounds for dismissal by virtue of incompetence. I just don't see how biology can be taught without its most central concept of evolution. Don't you think that you have a right to require any competent biological interpreter in your parks to discuss the focal concept of the discipline?

My Comments

I gave an interpretation of this case study in my lecture, and I also discussed the same topic informally with some of the organizers of the conference. There are five main points I wish to make.

1. The form letter—especially when interpreted in the context of Kaye's *Legacy* article and published letter—reeks of what I describe in my book (*Reason in the Balance*) as the "subtext of contempt." The claim that the NPS "does not endorse any particular philosophical or religious position" is an insult to the intelligence of any visitor who has just been told that plants and animals owe their existence solely to unintelligent and purposeless causes. (I have learned that the real Marcia received a different but equally unresponsive letter; presumably the current form letter was drafted subsequently.)

   Marcia's complaint was that the true subject matter of the talk was not advertised and that naturalistic evolution was presented as a dogma. The dominant position in the scientific community today is that fully naturalistic evolution is a fact beyond question, but that position is controversial. Kaye seems to recognize this with his concept of the national parks as places where the public should be confronted with "dangerous ideas." If the policy is to shock the religious sensitivities of the park visitors, then the park authorities should not respond to complaints with bland stonewalling.

2. There are at least 3 main positions the NPS could take on this subject:

- Avoid routinely promoting naturalistic evolution to visitors who come mainly to enjoy the scenery and hear about the characteristics of the flora and fauna;
- Have a regular, advertised program of teaching about orthodox evolutionary theories but recognize that the subject is controversial and indicate in some way that disagreement is expected and accepted;
- Adopt as a matter of policy the principle that a goal of the NPS is to persuade the public to accept the whole story of naturalistic evolution from the origin of life to the appearance of humans, and present that story at every opportunity as a fact about which only ignorant and prejudiced people have any doubts. I would support either of the first two alternatives, and would characterize the third as inappropriate for the parks, as if one were to invite guests to a purportedly social occasion and then subject them to a high-pressure sales pitch. The NPS policy as enunciated by Kaye seems to endorse the third alternative, backed by threats of dismissal for employees who are insufficiently enthusiastic about selling the product.

3. It appears that Kaye developed the policy in response to the critical letter by Kathy Freeburger, and perhaps because of perceived "acts of omission," on conscientious grounds , "by some, who profess to be interpreters." Although he had just issued a call for the fearless proclamation of disturbing ideas, Kaye's reaction to the first note of disagreement was pure authoritarianism. I wonder if Gould would have answered as he did if Kaye had enclosed all the documents and told him that the policy was aimed at dismissing employees like Freeburger. She works for a state agency and therefore is beyond Kaye's direct reach. Would an NPS career employee have been sufficiently "fearless" to invite dismissal by questioning the official ideology.
4. I do not know why Kaye chose to invoke the New Age writer Marilyn Ferguson as an authority, but the choice illustrates how naive it is to assume that "evolution" is a purely scientific topic having nothing to do with worldview questions. As the Darwinist philosopher of science Michael Ruse once wrote: "Biology drips with as many wishes/wants/desires/urges, as many exhortations towards right actions, as a sermon by Luther or Wesley." Recent books by Richard Dawkins and Daniel Dennett describe Darwinism as inseparable from atheistic materialism. Other Darwinists, like Julian Huxley, Pierre Teilhard de Chardin, and Theodosius Dobzhansky have spiritualized the evolutionary process as the basis for a pantheistic or naturalistic religion.

   The public has good reason to suspect that promotion of "evolution" often involves an agenda that goes well beyond the realm of empirical fact and into the realm of religion and philosophy.
5. Gould's view—that free speech is absolute on a soapbox but that employees must teach what they are hired to teach—is sound in principle but subject to abuse in practice. I am aware of no act of Congress that commissions the National Park Service to convince a reluctant public that purposeless material causes (or a spiritualized New Age "evolution") produced all the diverse and complex features of living organisms. The interpreters are hired to serve and inform the public, including visitors like Marcia whose worldview is theistic. Of course, the interpreters should teach what is true and not what is false, and expert opinion is valuable in telling the difference, but Gould would be the first to acknowledge that experts can be profoundly biased.

