

29TH DISTRICT  
JAMES J. RHOADES

PLEASE REPLY TO:

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ORIGINAL: 2187 Testimony in File



Senate of Pennsylvania

June 11, 2001

COMMITTEES

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EDUCATION COMMITTEE OF INCSL  
EDUCATION COMMISSION OF THE STATES  
COMMISSIONER

John R. McGinley, Chairman  
Independent Regulatory Review Commission  
14th Floor, Harrisstown 2  
333 Market Street  
Harrisburg, PA 17101

RE: IRRC Regulation #6-273  
Department of Education  
Chapter 4: Academic Standards for Science and Technology and Environment and Ecology

RECEIVED  
2001 JUN 12 11:10:00  
INDEPENDENT REGULATORY  
REVIEW COMMISSION

Dear Chairman McGinley:

Members of the Senate Education Committee have received and reviewed proposed regulations #6-273. The Committee also conducted a hearing on June 5, 2001 to solicit testimony from interested parties on the regulations. The Department of Education, State Board of Education, Franklin and Marshall College, Lehigh University, Capitol Area Math Science Alliance and the Math/Science Collaborative of Southwestern PA provided representatives who testified at the hearing.

Please find attached a copy of all of the testimony collected from the Committee hearing on June 5<sup>th</sup>. Members of the Committee will be considering the testimony in order to submit detailed recommendations and comments on the proposed standards.

I am pleased to continue this process in the hope that these proposed standards can be the strongest, most workable approach to challenging the students of this Commonwealth.

This Committee appreciates the opportunity to comment on these proposed regulations.

Sincerely,

A handwritten signature in cursive script that reads "James J. Rhoades".

JAMES J. RHOADES  
Chairman, Senate Education Committee

ORIGINAL: 2187



## HOUSE OF REPRESENTATIVES

COMMONWEALTH OF PENNSYLVANIA  
HARRISBURG

June 11, 2001

Mr. Robert E. Nyce  
Executive Director  
IRRC - 14<sup>th</sup> Floor  
333 Market Street  
Harrisburg, PA 17101

RECEIVED  
2001 JUN 11 PM 5:07  
REVIEW COMMISSION

Dear Dr. Garland:

We have received numerous letters from constituents and interested parties concerning the proposed Science and Technology Academic Standards and their impact on scientific instruction in our state.

Given that there were no hearings conducted on the proposed science standards prior to the Committee's action, we would like to take this opportunity to offer the following recommendations on this very important matter:

1. Under Academic Standards for Science and Technology, academic standard 3.3.10.D.1 (Biological Sciences, 10<sup>th</sup> Grade), the first bulleted descriptor should be amended to eliminate the phrase "that support or do not support the theory of evolution."
2. Under the Academic Standards for Science and Technology, academic standard 3.3.12.D (Biological Sciences, 12<sup>th</sup> Grade), the first bulleted descriptor that reads, "Analyze the impact of new scientific facts on the theory of evolution" should be eliminated.
3. Under the Academic Standards for Science and Technology, academic standard 3.1.12.E (Unifying Themes, 12<sup>th</sup> Grade), the first and second bulleted descriptors should be amended to include the term "evolution" with the other examples of theories and concepts.

It is our belief that these proposed science standards already provide for an appropriate evaluation of evolution and other existing theories, specifically:

- Academic standard 3.2 Inquiry and Design, Grade 12 (3.2.12A) requires students to "evaluate the nature of scientific and technological knowledge and critically evaluate the status of existing theories."

- Academic standard 3.2 Inquiry and Design, Grade 7 (3.2.7A) requires students to "explain and apply scientific and technological knowledge, distinguish between a scientific theory and a belief, explain how skepticism about an accepted scientific explanation led to a new understanding, and explain how new information may change existing theories and practice."
- Academic standard 3.1 Unifying Themes, Grade 12 (3.1.12 F) requires students to "evaluate change in nature, physical systems and man made systems, evaluate fundamental science and technology concepts and their development over time (c.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, Copernican and Ptolemaic universe theories) and analyze how models, systems and technologies have changed over time (c.g., germ theory of disease, solar system, cause of fire)."

Hence, there is no need for additional language that singles out the theory of evolution.

