

3. The values which we used for primordial lead are Pb-206/Pb-204 = 9.346 and Pb-207/Pb-204 = 10.218. The values for decay constants are $k(\text{U-238}) = 1.55125\text{E-}10$ and $k(\text{U-235}) = 9.8485\text{E-}10$, taken from "Proposal for Simultaneous Adoption of New U, Th, Rb, and K Decay Constants for Calculation of Radiometric Dates," by Richard Lee Armstrong, Dept. of Geological Sciences, University of British Columbia, Vancouver, B.C., Canada V6T 1W5, published informally about 1975. The formula for the lead/uranium age is

$$t = \frac{2.3026}{1.5513 \times 10^{-10}} \log \left[1 + \frac{(\text{Pb-206/Pb-204})_{\text{correctd}}}{(\text{U-238/Pb-204})} \right]$$

The corrected value of the measured ratio, Pb-206/Pb-204,

is obtained by subtracting from it the corresponding primordial lead/lead ratio.

4. The value used for U-238/U-235 is 137.88, taken from Armstrong, *Ibid.* The formula for the lead/lead "age" is

$$\frac{\left[\frac{\text{U-235}}{\text{U-238}} \right] \left[\frac{\text{Pb-206}}{\text{Pb-207}} \right]_{\text{correctd}}}{1} = \frac{e^{k_{235}t} - 1}{e^{k_{238}t} - 1}$$

The solution for t must be obtained by a reiterative process which is easily programmed on a hand calculator.

5. Funkhouser, John G., and John J. Naughton. 1968. *Journal of Geophysical Research*, 73:4601-4607.
6. This explanation was proposed to me by Prof. James Gill of the University of California at Santa Cruz, an experienced geochronologist.

EDUCATIONAL COLUMN

TEACHING ABOUT ORIGIN QUESTIONS

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Abstract

With this article the author begins a series in which he draws upon a decade of classroom experience in teaching about origin questions. He encourages creative, innovative "solutions" rather than litigation regarding teaching about first origins. Thus the series of articles is intended to generate calm and clear understanding of "how to" teach in a fair and just manner. This article contains a discussion of the validity of two contrasting viewpoints about origins.

Introduction

To protect the integrity of a pluralistic educational curriculum, a positive alternative to the majority "establishment" interpretation of first origin questions is needed in American schools. A viable contrasting position to the "conventional wisdom" of the mechanistic, animalistic origin of human beings is needed as an integral part of curriculum in both public and parochial schools. However, teachers must understand "how to do it," if they are to supplement the exclusive, monopolistic ideas of "evolutionary" origin of modern male and female human beings.

All educators need to recall that the exercise of academic freedom is fully legal in the United States. Thus wherever questions of ultimate origin of the universe, or life on the earth, or mankind arise there are *no legal prohibitions* against open, candid discussion of different interpretations of objective, scientific data in science classes, or in any social studies, history, or anthropology classes.¹

Analysis of many, many cultures results in the conclusion that many, many "creation stories" have been developed. Yet, upon careful consideration of all available "variations," it is imperative for all educators to understand that *only two primary* viewpoints or interpretative approaches on the origin of all things are involved: (1) a theistic viewpoint, or (2) a non-theistic viewpoint. In short, either the Eternal, Personal Creator God was *the* source of *all* things or He was not.

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The heavens and the earth and all that is therein were created by the Eternal, Personal Creator God, as believed by many of the "founders" of the modern scientific discipline. Or, all things in the universe, in the solar system, in plant form and animal form came into existence in some way from Eternal, Impersonal Matter-Energy, which is the position held by the majority of scientists today. For this on-going discussion of "Teaching about Origin Questions," the latter, majority alternative will be labelled Total Evolutionism, and shall be understood as the fully contrasting viewpoint to that of Total Creationism that identifies the former, "traditional" viewpoint. These are *the two* fundamentally contrasting points of view for different interpretations about first origin questions. (Admittedly variations and modifications of each are possible, but basic comparative statements are provided in Table I.)