   Imagine his reaction if a government agency were to decide, on the authority of a Harvard professor, to threaten museum interpreters with dismissal if they refused to endorse current sociobiological theories of human behavior. If my own experience is any indication, probably

many of the Darwinist nature talks feature the kind of adaptationist "just-so stories" that Gould himself has criticized.

The lesson I draw from this case history is that a very narrow point of view seems to have become official NPS policy, at least in the Southwest region. NPS officials ought to consider development of a better policy, one which combines accurate teaching about nature with respect for the park visitors, and with a genuine determination to avoid philosophical, political, or religious propagandizing. Such a policy would be in the long-term interests of the scientific community itself. It may be possible for a time to maintain a scientific orthodoxy with authoritarian methods, despite widespread public skepticism, but in the long run whatever is maintained that way will not be science.

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Ferguson, M. 1980. *The Aquarian Conspiracy: Personal and social transformation in the 1980's*. New York: St. Martin's Press.

Johnson, P. 1995. *Reason in the Balance*. Downer's Grove, IL: InterVarsity Press. C/E

Again, Johnson Gets It Wrong

Eugenie C. Scott and Robert M. West

Phillip Johnson has indeed exposed a prejudice of the National Park Service (NPS)—it prefers to ground its interpretive and educational materials in contemporary scientific research. The NPS has custodial and interpretive responsibility for some of the most glorious and informative examples of natural phenomena in the United States. To its credit, it has developed many of these sites in ways such that they are both educational and revelatory.

The NPS trains its employees to present the consensus scientific view of the history of land forms and the origin of the diversity of life forms in their service centers. This consensus is that natural forces such as plate tectonics, mountain building, erosion and other geological forces have shaped the land and that heredity, adaptation, and evolution have shaped the living forms. Following the approach which is the standard in science, Park Service employees are expected to explain these phenomena without reference to supernatural causes. Johnson would prefer that the occasional reference to miracles, supernatural design or other nonscientific approaches be allowed and fears that ignoring possible supernatural causation makes science antireligious. He worries that using only naturalistic explanations may be offensive to park visitors.

But whether he likes it or not, supernatural explanation in science has been ruled out by modern scientists, not because of an antipathy to religion, but because supernatural explanations aren't usually testable, rejectable, or reliable. Natural explanations do fit these criteria, so they *are* used. Johnson's chief error in both *Darwin on Trial* and this article is to confuse the necessary *methodological* naturalism by which modern science is practiced (i.e., explaining only natural phenomena using only natural causes) with *philosophical* naturalism, a philosophy that claims that matter and energy and their various forms are sufficient to explain the world and that there is no super-

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natural. He believes that unless a door is left for supernatural explanations, evolution is necessarily an antireligious philosophy.

Yet all science is practiced without reference to the supernatural, not just evolution. Particle physicists do not explain phenomena by concluding, "and then a miracle occurred," nor mathematicians explain the calculus by arguing "because God wanted it that way." Yet Johnson is strangely silent on particle physics and calculus. We should not let him get away with re-defining evolution as a theology, which is what he alleges the Park Service is doing in its simple presentations of scientific fact. For example, in paragraph 4, he implies that because certain evolutionists such as Dawkins or Huxley were philosophical materialists, the scientific study of evolution itself is inherently philosophically materialistic. He is simply wrong.

Just as Johnson accuses teachers of promoting naturalist philosophy when they teach evolution, so he accuses Park Service personnel of trying "to convince a reluctant public that purposeless material causes" produced modern living things. On the contrary, it's the job of the Park Service personnel to present the accepted scientific consensus to the public, not to "convince" them of its veracity. For example, visitors to NPS sites (including Grand Canyon, Dinosaur National Monument, and a host of others) regularly comment on what they have seen. These comments include "Wow, is that old!," or "Boy, ancient life was really different!," or "Now I see how erosion can work over a long time to carve out the Grand Canyon." These comments result from effective and accurate interpretation provided by Park Service employees, many of whom are college students on short-term appointments. And the same can be said for people who work at state parks, such as Ashfall State Historic Site in Nebraska or Dinosaur State Park in Connecticut.