Finally, we would like to have the Committee's letter request further clarification on the following item:

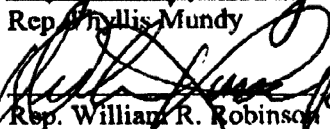
4. The proposed Academic Standards for Science and Technology, academic standard 3.2.10.A.2 (Inquiry and Design, 10th Grade) states that students should "Know that science is limited to the study of observable aspects of the world and the universe." The term "observable" is not clearly defined and can be interpreted in various ways. **We recommend that this language be clarified.**

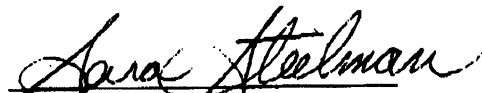
Sincerely,

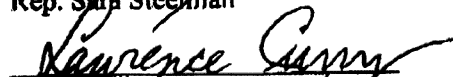
  
Rep. Nick Colafella, Democratic Chair

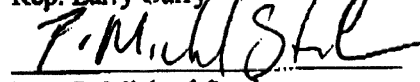
  
Rep. Connie Williams

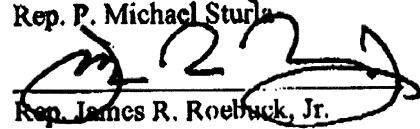
  
Rep. Phyllis Mundy

  
Rep. William R. Robinson

  
Rep. Sara Steelman

  
Rep. Larry Curry

  
Rep. P. Michael Sturla

  
Rep. James R. Roebuck, Jr.

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*House of Representatives*  
COMMONWEALTH OF PENNSYLVANIA  
HARRISBURG

COMMITTEES

EDUCATION  
FINANCE  
LABOR RELATIONS  
STATE GOVERNMENT, SECRETARY

ORIGINAL: 2187  
TO:

Honorable Jess M. Stairs, Majority Chairman, Education Committee  
Honorable Nicholas A. Colafella, Minority Chairman, Education Committee  
Honorable Members of the House Education Committee

FROM: Representative Daryl D. Metcalfe  
Representative Bob Bastian  
Representative Thomas F. Yewcic  
Representative Samuel E. Rohrer  
Representative John A. Lawless  
Representative Jere W. Schuler  
Representative Thaddeus Kirkland

DATE: June 11, 2001

SUBJECT: Proposed Academic Standards for Science and Technology, Reg. #6-273

RECEIVED  
2001 JUN 12 AM 11:46  
LEGISLATIVE  
COMMISSION

**Recommendation to the Pennsylvania State Board of Education:** *That the science standards for Pennsylvania schools exclude any reference to or aspects of the hypothesis, "theory of evolution," as it relates to origins and that component of evolution that is naturalistic evolution.*

I am submitting this as testimony, regarding the above referenced proposal and recommendation. One of the areas of concern is the proposed standard regarding the teaching of evolution.

The first problem is that the word evolution as used in the standards, is broadly defined within the context it is used.

Evolution as defined, through it's usage in the standards, could be everything from; the erosion of a river bed by the fluctuating currents of the river (changes in our environment caused by environmental forces); to the varying characteristics within a certain species (micro-evolution); to the hypothesis, that a cell came in to being in a fluid, which eventually turned into a fish, which eventually turned into a land animal, eventually turning into a bird, or an ape and then into a man (macro-evolution); to the hypothesis of a big bang that brought about an organized solar system with all of the right conditions for life to exist.

We all agree that our environment does change as it ages (the second law of thermodynamics, the law of entropy) and is acted on by environmental forces, and that

## Proposed Academic Standards

June 11, 2001

Page 2

there are variations within a species. We are able to apply the empirical scientific method to these aspects of change.

Referencing the proposed standards:

A definition of Scientific thinking is- ... explanations or answers have been tested and verified with information.

Standard 3.2.10 A. reads: Know that science is limited to the study of observable aspects of the world and the universe.

Our ability to apply the empirical scientific method of observation or experimentation to the science standards that are established should be a requirement, based on the above referenced areas of the standards, and also in order to promote good science.

Naturalistic evolution, (which would include macro evolution and evolution relating to origins), is to assume that the entire realm of nature is a closed system of material causes and effects, which have not been and cannot be influenced by anyone or anything from the outside. This hypothesis advances the belief in a universe that has come into being on its own. The origin of the universe cannot be duplicated, be observed or tested with experiments, because it has occurred in the past. Naturalistic, "evolution," is a hypothesis of origins. Since one is not able to apply the empirical scientific method to it and it does not meet the definition of science, it must be excluded from the science curriculum.

Naturalistic evolution is not factual, is not proven, it is a belief system. It is a belief, which is the foundation of the religion of Secular Humanism. Secular Humanism has been declared by the U.S. Supreme Court to be a religion, *Torcaso v. Watkins*, 367 U.S. 488, 495 (1961).

