

MEMORANDUM

TO: Florida State Board of Education
FROM: Dr. Francis W. Grubbs, Ph.D.
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DATE: February 5, 2008
RE: Final Draft of Science Sunshine State Standards

Although we sent a memorandum (01/15/08) addressing the Proposed Revisions to Florida's Science Standards, and Fred Cutting submitted a Minority Report as a Science Framer Committee member, we now recognize significant changes in the final draft (draft) of the Sunshine State Standards for Science, and therefore, submit an update addressing the final draft, as an addendum to our earlier memoranda.

We will organize our remarks under three main categories: Clarifying the Language, Proposed Restatements of Big Ideas and Benchmarks, and the Evolution of Evolution. Please recognize that, as we have stated before, we are not opposing the inclusion of Evolution in the curriculum, we are opposing concerted attempts to alter the nature of science education.

Clarifying the Language

In the entire "draft" there is no attempt to define for the student the meaning of "Evolution" and it is presented as a fact without attempting to address what is a validated theory, and what is still an hypothesis. However, there seems to be a deliberate attempt to introduce the term and formulate a concept within the developing minds of students so they will never consider the differences between the verifiable concepts of "microevolution" (evolution below the level of species) and the unverified understandings of "macroevolution" (evolution on the "grand scale" resulting in the origin of higher taxa).

Notice how this conceptual development is programmed in this draft. First, in Grade 2, and is repeated in Grades 5, 6 and 9-12 The Big Idea 7: Earth, Systems and Patterns are introduced by "*The evolution of Earth is driven by the flow of energy and the cycling of matter through dynamic interactions among the atmosphere, hydrosphere, cryosphere, geosphere, and biosphere, and the resources used to sustain human civilization on earth.*" Furthermore, the Benchmarks achieving this big idea are all related to weather and the sun's energy. The question must be addressed, why is the term "*evolution of Earth*" used? If it is used to mean "change over time" we have no argument, but the very introduction of "*evolution*" without any explanation certainly confuses future understandings. Our recommendation is to simply change the wording to read: *Changes in the Earth's systems are driven by the flow* Without this type of change the developing concept will later be understood as earth evolved from nonmatter and continues to evolve.

In Grade 3 Big Idea 15: *Is entitled Diversity and Evolution of Living Organisms.* The Benchmarks under this Big Idea deal with the classification of animals and plants into major groups, and how they respond to changing seasons. There is nothing in these Benchmarks that

address the kind of change pertaining to “evolution” and would be much more precise to simply entitle this Big Idea: *Diversity and Classification of Living Organisms*.

The above language is repeated in Grade 5, Big Idea 15. The Benchmarks here deal with environmental changes, and survival; but nothing to link it directly with the concept of *evolution*. It is, however, *mind conditioning* for the later concept of *natural selection*. We can only assume that these are attempts to format the minds of developing children to think of all differences in plants and animals to be the result of macroevolution.

In Grades 5, 6, 7, 8 and 9-12 under Big Idea 2 dealing with the Characteristics of Scientific Knowledge item A. states: *Scientific knowledge is based on empirical evidence, and is appropriate for understanding the natural world, but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing, such as art, philosophy, religion*. This is a major inconsistency and may even be an attack on traditional science. First, scientific knowledge is based on *empirical* evidence. Later in Benchmark SC.5.N.2.1 this is further supported with this statement: *“Recognize and explain that science is grounded in empirical observations, that are testable, explanation must always be linked with evidence.”* Benchmark SC.9-12.N.2.1 makes the statement: *Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science)*. Now these and the other Benchmarks under these sections are excellent and properly delimit science. But why did these writers add to the big idea, *“but it provides only a limited understanding of the supernatural, aesthetic, or other ways of knowing such as art, philosophy, religion.”* If scientific knowledge is based on empirical evidence, and must be testable—it can only deal with physical existence and cannot in any way provide any understanding of supernatural, philosophy, and religion. When science makes any conclusion concerning these things it clearly must be identified as one of the *pseudosciences* identified in the Benchmarks. This is a major expansion of science and we can only believe it is the preparation for including a *faith-based* philosophical system in grades 7-12.