Two Contrasting Viewpoints

A clear indication of the grand magnitude of the position of Total Evolutionism can be found in the lead article by the famous evolutionist Dr. Ernst Mayr in the *Scientific American*² of September 1978. That issue contained nine articles on the status of evolutionary thinking at that time and was distributed widely as a "public service." Presumably, according to Dr. Mayr, biological (organic) evolution was preceded by chemical (molecular) evolution, which was preceded supposedly by atomic (cosmic) evolution. (And social studies specialists have extended evolutionist thinking to propose societal (social) evolution as a type of "postlude" to "biological evolution.")³

A majority of professionally qualified scientists support teaching the youth of America the objective, scientific facts that can be used to support Total Evolu-

Table I. Comparative Statements Regarding Origins

- E. 1. Total Evolutionist postulates (believes axiomatically) that the universe began at the explosion of a dense quantity of matter. (No attempt is made to answer the question of origin of matter that supposedly exploded due to some energy change; hence such matter and energy is essentially taken to have been eternal.)
- C. 1. Total Creationist postulates (believes axiomatically) that the universe is the result of creative acts of a Creator. (No attempt is made to answer the question of origin of the Creator that is believed to be the First Cause; hence the Creator is taken to have been eternal.)
- E. 2. Total Evolutionist postulates (believes axiomatically) that the solar system came into being as a consequence of the explosion of a dense quantity of matter resulting in some nucleogenesis of elements and subsequent accretion of matter into the sun and planets.
- C. 2. Total Creationist postulates (believes axiomatically) that the solar system is the result of creative acts of cosmic nucleosynthesis of a Creator which He empowered to form light, the sun, moon, and the earth as essentially stable, "finished" (with interactions of disintegration and conservation "forces").
- E. 3. Total Evolutionist postulates (believes axiomatically) that life on the earth came into being as a consequence of interaction of energy and previously existing sub-molecular portions of matter. (A five-stage "scenario" is often utilized entailing change from supposed reducing atmosphere to present oxidizing atmosphere, some genesis of nucleotides, some genesis of polymers, some genesis of coacervates and proto-cells, and some genesis of living cells.)
- C. 3. Total Creationist postulates (believes axiomatically) that life on the earth is the result of creative acts of a Creator such that organization and complexity of the smallest unit of a living system, the cell, was established with a continual supply of energy and repair of natural processes corrective of harmful chemical reactions.
- E. 4. Total Evolutionist postulates (believes axiomatically) that species come from species through some micro-evolutionary means, such as mutations and recombinations, over time.
- C. 4. Total Creationist postulates (believes axiomatically) that recognizably different organisms (kinds) are the result of creative acts of a Creator which have remained essentially stable over time (though many have become extinct); each kind shows a potential for variability within some genetic limits such that species, genera, and other arbitrary classificatory divisions can be assigned for ease of grouping according to similarities (and differences).

(Note: Any use of the expression: species (kinds), as supposedly meaning a synonymous relation generates confusion. These terms are not necessarily synonymous as modern creationists have published repeatedly.)

tionism. (See Table II for a listing of such data.) This "conventional wisdom" has been taught exclusively in science classes and in social studies classes during the last three decades, if not for the last 100 years. However, for the last 20 years, a minority of professionally qualified scientists have gathered and published extensively the objective, scientific facts that can be used to support Total Creationism. (See Table III for a listing of such data.)

With this understanding that there are two major contrasting positions of interpretation regarding ultimate beginnings, and according to exercise of proper academic freedom, *both* viewpoints of Total Evolutionism *and* Total Creationism should be considered whenever first origin questions arise. Seemingly even Charles Darwin might have agreed that a balanced treatment of the facts for Total Evolutionism and Total Creationism and arguments for both sides should be presented as public and parochial school curricular content. In the Introduction to *Origin of Species*, Darwin stated:

For I am fully aware that scarcely a single point is discussed in this volume on which facts cannot be adduced, often apparently leading to conclusions directly opposite to those at which I have arrived. A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question; and this is here impossible. (pp. 11-12, The Modern Library Edition.)

Of course "stating and balancing the facts and arguments on both sides of each question" is quite possible in open, candid discussion in the classroom.