The first and second tenets in the *Humanist Manifesto 1* (1933) are:

First: Religious humanists regard the universe as self-existing and not created.

Second: Humanism believes that man is a part of nature and that he has emerged as a result of a continuous process.

Naturalistic, "evolution," is a philosophy, which is the foundation of a religion and should not be taught in a dogmatic approach, touted as science. The proper place in our educational curriculum for evolution to be taught would be in a social studies class at the same time as other religions of the world are explained to the students. This would provide an opportunity for the other model of origins, "special creation," or, "intelligent design," to be taught in a parallel fashion.

There are a multitude of evidences which point to, "intelligent design," and refute the hypothesis of, "the theory of evolution," relating to origins. In the interest of academic freedom, academic excellence and religious freedom, these evidences should be brought into the classroom and not dogmatically filtered out, as some would suggest. Evidences are abundant from homology, embryology, vestigial organs, the fossil record, physics, to molecular biology and more. Michael Behe, author of *Darwin's Black Box* and a professor of Biochemistry at Lehigh University, presents modern information displaying the irreducible complexity of life at the molecular level, which points to intelligent design and destroys the evolutionary thought. Critical thinking skills should be encouraged, not discouraged. The position of some to filter out of the classroom the discussions regarding both of the models of origins is an attempt to indoctrinate, not educate.

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House of Representatives  
COMMONWEALTH OF PENNSYLVANIA  
HARRISBURG  
June 5, 2001

COMMITTEES

AGRICULTURE AND RURAL AFFAIRS, VICE-CHAIR  
EDUCATION  
ENVIRONMENTAL RESOURCES AND ENERGY

DEMOCRATIC POLICY COMMITTEE  
LEGISLATIVE COAL CAUCUS  
SOUTHWEST REGIONAL CAUCUS, WHIP  
STATE SYSTEM OF HIGHER EDUCATION  
SYMPOSIUM, CO-CONVENOR

ORIGINAL: 2187

Dr. Peter Garland  
Executive Director  
Pennsylvania State Board of Education  
333 Market Street  
Harrisburg, PA 17126-0333

Dear Dr. Garland:

After reading the proposed standards in science and technology and in environment and ecology, I noted some points on which I would like to comment independently of the other members of the Education Committee.

First, I commend the board for beginning with an overview of unifying themes across the whole range of the sciences and their associated technologies. In Standards 3.1.10.E and 3.1.12.E, however, I would suggest adding the term "theory of evolution" to several of the descriptors. They would read as follows: 3.1.10.E "Describe how fundamental science and technology concepts are used to solve practical problems (e.g., momentum, Newton's laws of universal gravitation, tectonics, conservation of mass and energy, cell theory, theory of evolution, Pasteur's germ theory, theory of relativity, heliocentric theory, gas laws, feedback systems)"; 3.1.12.E "Evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, theory of evolution, unified field theory, energy measurement, automation, miniaturization, Copernican and Ptolemaic universe theories)"; 3.1.12.E "Analyze how models, systems, and technologies have changed over time (e.g., germ theory, theory of evolution, solar system, cause of fire)." This set of examples should probably also include the theory of matter/atomic theory.

This would link the continuing study and analysis of evolution with the continuing study and analysis of all scientific theories, as is quite appropriate. Any scientific theory is always open to question, and students should understand that. The point is reiterated in the section on inquiry and design in 3.2.12.A, in which the descriptor "Critically evaluate the status of existing theories" could have added to it "(e.g., germ theory of disease, wave theory of light, classification of subatomic particles, theory of evolution, epidemiology of AIDS)." It is perfectly reasonable for a teacher who is adequately prepared to use any of these topics to stimulate classroom

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COMMISSION  
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discussion, although not all teachers in Pennsylvania are necessarily fully prepared to lead such discussions.

These standard descriptors already imply that the theory of evolution is just another theory, no better or different than atomic theory, cell theory, or germ theory, and should be considered just as open to scientific debate as they are. This natural grouping can, as I show above, be made explicit.

That being so, it is both repetitious and misleading to include in Standard 3.3.10.D. the descriptor "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution," since by singling out evolutionary theory, the implication is created that evolutionary theory is somehow different from other theories in the sciences, which is not the case. An alternative form for that descriptor might be "Analyze data from fossil records, similarities in anatomy and physiology, embryological studies, and DNA studies that are relevant to the theory of evolution."