Johnson is asking these people, usually well-trained in science, to put a non-scientific qualifier with every one of their remarks. Why is Grand Canyon grand? Because it is a gorge cut by the Colorado River through a vast thickness of very old rocks—as geologists have documented and disseminated for over a century. Why are there fossil dinosaurs at Dinosaur National Monument? Because a Jurassic river system slowed in that vicinity, depositing dinosaur bones and carcasses along with other stream-borne flotsam and jetsam. Johnson might ask the interpreters at these sites to add: "But all I have told you is mere conjecture from a bunch of scientists who have spent their lives trying to unravel the geological and biological history of the Earth. Grand Canyon might really have taken only a few years to form, after the Noachian Flood. And those dinosaurs at Dinosaur National Monument—why they just couldn't make it onto the Ark."

In contrast to the approach Johnson suggests the Park Service should adopt, the NPS states in a forthright manner, "This is how contemporary science interprets the world we live in, this is what is taught in the public schools (see appendix) and what is regarded as current knowledge, and it is our responsibility to present it effectively to the public who visit their national

properties." How can visitors to the national parks, which generally have been set aside *because* they illustrate or demonstrate some *natural* phenomenon or phenomena, be offended when there is a naturalistic explanation offered for the natural world? Why berate the NPS for simply doing what it says it is doing—interpreting the natural world? The main reason is that Johnson has got it wrong.

In the current article and in both *Darwin on Trial* and *Reason in the Balance*, Johnson misdefines evolution as an atheistic belief system. This is what he means by his often-iterated phrase "fully naturalistic evolution." He is convinced that this belief system is fervently advocated in K-12 schools and universities, to the detriment of religion, and now he accuses the US National Park Service of committing the same grievous act. He errs in his definition of evolution, and subsequently errs in his accusation of misbehavior by Park Service interpretive employees. Johnson is welcome to defend his theology against naturalism: it's a free country. But he should not misrepresent evolution to achieve his theological ends.

References:

Johnson, P. 1991. *Darwin on Trial.* Washington, DC: Regnery Gateway.

Johnson, P. 1995. *Reason in the Balance.* Downer's Grove, IL: InterVarsity Press.

National Research Council. 1995. *National Science Education Standards.* Washington, DC: National Academy Press.

Appendix

Content and context of the consensus scientific view for presentation in pre-college science curricula in life and earth sciences, from *National Science Education Standards*, Washington, DC: National Academy Press, 1995.

Grades 9–12

Pp. 181–184 Students have difficulty with the fundamental concepts of evolution. For example, students often do not understand natural selection because they fail to make a conceptual connection between the occurrence of new variations in a population and the potential effect of those variations on the long-term survival of the species. . . . . With some help, students can understand that, in general, mutations occur randomly and are selected because they help some organisms survive and produce more offspring. Other misconceptions center on a lack of understanding how a population changes as a result of differential reproduction (some individuals produce more offspring) as opposed to all individuals in a population changing. Many misconceptions about the process of natural selection can be changed through instruction.

P. 185 Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of

offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuring selection by the environment of those offspring better able to survive and leave offspring.

The great diversity of organisms is the result of more than 3.5 billion years of natural selection and evolution that has filled every available niche with life forms.

Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.

The millions of different species of plants, animals, and micro-organisms that live on earth today are related by descent from common ancestors.

Biological classifications indicate how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on their similarities which reflect their evolutionary relationships. Species is the most fundamental unit of biological classification.

P. 188 In studying the evolution of the earth system over geological time, students develop a deeper understanding of the evidence, first developed in grades 5-8, of earth's past and unravel the interconnected story of earth's dynamic crust, fluctuating climate, and evolving life forms. The students' studies develop the concept of the earth system existing in a state of dynamic equilibrium. They will discover that while certain properties of the earth system may fluctuate on short or long time scales, the earth system will generally stay within a certain narrow range for millions of years. This long-term stability can be understood through the working of planetary geochemical cycles, and the feedback processes that help to maintain or modify those cycles.