Two Viewpoints in Science Classes?

Is discussion of ultimate origin questions possible in science classes? Is consideration of ultimate origin questions a matter of teaching religion and therefore of questionable constitutionality, at least in the public schools? Answers to these questions involve understanding the meaning of the terms, "science" and "religion."

In presentations of Total Creationism, no theistic "religion" or sectarian teaching need be entailed. This is so if all educators understand that "religion" may be defined as (1) "belief in a divine or superhuman power or powers to be obeyed and *worshipped* as the creator(s) of the universe"; (2) "expression of this belief in *conduct and ritual*"; and (3) "any specific system of belief, *worship or conduct*."

Clearly two main facets of meaning are incorporated in these definitions of "religion": (1) the facet of belief, and (2) the facet of worship. Noteworthy is the fact that *no* attention to worshipful conduct or ritualistic procedure need be included in teaching about Total Evolutionism or Total Creationism, as contrasting approaches to teaching about first origin. Any procedures or practices of using prayer beads, a prayer rug, a head covering, certain wearing apparel, or facing toward the east are not part of any recommended approach to teaching about origins in the public schools.

Rather, exclusive attention can be given to consideration of the *facet of belief* held by different people. Different people have held different beliefs about beginnings, but their beliefs are basically theistic or non-

Table II. Objective, Scientific Data Used by Professionally Qualified Majority Scientists to Support Total Evolutionism

1. Red shift of light spectra.
2. Occurrence of nova and supernovae.
3. Detection of background radio noise.
4. Detection of background radiation.
5. Synthesis of coacervates and cell-like globules.
6. Synthesis of amino acids (non-living "building blocks" of living substance).
7. Production of synthetic "equivalents" of urea, rubber, cloth fibers.
8. Similarities of skeletal, muscular patterns, and brain form.
9. Similarities of embryonic structure.
10. Similarities of DNA and RNA components of life.
11. Similarities of hemoglobin, cytochrome c, and other biochemical aspects.
12. Human behavioral similarities to emotional, territorial, and aggressive animal-like behavior involving reaction to signs, signals, and perceptual thought.

theistic. And teaching *about* the beliefs of people is fully legal and consistent with the U. S. Supreme Court rulings.⁴ The important point to understand is the fact that teaching about origins involves *beliefs* that people have had or do presently hold with regard to beginnings. Total Evolutionism entails one set of beliefs about human origins, and Total Creationism entails another set of beliefs about human origins.

To assure students that one pattern of beliefs is not favored above another set of beliefs, modern teachers should practice open, candid treatment of origin questions wherein both the viewpoints of Total Evolutionism *and* Total Creationism are presented. Such would be consistent apparently with Darwin's "fully stating and balancing the facts and arguments on both sides of each question."

What is Science?

How might this be done in science classes? Actually the *crux* of any decisions about treatment of first origin questions in science classes is understanding the answer to the question, what is science? Today it is assumed generally that scientists can investigate *any* area in inquiry. Yet, is it possible to study *scientifically* the ultimate origin of the universe, or origin of life on the earth, or origin of mankind?

Because proper, orderly scientific activity involves necessarily direct and/or indirect observation(s) of *natural* objects and/or events that occur or exist in the physical environment, questions of ultimate origins are not open to study scientifically. Many, many evolutionists have written⁵ quite authoritatively about the full dependence of the scientific endeavor upon observations (direct and/or indirect) of *natural* objects and/or events. Professional scientists study naturally occurring objects and/or events; modern scientists do not study the supernatural or the *unnatural*.