Similarly, in Standard 3.3.12.D., the descriptor "Analyze the impact of new scientific facts on the theory of evolution" is redundant, and probably excessive. Much as I might like to see all students in Pennsylvania required to examine contemporary data on the documented occurrence of natural selection in populations (a phenomenon Darwin thought might occur too slowly to be recognized), the increasingly compelling fossil sequence of hominid evolution, the fascinating case of the thoroughly researched evolution of HIV, or the masses of data that led to the development of the theory of punctuated equilibria as a plausible explanation for the observed patterns of speciation in the fossil record, an examination of the flood tide of new supporting data adequate to permit the act of critical analysis by high school seniors would absorb much of the time allotted for science in general and biology in particular in the high school curriculum. Beautiful as the theory of evolution is, it is probably not necessary (or possible) for every high school graduate to understand it fully. I would suggest deleting this descriptor.

I also see a problem with a descriptor that appears under 3.3.4.C and again under 3.3.10.D. "Distinguish between learned and inherited characteristics." Do we really want to promote a philosophy of naïve genetic determinism? The descriptor is a milder version of the old, frequently false dichotomy between genetic and environmental effects on phenotype, and encourages students to believe that traits are one or the other, when they are sometimes both. Perhaps the most obvious example of this is that the fact that mathematical talent has a strong heritable component is interpreted by an extraordinarily large number of parents and children as implying that if they don't have "the right genes" they cannot be expected to learn even relatively simple math concepts. This is not the kind of thinking we should be encouraging through our educational standards.



In addition, the descriptor is in neither case descriptive of the standard to which it is attached. Standard 3.3.4.C is "Know that characteristics are inherited and thus offspring closely resemble their parents." If we want students to recognize that principle, shouldn't the descriptor focus on inheritance, not on other ways in which offspring might come to resemble their parents? A better descriptor might be "Identify physical characteristics that appear in both parents and offspring and differ between families (or strains, or species)." Standard 3.3.10.D is "Explain the mechanism of the theory of evolution." It would be more precise if it read "...mechanisms of evolution," but in any case, a better descriptor would be "Explain why natural selection can act only on inherited traits."

Several descriptors seem to have been omitted from Section 3.3.D, or, in some cases, to have been linked with the wrong standard. "Know that [heritable] differences in individuals of the same species may give some advantage in surviving and reproducing," which is in 3.3.4.D, the standard for which is "Identify changes in living things over time," belongs in 3.3.7.D, which is "Explain basic concepts of natural selection."

Standard 3.3.7.D also needs descriptors pointing out that one of the basic concepts of natural selection is the tendency toward unchecked increase in all living things ("Calculate how many flies could be produced in one year if two flies have 10 offspring every 5 days and each of those offspring continues the same pattern of reproduction.") and that the central concept of natural selection is differential reproductive success, not individual longevity or control of resources.

Students also need to have some understanding of what mutation is and what role it plays in natural selection to reach Standard 3.3.7.D, but a basic understanding of mutation is not required, according to the descriptors in 3.3.C, until the end of 10<sup>th</sup> grade. The understanding of mutational effects on genotype and phenotype, now located in 3.3.10.C, should be part of 3.3.7.C ("Know that every organism has a set of genetic instructions that determines its inherited traits.")

The last two descriptors in 3.3.12.C ("Describe the factors affecting gene frequency in a population over time and their consequences" and "Describe and differentiate between the roles of natural selection and genetic drift") have nothing to do with the 3.3.12.C standard ("Explain gene inheritance and expression at the molecular level") and quite a lot to do with Standard 3.3.10.D, mechanisms of evolution; that is where they belong.

Standard 3.3.10.D also needs a descriptor speaking to the key issue of reproductive isolation of species. There should be something on the order of "Describe mechanisms of reproductive isolation (geographic, physiological, behavioral) that disrupt gene flow within a population and promote speciation."

The descriptor "Describe how selective breeding and genetic technologies can change genetic makeup of organisms" (3.3.7.C) should read "Describe how selective breeding, natural selection, and genetic technologies can change genetic makeup of organisms."

In the descriptor "Compare modern descendants of extinct species and propose possible accounts for their present appearance" (3.3.10.C) the word "scientific" should be added between "possible" and "accounts."

In the first descriptor for Standard 3.3.10.C, several words have apparently been omitted. Surely it should read "Compare mitosis and meiosis with regard to function and process." As it is, it makes no sense.