P. 190 The origin of the universe remains one of the greatest questions in science. C/E

Media Review

"The Mysterious Origins of Man" broadcast on NBC at 7 p.m. EST on February 25, 1996

Reviewed by Frank J. Sonleitner, Department of Zoology, University of Oklahoma, Norman

This program, hosted by actor Charlton Heston, promised to present evidence suggesting that humans made the climb from stone-age to civilization more than once and that our present humanity is just the latest in this cycle. Michael Cremo and Richard Thompson, authors of *Forbidden Archaeology: The hidden history of the human race* (San Diego: Bhaktivedanata Institute, 1993) say their book documents hundreds of cases of "anomalous" artifacts that indicate the presence of modern humans much earlier in the past than mainstream archeologists accept. For example, J. D. Whitney claims to have found stone tools in strata under Table mountain in California that were 55 million years old. Geologist Virginia Steen McIntyre claims to have discovered stone tools in Mexico dated at 250,000 years. She and authors Cremo and Thompson claim a conspiracy in the scientific community suppresses evidence that doesn't fit currently accepted theories; and this conspiracy is the recurrent them of this program.

Human Antiquity: Either by lengthening the time into the past at which the archeological evidence of "modern" humans is found or by shortening the absolute time span of the geological column, the "experts" in this program argue that archeologists have ignored important evidence of advanced human culture in the past. For example, creationist Carl Baugh (here called an archaeologist and anthropologist) claims that human footprints were discovered alongside those of dinosaurs. Dale Peterson, M.D. and Baugh's creationist colleague, Don Patton (here called a geologist), show us the Burdick footprint claiming that cross-sections of this anatomically incorrect print prove it is real. Even older are apparently man-made metallic spheres found by South African miners in Precambrian strata thought to be 2.8 billion years old.

On the other hand, David Hatcher Childress (author) claims that the geologic time scale is much shorter than geologists think making it more likely that humans and dinosaurs were contemporaneous and that dinosaurs may still be alive today. As an example, in 1977 a Japanese fishing boat recovered the carcass of what may be a plesiosaur. These findings suggest,

Heston tells us (perhaps splitting the difference), that humans existed on earth 135 million years ago in the Cretaceous Period.

Human Origins: Richard Milton ("science investigator" and "author shattering the myths of Darwinism") quickly dismisses Darwin's theory of evolution with claims that *the* missing link has never been found. Java man (*Homo erectus*), he claims, was eventually rejected by Eugene Dubois, its discoverer; Lucy was just an ape. Heston tells us that Java man was prominently displayed at the American Museum of Natural History in New York until 1984 when it was removed, implying that scientists agree that it really was no more than an ape. In truth, it was there only on temporary loan for a special exhibition of more than 50 of the most important hominid fossils from museums all over the world (*Discover* [June 1984]: 63.). It is normally kept at the Museum of Natural History in Leiden, the Netherlands.

The Origin of Civilization: According to Neil Steede (meso-American archaeologist), the remarkable stone constructions of Tiahuanaco in Bolivia predate the Inca Empire and are possibly 12,000 years old. Metal staples used to hold together the precisely cut building stones indicate a remarkably high level of technology which should lead us to question the origin of civilization.

Graham Hancock ("investigative journalist" and author of *Fingerprints of the Gods*) says that megalithic monuments found around the world indicate the presence of an advanced civilization on the planet long before conventional history tells us. John Anthony West ("independent Egyptologist") provides evidence that the Sphinx may be 12,000 years old. Robert Bauval ("astronomer-engineer" and author of *The Orion Mystery*), on the basis of unspecified astronomical evidence, says the sphinx may be 10,500 years old. According to Hancock, the compelling similarities of these megalithic monuments in both the Old and New Worlds suggest an ancient sea-faring people who sailed the earth.

A world map drawn by a Turkish Admiral Piri Re'is in 1513 from ancient sources charts the earth with astounding accuracy. Another world map, found by Charles Hapgood (Professor of Science) in the Library of Congress, that was drawn in 1532 by Oronteus Finaeus includes a map of Antarctica as it would look under its ice sheet. This is supposed to be evidence of an advanced civilization in prehistory that had explored the entire globe.