Importantly, then, modern science teachers are well prepared to help young minds understand that the beginnings of the universe, of life on the earth, and of human beings are each singularities that are beyond any repetition. Since proper, orderly science involves

Table III. Objective, Scientific Data Used by Professionally Qualified Minority Scientists to Support Total Creationism

1. Angular momentum in solar system, of universe.
2. Polonium halo research: rapid rock formation.
3. Orderly patterns (designs) of constellations, comets and planetary motions.
4. Tendency toward breakdown of living systems.
5. Complex pattern (design) of DNA code, molecular interdependency, cell organelle and organ interactions.
6. Definite pattern (design) of exclusively "left-handed" amino acid structure.
7. Law of Biogenesis: All life comes from existing life.
8. Abrupt appearance of fossil forms separated by systematic gaps between fossil forms.
9. Distinctness of DNA, chemical components, and pattern (design) of morphological similarities.
10. Laws of Mendel: combination, recombination always results in easily recognized plant, animal forms; *conclusive* evidence of fixed reproductive patterns (designs).
11. Distinctness of human self-conscious awareness and metaphysical concern.
12. Distinctness of human personality involving moral and ethical concern; reflective, symbolic, abstract, conceptual thought.

necessarily *repeatable* observations of natural objects and/or events, then students can learn that first beginnings are outside of real scientific study.

Thus the Eternal, Personal Creator God that is basic to Total Creationism is not subject to scientific study. Proponents of Total Creationism admit that sudden, *unnatural* concepts are a part of their thinking. They *believe* that the Eternal, Personal Creator God who exists outside of and independent of the cosmos called forth supernaturally the galaxies, stars, comets, and planets, including the earth with special atmosphere; and as well brought forth suddenly the basic plant forms with established potential for variation within genetic limitation, along with sudden appearance of the basic animal forms with established potential for variation within genetic limitation, including special creation of particularly unique sentient human beings.

However, each set of these creative phenomena is beyond the scope of the natural. Therefore, such aspects could not possibly be submitted to scientific study, as is fully recognized and understood by all professional scientists.

Likewise, the Eternal, Impersonal Matter-Energy condition that is basic to Total Evolutionism is *not* subject to scientific study. Proponents of Total Evolutionism repeatedly include catastrophic, *unnatural* objects and/or events in their thinking. They *believe* that the universe began with a supposed explosion of some dense substance of unknown origin; then they imagine accretion of celestial objects, including the earth; followed in time by spontaneous appearance of some living substance as progenitor of all present life on this earth; and then, presumed gradual accumulation of errors due to minor mutations resulting in totally new organisms, including human beings.

However, each one of these supposed changes could not possibly be submitted to scientific study, which conclusion should be readily recognized, understood, and agreed to by all professional scientists.

It is imperative to make quite clear to students, therefore, that both viewpoints about origins—Total Evolutionism *as well as* Total Creationism—involve beliefs about changes that are *unnatural* and are not repeatable; hence such concepts associated with either the theistic or the non-theistic viewpoint about first origins are *definitely* singularities that are outside proper, orderly scientific study. Understandably, special creative phenomena attributed to the Eternal, Personal Creator God may not be studied scientifically, *but also* all the imagined *unnatural* changes presumed to have come about in the distant past that started from some Eternal, Impersonal Matter-Energy condition may not be studied scientifically.

However in the 1980's professionally qualified individuals of the majority do present objective, scientific facts in support of Total Evolutionism; whereas professionally qualified individuals of the minority do present objective, scientific facts in support of Total Creationism.⁶

Nevertheless, in maintaining the integrity of academic freedom of all students and all teachers in a pluralistic educational curriculum, modern instructors teaching about origin questions are responsible to delineate the *significant differences* between beliefs about *unnatural* concepts and proper scientific theories.

Scientific Theories and Hypotheses

Proper scientific theories fully involve *natural* objects and/or events existing or occurring in the present physical environment of some living human investigator, which are either directly or indirectly observable in an understandable fashion that can be repeated. This is true for proper scientific theories such as the Gene Theory (breeding practices involving presumed or imagined genes), the Kinetic-Molecular Theory (studies of gases involving presumed or imagined molecules), or the Atomic Theory (studies of physical structure of matter involving presumed or imagined atoms and sub-atomic entities). (Recall that excellent, repeatable experimental evidence exists for the presumed existence of genes, molecules, atoms, and electrons.)

From these points it follows that an "hypothesis" in proper, orderly science is testable. The very genius of successful scientific endeavor in the biological sciences, and especially in the physical sciences, has been the direct or indirect testing of hypotheses and the purposeful quantification of results. Thus it follows that some Big Bang "Hypothesis," or Steady-State "Hypothesis," or Autotrophic "Hypothesis," or Heterotrophic "Hypothesis" are different from proper scientific theories.