Similarly, the last descriptor under 3.3.12.D, "Evaluate the concept of natural selection in illustrating evolution theory" is so clumsily written as to be almost incomprehensible. The concept of natural selection does not illustrate evolutionary theory; it is the driving force in evolution. Did the writer mean that in their analysis of the theory of evolution, students should demonstrate that they understand the centrality of natural selection, or what? One hesitates even to guess.

Another problematic construction occurs in 3.3.4.A. The standard is "Know the similarities and differences of living things." The descriptor is "Know that some organisms have similar external characteristics...and that similarities and differences are related to environmental circumstances." The last phrase isn't really a descriptor for the standard, but if the idea is to get students thinking about the fact that species in similar habitats show similar adaptations, what's wrong with using that language? The use of "circumstances" seems unnecessarily vague.

Finally, I agree with the comment that the agricultural science section should be in the science and technology standards, but only because I think both agricultural science and ecology (and the environment) are all part of biological sciences and should be included in that section. An entire set of curriculum standards for this area is a case of political correctness run amok.

Slicing ecology out of the sciences has led to an unwarranted proliferation of "ecology" standards, culminating in the absurdity of devoting as much space to integrated pest management curriculum standards as to the standards for cell biology. The desperate attempt to fill space has led to such standards as 4.5.7.A: "Explain benefits and harmful effects of pests." We usually define as pests those organisms without redeeming benefits: Do we really expect 7<sup>th</sup> graders to discover some benefit in the German cockroach?

Even more ridiculous is 4.5.12.C: "Analyze the historical significance of integrated pest management on society." Since IPM is a development of the last 15 years or so, its historical significance is slight at best, nonexistent at

worst. But we have a descriptor that reads "Identify historic events affecting integrated pest management and cite the practices used (e.g., avian flu, bubonic plague, potato plightsic)." During the major historic outbreaks of bubonic plague in Europe, which predated any concept of the germ theory of disease, let alone IPM, it would appear that one form of "pest management" practiced was the burning alive of cats on the theory that they were, as potential witches' familiars, collaterally responsible for the plague. Given the actual causes of plague, killing rat predators was an extraordinarily ineffective response to the problem. Although the study of these antique customs may have some amusement value, it is difficult to see why any time should be devoted to it in a science class.

I don't really expect the board to put the ecology and environment standards back in biology and earth sciences, where they would fit quite nicely, but I would hope that at least some of the standards would be pruned back, rather than bulked up, apparently to fit a model that determines that every topic must be represented by standards and descriptors at every grade level.

Sincerely,

A handwritten signature in cursive script, reading "Sara G. Steelman". The signature is written in black ink and is positioned above the printed name.

Sara G. Steelman, Ph.D.

RAYMOND BUNT, JR.  
MAJORITY DEPUTY WHIP

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ORIGINAL: 2187



*House of Representatives*  
COMMONWEALTH OF PENNSYLVANIA  
HARRISBURG

June 5, 2001

Peter H. Garland, Executive Director  
State Board of Education  
333 Market Street  
Harrisburg, PA 17126-0333

Dear Dr. Garland:

I am writing to urge that you give favorable consideration to the recommendations of the Pennsylvania Association of Agricultural Educators with respect to the proposed standards in Science and Technology and Environment and Ecology. Their letter to you on May 18, 2001 clearly states their position with regard to these standards. In addition, the specific recommendations they included (and I have also attached for your reference) are, I believe, clearly consistent with the intent of Act 26.

Considerable effort has gone into developing language appropriate to agriculture, knowledge of which is sorely missing among today's students. This fact, along with the specific directives of Act 26, should not be ignored by the Board. In relation to this, I find it particularly disturbing that the Board chose to ignore the comments and recommendations of the Independent Regulatory Review Commission. Certainly their objective review should be given due consideration by the Board.

Again, I urge you to give this matter serious reconsideration. Thank you for this opportunity to share my views and please feel free to contact me if you have additional questions.

Sincerely,

A handwritten signature in black ink that reads "Raymond Bunt, Jr.".