What happened to this civilization which the program suggested is Plato's Atlantis? Rand Flem-Ath (coauthor of *When the Sky Fell*) believes it was located in Antarctica and was destroyed when Antarctica was *instantly* frozen, just as the thousands of woolly mammoths in Siberia and North America were frozen. This occurred about 12,000 years ago when the entire earth's crust suddenly shifted about its core a distance of 2,000 miles, sending Antarctica to the South Pole.

This theory of crustal displacement seems based on the work of Charles Hapgood whose work predated plate tectonics. Hapgood proposed that the forces that caused the crust to shift, moving North America 2,000 miles

further south and Antarctica towards the South Pole, occurred over a period of about 10,000 years (hardly instantaneous, as Flem-Ath and Heston claim!) The Piri Re'is map and others were the subject of a book by Hapgood (*Maps of the Ancient Sea Kings*, Chilton Books, 1966.) The details given in the latter book are significantly different from those given in this program! For example, the Re'is and Oronteus maps show only the coastline of Antarctica as free of ice.

In light of all this evidence from "experts" whose credentials are consistently exaggerated in this program, Heston tells us that humans may have existed on earth for many millions of years and that an advanced culture existed over 12,000 years ago and was destroyed by a great cataclysm. How is it that the scientific community managed to overlook these "anomalous" data that contradict the currently accepted explanations? For the answers to this question, readers are directed to the sources that follow. Cremo and Thompson's book was reviewed by Wade Tarzia (*Creation/Evolution* 34, no. 1 [Summer, 1994] : 13-25) An abridged edition of the book, *The Hidden History of the Human Race*, is reviewed by Bradley Lepper (*Skeptic* 4, no. 1 [1996]:98-100.) Remarks from scholars and scientists in several disciplines can also be found in the lead feature in *NCSE Reports* 15:4 (Winter 1995). C/E

Theatre Review

"Inherit the Wind"
by Jerome Lawrence and Robert Lee, National Actors Theatre, New York

Reviewed by Brian J. Alters, University of Southern California

As Broadway playgoers pass under the Royal Theatre's main door they see a large banner that reads: " 'You may believe you're descended from monkeys; I don't believe it . . . I think (parents) have a right to insist that godless evolution not be taught to their children. . . . ' Patrick J. Bucahanan, *New York Times*, February, 9, 1996." The banner is there to inform the audience of the ongoing argument, whether in courts or in politics, concerning the creation/evolution issue. The play they are about to see is Jerome Lawrence and Robert Lee's "Inherit the Wind," starring George C. Scott and Charles During (with a live spider monkey also sharing the stage).

The play is intended to be drama not history. Only a few phrases were taken from the actual transcript of the Scopes Trial; not even the names of the characters and locations are factual. However, portrayals of the historical characters and locations are so thinly veiled that even those with the most minimal of historical backgrounds concerning the Scopes trial could make the connections. Scott plays Henry Drummond (Clarence Darrow), and Durning plays Matthew Harrison Brady (William Jennings Bryan). The action is set during "summer, not too long ago" in "a small town." The acting troop is the National Actors Theatre under the artistic directorship of Tony Randall.

The two-hour play is performed on a single, curtainless split-level stage set with an upper level depicting the outside of a courthouse and the lower level as the inside of the courthouse. The setting for the collision of Drummond and Durning begins with the welcome to Drummond by E. K. Hornbeck (played by Anthony Heald), a big-time Chicago journalist and evolutionist who has been sent to the small town to cover the trial, "Mr. Drummond, welcome to Hell." The remainder of the play involves the interactions of the biblical fundamentalist townspeople, Drummond, and Brady over Bertram Cates's (John Scopes) breaking of the law by teaching evolution in the local public school.