Proposed Restatements of Big Ideas and Benchmarks

The second area that we believe needs to be readdressed is the several Benchmarks in the Life Science Body of Knowledge, Standard 15: Diversity and Evolution of Living Organisms. As currently written the following proposed Standards and Benchmarks take a dogmatic tone that do not reflect the true nature of science, and dramatically overstate the degree of proof supporting Neo-Darwinian evolution and theories of chemical evolution. Examining the wording of several of the proposed benchmarks seems to demonstrate an inherent bias in the language of the statements.

1. Benchmark SC.7.E.15.1: *Recognize that fossil evidence is consistent with the idea that living things evolved from earlier species*. This statement suggests that evolution from earlier species is evidentially absolute. It would be more scientifically correct to change this language in a way that should at least provide an alternate understanding that this evidence is not absolute. One suggestion would be: ***Recognize and describe how consistent fossil evidence seems to be with the hypothesis that living things evolved from earlier species.***
2. Benchmark SC.912..L.15.1: *Explain how evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology), and*

observed evolutionary change. Once again this Benchmark demonstrates a bias that evolution is a fact totally supported by the listed items. It would more accurately represent a scientific viewpoint to redraft this Benchmark to read: ***To be able to explain what evidence the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change provide to support the theory of evolution and which division of evolution it supports.***

3. Benchmark SC.912.L.15.8: Describe the *scientific explanations of the origin of life on Earth.* This language demonstrates a strict evolutionary bias suggesting that there is no question nor doubt in the scientific explanations of the origin of life. In an earlier Benchmark there was indication of a clear understanding of the terms hypotheses, theories, laws, and models. Here the terms of science are ignored. We call for a careful restoration of honesty and integrity to science education and suggest that this Benchmark be reworded and that it also be applied to *Benchmarks SC.912.L.15. In.c and SC.912.L.15.Su.c:* Our suggested wording: ***Describe the scientific hypotheses for the origin of life on Earth, and the limitations of science in constructing a theory of origin.***
4. Benchmark SC.912.L.15.10: *Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans including brain size, jaw size, language, and manufacture of tools.* The language of this Benchmark, once again, overstates the evidence and implies there is sufficient direct fossil evidence for hominid evolution to identify trends. A review of recently discovered fossils classified as hominid and of the debates among paleoanthropologists over issues of classification certainly does obfuscate the identification of trends. We suggest a rewording that would provide the same learning proficiencies for the learner, but devoid of the inherent unscientific bias. ***Identify the types of hominid fossil evidence from the estimated six million years of hominid existence, and describe the types of evolutionary changes from those classified as early hominids to modern humans, including brain size, jaw size, language, and manufacture of tools, as suggested by this evidence.***
5. Benchmark Sc.912.L.15.11: *Discuss specific fossil hominids and what they show about human evolution.* This language again suggests that the fossil hominids totally support the case for evolution. We suggest a language that provides a more open science mind-set to provide a greater learning experience. ***Discuss specific fossil hominids categorizing the specific differences between earlier and later hominids and the scientific explanations and evidence for these differences.***
6. Benchmark SC 912.L.15.9: *Explain the role of reproductive isolation in the process of speciation.* This Benchmark drastically oversimplifies reproductive isolation and even suggests that it is the basis for evolution overriding the specie barrier. A suggested rewording which would increase scientific understandings is as follows: ***Explain the concept of reproductive isolation and its role in keeping species differentiated, and explain the barriers to speciation by reproductive isolation, including gametic, zygotic, embryonic or larval, hybrid inviability, and hybrid sterility.***

7. *Benchmark SC.912.L.15.14: Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.* The language of this Benchmark seems to suggest that natural selection is a factual mechanism, but that there are other possibilities. Furthermore, it is possible to infer that macroevolutionary change can also be automatically assumed because of the microevolutionary evidence. Suggested rewording: ***Discuss the theories of the mechanisms producing evolutionary change including natural selection, genetic drift, and gene flow, and describe the evidence of what evolutionary change can be demonstrated by each.***

This section has been given to demonstrate how language of questions containing an implied bias limits student responses and distorts the educational outcomes. The bias expressed in these Benchmarks expresses the belief that all of evolution is completely proven and factual. This presents a view contrary to traditional science and tends to curtail the spirit of inquiry in students.