Raymond Bunt, Jr., Majority Chairman  
Agriculture and Rural Affairs Committee

RB/ab

Enclosure

cc: Charles Zogby, Department of Education  
✓ Robert Nyce, IRRC  
Samuel E. Hayes, Jr., Secretary  
Honorable Jess Stairs  
Honorable Nicholas Colafella

COMMITTEES

AGRICULTURE AND RURAL AFFAIRS.  
MAJORITY CHAIRMAN

JUDICIARY  
POLICY  
LAND USE MANAGEMENT SUB-COMMITTEE

BOARDS AND COMMISSIONS:

ANIMAL HEALTH & DIAGNOSTIC COMMISSION  
STATE AGRICULTURAL LAND PRESERVATION BOARD  
AGRICULTURE RESEARCH COMMITTEE

ASSIGNMENTS

ALEC-CIVIL JUSTICE TASK FORCE  
PA AGRICULTURAL LAW RESOURCE &  
REFERENCE CENTER, BOARD MEMBER  
DELAWARE RIVER BASIN CAUCUS  
LOCAL TAX REFORM CAUCUS  
RURAL HEALTH CARE CAUCUS  
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FUNDS TASK FORCE COMMITTEE MEMBER

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2001 JUN 26 PM 1:23  
INDEPENDENT  
REGULATORY  
REVIEW  
COMMISSION

## PENNSYLVANIA ASSOCIATION OF AGRICULTURAL EDUCATORS

### Recommendations to the Science and Technology Standards RECOMMENDATIONS ARE INCLUDED IN ITALICS

#### Table of Contents page- by adding

#### 3.9 *Agricultural Science*

*Animal Science*

*Mechanical Systems*

*Processing Systems*

*Plant / Soil Science*

#### Introduction page

#### 3.9 *Agricultural Science*

#### Page 3

#### 3.9 *Agricultural Science*

*The application of scientific principles in the production and processing of food and fiber.*

**What is Science?** Any study of science... natural phenomena and events, *including agricultural science.*

#### Page 4

**Knowledge** - facts, principles, theories and laws verifiable through scientific inquiry by the world community of scientists; includes physics, chemistry, *agricultural*, earth, biological sciences.

#### What is Technology?

...

These improvements may relate to survival needs (e.g., food *and fiber*, shelter or defense) or they may relate to human aspirations (e.g., knowledge, art, or control).

#### Page 5

Technology can be divided into *three* main systems that include *agricultural* / biological / chemical-related, informational, and physical technologies:

Technology: *Three systems add Agricultural / Biological / Chemical Related Systems*

Biotechnological System    Informational Systems  
*Agriculture*                      *Global Information Systems*  
   *Electronic Commerce*

**Page 12**

3.3.4.A

- *Describe how plants and animals are classified according to use.*

3.3.10.A

- *Explain how breeds of animals and cultivars of plants are developed.*

3.3.12.A

- *Explain significant biological / agricultural diversity found in each of the biomes.*

3.3.4. B

- *Compare human / animal / plant life processes with life processes of the cell.*

3.3.10. B

- *Describe the cause and effects of disease on an organism.*
- *Explain how disease is prevented.*

**Page 19**

3.5.7.B

- *Explain how available resources affect agricultural activities across Pennsylvania*

3.5.12.B

- *Identify and evaluate earth resources through map interpretation and the use of global information systems.*
- *Analyze existing geological data and determine highest and best use.*

**Page 29**

Add to glossary

*Agricultural Systems: The production of plants and animals for food and fiber including the related technology, supplies, services processing, marketing and distribution of agricultural products.*

*Agricultural science: The application of scientific principles and new technologies to agriculture.*