In principle, Drummond is really fighting for an individual's right to think and seek truth, instead of being forced to accept the doctrine advocated by

the town and Brady (i.e., creationism). At one point he assures the court, that unlike what Brady contends, he is not "trying to destroy everyone's belief in the Bible and in God," but "just trying to stop the bigots and ignoramuses from controlling education in this country." In a very dramatic and entertaining way, this presentation of "Inherit the Wind" clearly delineates the struggle between those who wish to legislate anti-evolutionism and those who strive to keep science free from religious absolutism.

The play opened April 4th and was originally scheduled to run only to April 14; however, with the reviews having been favorable and the attendance large, the run has been extended. On the Thursday evening I attended, the 1081-seat house was full, with Scott receiving a standing ovation during his curtain call. I much preferred this stage production to the film presentations and heartily recommend the experience to all. C/E

Book Review

The Independent Birth of Organisms: A new theory that distinct organisms arose independently from the primordial pond, showing that evolutionary theories are fundamentally incorrect

by Periannan Senapathy, 1994, Genome Press, Madison, WI, 628 pp. $29.95 hard cover

Reviewed by Andrew J. Petto, Department of Anthropology, University of Wisconsin, Madison

August Weismann is well-known today for his turn-of-the-Century proclamation that the science of genetics absolutely proves that evolution is impossible. Now, Periannan Senapathy appears to be vying for similar honors in the 21st Century. A molecular biologist and president of a biotechnology company in Madison, WI, Senapathy has been exploring the structure and function of DNA for nearly two decades. In fact, one part of the book that I can truly recommend is the "Genetics Primer"—a 32-page appendix to the main text that describes what we know about structure, function, and regulation of genes. However, most of the book is a diatribe against evolutionary theory as Senapathy thinks we know it.

The reader should make no mistake; *The Independent Birth of Organisms* is no creationist treatise. Senapathy's main interest is the in origin of life—and a thoroughly naturalistic origin at that. However, the first 200 and the last 160 pages really *do* read as though they were written by creationists. These pages are marked by Senapathy's exegetical exposition of research by leading evolutionary biologists coupled with examples of inconsistencies and problems of interpretation in both the fossil record and in comparative biology. These pages read very much like the articles that list the "evidences" against evolution in creationist texts. Readers familiar with creationist writing will find themselves on familiar grounds in the discussions of mutation, randomness, probability, (lack of) transitional forms, and so on.

The biggest problem for the reader—and it is a very big problem indeed!—is the "flexible" way in which the "organisms" of the title are defined. To Senapathy, "organism" seems to mean anything from an individual to a

superfamily, or even a higher taxon. This concept seems closest to the creationist concept of "kind." Of course, the evaluation of his "theory" of independent birth of organisms must depend on what precisely he means by "organism." Furthermore, the definition seems to change, so that, for example in some discussions, the "organism" that includes humans is the genus *Homo.* Sometimes it is the family Hominidae, sometimes the whole order Primates, and on pages 531-532 the whole subphylum Vertebrata. This is particularly a problem for making sense out of the last few chapters in which Senapathy tries to apply his new theory to the fossil record and comparative biology. Although he admits to needing more research in this area, how can we test, or even understand these ideas, if we cannot say precisely what we are studying?

What is more distressing to those of us who consider ourselves science educators is the poor understanding that Senapathy, obviously trained extensively in biological science, has of evolutionary theory and why it is the foundation of modern biology. At one point (p. 132), he argues that autapomorphy (derived traits unique to a particular lineage) is evidence *against* descent from a common ancestor. On page 416 he writes

> It is imperative that we are not deluded by gene similarities. If we look at these similarities with an absolutely open mind and consider that genes can independently occur in a primordial pond and give rise to independent births of organisms, then the fog will clear and we will certainly begin to see the truth. It is time to free ourselves from the shackles of evolution that say similar genes are evolutionarily related. When we do so we can see that there is nothing left to validate the theory of evolution! Truly, let us ask ourselves what is there to support the theory of evolution? The *only thing* that keeps alive the concept of evolution is the similarity of genes tying organisms together (emphasis added).