The Evolution of Evolution

Our focus now shifts to the Big Idea 15: Evolution and Diversity. In the sixth and seventh grades, statement A. declares: *Evolution is the organizing principle of life science.* This is interesting since in grade six Big Idea 14: Item B. states: *The cell theory is the fundamental organizing principle of life on earth.* An organizing principle is a force or process that bring parts together to form an ordered system. As it relates to the cell theory it describes structure, but when used of Evolution it suggests process. To comprehend what is meant by *Evolution is the organizing principle of life science* it demonstrates that the writers are declaring that when they use the word *evolution* they are representing that matter spontaneously appeared from non-matter, that life spontaneously appeared from nonliving matter, and that all species of plants and animals evolved from the first life form. Furthermore, they imply that this entirety of macroevolution is considered as fact. Each of these stages of evolution are based on a “*leap of faith*” (Discussed in the earlier memoranda) not the evidentiary data of scientific findings.

In nine through twelve grade levels the statement vaults to a gigantic article of faith as Evolution is introduced by the statement: *Evolution is the fundamental concept underlying all of biology and is supported by multiple forms of scientific evidence.* This is a gigantic incendiary bomb since it uses a general term with multiple meanings with no attempt to parse nor define, and then further makes it the “*fundamental concept*” or interpretive basis for all of life science, or comprehension of life.

With the powerful wording that *Evolution is the fundamental concept underlying all of biology . . .* the Proposed Standards demonstrate the next stage in the *Evolution of Evolution.* This is a matter of fact statement that Evolution is the only basis of an interpretive system for understanding all of life-science, and even life itself. This formerly unscientific conclusory statement, devoid of substantiating evidence, moves Florida’s science standards outside the realm of traditional science and enters, instead into the discipline of philosophy as the construct for defining a worldview. Forcing the student to see all of life philosophically from one undefined and unexplained philosophical worldview—a worldview that affirms there is no god; that matter is either eternal or has spontaneously appeared from non-matter; that life has

spontaneously generated from non-living matter with no purpose, no guidance, and no goal. All of these assumptions are philosophical and fall outside the parameters of science. This gigantic leap in the *evolution of evolution* moves the evolutionary hypothesis from the realm of science into a philosophical *faith-based* system.

We recommend an alternative statement to introduce the Big Idea of Evolution and Diversity which we believe is scientifically accurate and educationally valid. ***Microevolution is a scientific theory addressing any evolutionary change below the level of species, and is supported by substantial evidence from research findings and experimentations. Macroevolution is a scientific hypothesis addressing all evolutionary change including the origin of life and the origin of species, and is seeking validation by scientific data, inferences and argumentation. Both of these evolutionary understandings provide basic concepts for the study and understanding of biology.***

We strongly commend both the Science Standards Framers Committee and the Board of Education for the development of Standards for the teaching of science in Florida. We applaud the precise science concepts, the defined science methodology, clear descriptions of what is and is not science, and it is only in the imposition upon true science of the *evolution agenda* driven by lobby forces such as Fordham and AAAS that we take issue. Here definition is abandoned, the emphasis on empirical evidence is forsaken, traditional scientific methodology is attacked without a clear alternative, and the importance of subjective inferences and argumentation are elevated over scientific data.

We believe that evolution should be taught in the Florida Science Curriculum, but we believe it should be taught from a true science perspective using precise science terms and methodology—not as a philosophical worldview.