### 3.9. Agricultural Sciences

## Proposed Academic Standards for Science and Technology

3.9.4 GRADE 4

3.9.7 GRADE 7

3.9.10 GRADE 10

3.9.12 GRADE 12

*Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to...*

|  |  |  |   |
|--|--|--|---|
| <p>A. Know the significance of animal science.</p> <ul style="list-style-type: none"> <li>• Know That animals and humans are dependent on air and water</li> <li>• Types of domestic animals</li> <li>• Uses of domestic animals</li> <li>• Careers related to domestic animals</li> <li>• Safety issues and concerns related to animal production</li> </ul>                            | <p>A. Describe the significance of animal science.</p> <ul style="list-style-type: none"> <li>• Describe issues relates to animal health</li> <li>• Types of domestic animals</li> <li>• Uses of domestic animals</li> <li>• Careers related to domestic animals</li> <li>• Safety issues and concerns</li> <li>• Explain breeding and reproduction of domestic animals</li> </ul> | <p>A. Relate the significance of animal science.</p> <ul style="list-style-type: none"> <li>• Types of domestic animals</li> <li>• Uses of domestic animals</li> <li>• Identify basic anatomy of animals</li> <li>• Evaluate a group of animals for a specific purpose</li> <li>• Relate how an animal's genome might be mapped in the order to identify economically desirable traits</li> <li>• Careers related to domestic animals</li> <li>• Safety issues and concerns</li> </ul> | <p>A. Analyze the significance of animal science.</p> <ul style="list-style-type: none"> <li>• Identify types of domestic animals</li> <li>• Identify species, breeds and associated products and uses.</li> <li>• Explain animal pedigrees and family lines</li> <li>• Predict genetic types using the punnet square</li> <li>• Explain the principles of animal genetics</li> <li>• Identify careers related to domestic animals</li> <li>• Explain and describe the physiology of animal reproduction</li> <li>• Analyze how an animal scientist might manipulate an animal's genome in order to improve the economic and nutritive value of animal products.</li> <li>• Safety issues and concerns</li> </ul> |
| <p>B. Know the significance and differences between agricultural engineering systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural tools and engineering systems used in agricultural production</li> <li>• Uses of agricultural tools and engineering systems</li> <li>• Careers related to use and care of agricultural tools and engineering systems</li> </ul> | <p>B. Describe the significance and differences between agricultural engineering systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural tools and engineering systems</li> <li>• Uses of agricultural tools and engineering systems</li> <li>• Careers related to use and care of agricultural tools and engineering systems</li> </ul>                       | <p>B. Relate the significance and differences between agricultural engineering systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural tools and engineering systems</li> <li>• Uses of agricultural tools and engineering systems</li> <li>• Careers related to use and care of agricultural tools and engineering systems</li> </ul>   | <p>B. Analyze the significance and differences between agricultural engineering systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural tools and engineering systems</li> <li>• Uses of agricultural tools and engineering systems</li> <li>• Explain and demonstrate the principles of hydraulics and pneumatic sciences</li> </ul>   |

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|---|--|--|---|
| <ul style="list-style-type: none"> <li>• Safety issues and concerns of agricultural tools and engineering systems</li> <li>• Know tools and machinery used in animal production</li> </ul>  | <ul style="list-style-type: none"> <li>• Safety issues and concerns of agricultural tools and engineering systems</li> <li>• Identify tools and machinery used in animal production</li> </ul>   | <ul style="list-style-type: none"> <li>• Safety issues and concerns of agricultural tools and engineering systems</li> <li>• Analyze the effects of increased efficiency in agriculture through technological improvements</li> </ul>  | <ul style="list-style-type: none"> <li>• Careers related to use and care of agricultural tools and engineering systems</li> <li>• Safety issues and concerns of agricultural tools and engineering systems</li> </ul>   |
| <p>C. Know the significance and differences between agricultural processing systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural processing systems</li> <li>• Uses of agricultural processing systems</li> <li>• Careers related to use and care of agricultural processing systems</li> <li>• Safety issues and concerns of agricultural processing systems</li> </ul> | <p>C. Describe the significance and differences between of agricultural processing systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural processing systems</li> <li>• Uses of agricultural processing systems</li> <li>• Careers related to use and care of agricultural processing systems</li> <li>• Safety issues and concerns of agricultural processing systems</li> <li>• Describe how technology that have advanced agricultural production</li> </ul> | <p>C. Relate the significance and differences between agricultural processing systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural processing systems</li> <li>• Uses of agricultural processing systems</li> <li>• Careers related to use and care of agricultural processing systems</li> <li>• Safety issues and concerns of agricultural processing systems</li> <li>• Identify a commodity its origin and its steps through the process to the consumer</li> </ul> | <p>C. Analyze the significance and differences between agricultural processing systems.</p> <ul style="list-style-type: none"> <li>• Types of agricultural processing systems</li> <li>• Uses of agricultural processing systems</li> <li>• Careers related to use and care of agricultural processing systems</li> <li>• Safety issues and concerns of agricultural operating systems</li> </ul>   |
| <p>D. Know the significance of plant science.</p> <ul style="list-style-type: none"> <li>• Types of cultivated plants</li> <li>• Uses of plants and plant products</li> <li>• Careers related plant science</li> <li>• Safety</li> </ul>  | <p>D. Describe the significance of plant science.</p> <ul style="list-style-type: none"> <li>• Types of cultivated plants</li> <li>• Uses of plants and plant products</li> <li>• Careers related plant science</li> <li>• Describe safety issues with plant science</li> <li>• Define issues associated with plant production</li> </ul>  | <p>D. Relate the significance of plant science.</p> <ul style="list-style-type: none"> <li>• Types of cultivated plants</li> <li>• Uses of plants and plant products</li> <li>• Careers related plant science</li> <li>• Demonstrate use of safety equipment</li> <li>• Identify advanced training and post-secondary education in plant science</li> </ul>  | <p>D. Analyze the significance of plant science.</p> <ul style="list-style-type: none"> <li>• Analyze and explain the historical development of plant science</li> <li>• Identify current issues regarding plant and soil management that impacts agronomic and horticultural practices</li> <li>• Types of cultivated plants</li> <li>• Uses of plants and plant products</li> <li>• Careers related plant science</li> <li>• Safety</li> <li>• Identify dangerous plants</li> </ul> |