As this passage shows, Senapathy's approach is reductionist, molecular, and deterministic. Furthermore, although we all agree that similarity in gene sequences give strong support and a set of biological mechanisms to determine evolutionary relatedness, August Weismann reminds us that evolutionary theory began to rely on genetic models only in the second quarter of the 20th Century, and our ability to use genetic similarities to infer evolutionary similarity did not occur for nearly a century after Darwin. Besides, just as with all all biological data used to draw evolutionary inferences, only genetic similarities that reflect a shared ancestry are useful to these studies. Senapathy argues that none of these genetic similarities among "organisms" qualifies.

In this book and in interviews with the press Senapathy often has confused evolution with Darwin. It is true that many of his ideas are non-Darwinian, but then so is anything with a basis in modern genetics. Senapathy's main

argument is *not* with evolutionary theory. He accepts adaptation and variations in the genome as a part of the whole picture in a way that creationists accept microevolution. He really wants to argue about the origin of life and how it contributed to the starting distribution of living things on earth. Although this has a bearing on evolutionary theory, of course, evolutionary biology does not depend on a particular view of the origin of life. To understand the processes that account for the variation among organisms in time and space in the planet's history after life was already present is the main reason for developing a theory of evolution in the first place.

If the reader manages to survive the first 199 pages of anti-evolutionary diatribe, however, there are a couple of very interesting ideas in the middle of this book. When I first spoke with Senapathy in 1994 (prior to the publication of this book), we had a very interesting conversation based on these ideas. First, imagine that the distribution of protogenetic molecules in the primordial pond was nonrandom in some way—that is, local conditions on different parts of the planet could promote different compositions of these molecules. We could imagine, then, that the "genes" present in organisms formed at different places and times would be different from the start. Second, imagine that these early systems originally developed a protogenome full of the "junk" that we recognize today as introns, with prokaryotic "intron-free" genomes as a simplifying adaptation coming later. Senapathy shows through some examples how this strategy *might* produce meaningful sequences from randomly assembled units and at a higher probability than for assembly of these sequences without intervening nonsense sequences. To consider these ideas is to imagine how they might affect our views of the origin of life and its subsequent evolution.

In sum, this is an artichoke of a book. There are about 178 pages in the middle that present a couple of very interesting ideas that *might* have an impact on our understanding of the origin of life and how we interpret the history of life after those events. However, this book was written and edited in secrecy. The lack of independent review and editorial direction are readily apparent as the reader wades through prose from which it is often difficult to extract the meaning and direction of the thought. We are continually reminded by sentences ended by exclamation points how the author has demolished Darwinism or evolutionary theory (he uses the terms interchangeably) and how various points argued in previous sections have been "proved."

Despite the numerous problems and frustrations that reading this book brings, I *do* recommend reading pages 199-376. These lay out some important thoughts about the origin of life and how protogenetic molecules might have been formed and distributed among geographically dispersed and, perhaps, geologically distinct "biomes." What this book really challenges most effectively are the assumptions related to the relative uniformity of ecological conditions on earth at the time of the origin of life and the relatively uniform

distribution of these protogenetic molecules among the various aggregations that would give rise to the self- replicating systems that we call living things. *That* is a question worth thinking about, and one we would be well advised to consider. However, Senapathy's recycled obituary of evolutionary theory is premature, once again. C/E

About this issue . . . *continued from inside front cover*

The Independent Birth of Organisms. Senapathy applies molecular genetics to the study of the origin of life to conclude that no significant evolutionary transitions are possible from one major taxon to another. In the second review, Frank Sonleitner casts a critical eye on the television program, "The Mysterious Origins of Man," broadcast on NBC. Much of the program was based on the book *Forbidden Archaeology* reviewed in *C/E 34* (Summer 1994), by Wade Tarzia. Finally, Brian Alters offeres a review of the recent Broadway revival of "Inherit the Wind." This play is powerful theatre and powerful folklore, but recent events in real-world Tennessee remind us that challenges to modern science do not all lie behind us.

This issue also contains a special supplement for our readers. This supplement contains statements in support of evolution from educational institutions and organizations that were inadvertently omitted from the NCSE publication *Voices for Evolution*, which contains similar statements from religious, civil liberties, and scientific organizations and institutions. To order or learn more about *Voices for Evolution*, please contact the NCSE office.

— Andrew J. Petto

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