Such "hypotheses" about origins are essentially *speculations* about the unrepeatable past; they involve scenarios of what "could have been," or what "might have happened" without any present-day testability; they are not proper hypotheses formulated as answers to scientific questions. They involve inquiries by scientists, yes, but inquiries about *unnatural* concepts in

the past; thus they are different from proper scientific theories studied in the present.

It is one thing to ask questions about *natural* objects and/or events existing or occurring in the physical environment of some investigator. Contrasting to that is an entirely different set of inquiries that people like to ask about *past, unnatural, non-repeatable* aspects of life on the earth, about the solar system, and about the entire cosmos.

Reasons for Litigation

All of the above notwithstanding, proponents of the "conventional wisdom" accepted by the majority of scientists who *believe* in a mechanistic, animalistic origin of human beings do not favor the idea that young students should learn about the objective, scientific facts that minority scientists use to support the position of Total Creationism. As a consequence numerous cases of litigation have occurred in Texas; in Washington, D.C.; in Arkansas; and litigation is pending in Louisiana in the mid-1980's.

In search of terms that might be useful in such litigation the following have been utilized: scientific creationism, creation-science, evolution-science, and some people are now using origin science. Regrettably confusion abounds. Total Evolutionists do not understand that Scientific Creationism is a rubric for a set of beliefs about the past. (Note: Scientific Socialism is a rubric for a set of beliefs about interactions in the field of economics and social history.)

Total Evolutionists quite correctly ridicule the very thought of creation-science in litigation, as if referring to real science about *unnatural, creative* acts. However, Total Evolutionists are quite unwilling to admit that evolution-science is also ridiculous when used in litigation, as if referring to real science about *unnatural* concepts about all life on the earth having a common ancestry.

Condition of Scientific Thinking

As mentioned, there is an all too easy willingness in these closing years of the twentieth century to think that scientists can investigate *any* area in inquiry. That attitude, when examined closely, is identified as a philosophical outlook labelled *Scientism*. Thus many, many scientists, politicians, and citizens in general have accepted a too broad scope for supposed scientific inquiry. Hence many individuals in the American public are *scientistic* in their thinking.

However, there is *no science* of creative acts of the Eternal, Personal Creator God in whom Total Creationists believe. In parallel, it is imperative for all educators to understand that there is *no science* of *unnatural* changes of the Eternal, Impersonal Matter-Energy condition about which Total Evolutionists have beliefs.

Let it be easily understood that semantic confusion abounds through use of creation-science, evolution-science, and origin science in litigation, *and* when and if these terms are introduced into public school curricula. These combinations of words have been developed to take advantage of the "scientific" attitude or frame of mind so prevalent in the United States; and, as parts of legal strategies, should be reserved for arguments of litigation only.⁷

Conclusions

Teachers seeking to protect the integrity of proper academic freedom in a pluralistic educational curricu-

lum will serve the scientific discipline, and varieties of religious belief systems, if they teach young minds to understand forthrightly that proper, orderly scientific activity is limited to the study of *natural* objects and/or events. Consequently, *discussions* of *unnatural* concepts and first origin questions do not entail scientific studies or scientific theories. Rather *discussions* of *unnatural* concepts and first origin questions entail sets of contrasting beliefs and the associated objective, scientific data that can be used, *after the fact*, to support *either* Total Evolutionism, or Total Creationism.

Again, modern teachers seeking to preserve the integrity of a pluralistic educational curriculum should understand that there is *no* "science" of creative acts that are accepted by Total Creationists; and likewise, there is *no* "science" of *unnatural* changes that are accepted by Total Evolutionists. Yet significant amounts of objective, scientific data, as listed, can be used to support *either* of these two main contrasting viewpoints about first origin questions.

References

1. Rulings by Federal judges are limited to the jurisdiction of the judge. Thus the Judge Overton ruling in Arkansas pertained essentially to the litigation in Arkansas. Evidently, however, the mere suggestion of "legal blackmail" by organization personnel from outside public school systems has deterred some creative, innovative educators in many states with regard to teaching about origin questions.
2. Mayr, Ernst. 1978. Evolution. *Scientific American* 239: 45-55.
3. In debates and forums with evolutionary scientists proponents of Total Creationism find that a great number do not understand the wide scope of application of evolutionary ideas. Thus the article by Dr. Mayr is most instructive of the prevalent "real" situation.

Many biologists especially do not seem to recognize the broad scope of Total Evolutionism. They attempt to separate concepts about the origin of life from "organic evolution," but their ambiguous use of the term "evolution" is a significant factor in their thinking. Many biologists believe that extrapolation from empirically demonstrated small changes of living organisms (genetic variation, which is called *microevolution* by some scientists) substantiates belief in supposed large scale changes of organisms (specifically *macroevolution* or *megaevolution*) over immeasurable time. Such evolutionists fail to admit that all circumstantial evidence they employ to support their belief in *macroevolution* also may be interpreted as evidence in support of Total Creationism.

4. The justices of the U. S. Supreme Court have designated only three acts that violate the First Amendment in public schools: (1) state-required prayer—*Engel v. Vitale*, 370 U. S. 421 (1962); (2) state-required Bible reading—*School District of Abington Township, Pa. v. Schempp*, 374 U. S. 203 (1963); and (3) state-required on-premises religious training—*McCollum v. Board of Education*, 333 U. S. 203 (1948).
5. The following are representative: Simpson, G. G., *et al.* 1962. Notes on the nature of science. Harcourt, Brace and World, New York, p. 9 and Ayala, F. J. 1974. Biological evolution: natural selection or random walk? *American Scientist* 62:700.
6. Noteworthy is the needed understanding by all educators of the fact that the majority of scientists supporting Total Evolutionism are in a sense proponents of a philosophic outlook that might well be labelled the "Philosophy of Unnaturalism." Total Evolutionists do *not* formulate "naturalistic" explanations, rather they offer imaginative, *unnaturalistic* scenarios (stories, plays).
7. Actually, in the fullest sense of professionalism, Federal judges are not qualified to determine what is scientific, which was admitted publicly by a leading evolutionist educator at the 1982 National Association of Biology Teachers convention in Detroit. Only professional scientists with qualifications in specific areas are qualified to determine what is scientific in the respective areas of scientific study.

DID THE UNIVERSE START OUT STRUCTURED?

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Abstract

The problems of those cosmologies that assume a structureless initial state of the universe seem to make structured-origin models more promising and attractive.

Introduction

Since A. Penzias and R. Wilson discovered cosmic microwave background radiation in 1965, and even more so since S. Weinberg wrote his famous book *The First Three Minutes* in 1977, 'cosmology' has become almost synonymous with 'hot big-bang theory.' The so-called 'standard model' (or big bang) has forced all other concepts aside so that the proponents of other theories are hardly noticed.

One of the most important characteristics of the big-bang model is that it assumes a structureless beginning of the universe: either from a singularity which as such cannot have any structure, or from a completely homogeneous fireball having the same temperature, density, and composition everywhere. This lack of structure of the assumed initial state makes the model beguilingly simple; but this also appears to be its fatal defect.

The Big-Bang Model

The standard model is based on theoretical work by A. Einstein (1917), A. Friedmann (1922), and G. Lemaitre (1927) on the general theory of relativity. It takes into account the observation of E. P. Hubble and M. L. Humason (1927) that the redshift of spectral lines from distant galaxies is largely proportional to the distances of these galaxies. Interpreting the redshifts as 'cosmological', i.e. as a consequence of the speed of recession due to an expansion of space, Hubble introduced the notion of a uniformly expanding universe. In 1948-49 G. Gamov,^{1,2} R. A. Alpher, and R. Herman³ set up the model of the primordial fireball or big bang. They predicted an electromagnetic background radiation having the spectrum of a black body with the temperature 5°K. A suitable microwave radiation of 3°K was detected 15 years later.

At first it was assumed that all chemical elements were created in the big bang. Later the theory had to be changed: only hydrogen, deuterium, helium, and

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