ORIGINAL: 2187

**TO: Robert Nyce, Executive Director, Independent regulatory review  
Commission**  
**FROM: Dave Dumeyer,** *Dumeyer*  
**Executive Director, House Education Committee**  
**RE: Committee comments/objections on proposed science and technology  
standards**  
**DATE: June 11, 2001**

The House Education Committee completed its discussion and actions on the above-reference rule-making on this date. Due to the lateness of the hour for adjournment of the meeting, the Committee's comments could not be transmitted to the Commission in the usual timely fashion, but will be hand-carried to your office before 12:00 Noon on Tuesday, June 12, 2001. Thank you for your understanding in this matter.

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REVIEW COMMISSION



HOUSE OF REPRESENTATIVES  
COMMONWEALTH OF PENNSYLVANIA  
HARRISBURG

June 4, 2001

TO: Representative Jess Stairs, Chairman  
House Education Committee

FROM: Representative Nicholas Colafella, Democratic Chairman  
Representative Sara Steelman  
Representative Constance Williams  
Representative Larry Curry  
Representative Phyllis Mundy  
Representative P. Michael Sturla  
Representative William R. Robinson  
Representative James R. Roebuck, Jr.  
Representative Jerry L. Nailor  
Rep. Edward H. Krebs

RE: Proposed Academic Standards for Science and Technology, Reg. #6-273

On June 6, 2001 the House Education Committee will be voting on comments and recommendations to the proposed academic standards in Science and Technology and Environment and Ecology. Like you, we have received numerous correspondence from constituents and interested parties concerning these proposed standards and their impact on scientific instruction in our state.

Given that there are no hearings scheduled on the proposed science standards prior to the Committee's action, we would like to take this opportunity to offer recommendations on this very important matter.

Instead of a general statement noting the existing controversy between individuals of certain faiths and pro-evolution commenters, we would like to have the following recommendations regarding evolution be included in the Committee's correspondence to IRRC and the State Board of Education:

1. Under Academic Standards for Science and Technology, academic standard 3.3.10.D.1 (Biological Sciences, 10<sup>th</sup> Grade), **the first bulleted descriptor should be amended to eliminate the phrase "that support or do not support the theory of evolution."**
2. Under the Academic Standards for Science and Technology, academic standard 3.3.12.D (Biological Sciences, 12<sup>th</sup> Grade), **the first bulleted descriptor that reads, "Analyze the impact of new scientific facts on the theory of evolution" should be eliminated.**

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3. Under the Academic Standards for Science and Technology, academic standard 3.1.12 E (Unifying Themes, 12<sup>th</sup> Grade), **the first and second bulleted descriptors should be amended to include the term “evolution” with the other examples of theories and concepts.**

It is our belief that these proposed science standards already provide for an appropriate evaluation of evolution and other existing theories, specifically:

- ❑ Academic standard 3.2 Inquiry and Design, Grade 12 (3.2.12A) requires students to “evaluate the nature of scientific and technological knowledge and critically evaluate the status of existing theories.”
- ❑ Academic standard 3.2 Inquiry and Design, Grade 7 (3.2.7A) requires students to “explain and apply scientific and technological knowledge, distinguish between a scientific theory and a belief, explain how skepticism about an accepted scientific explanation led to a new understanding, and explain how new information may change existing theories and practice.”
- ❑ Academic standard 3.1 Unifying Themes, Grade 12 (3.1.12 E) requires students to “evaluate change in nature, physical systems and man made systems, evaluate fundamental science and technology concepts and their development over time (e.g., DNA, cellular respiration, unified field theory, energy measurement, automation, miniaturization, Copernican and Ptolemaic universe theories) and analyze how models, systems and technologies have changed over time (e.g., germ theory of disease, solar system, cause of fire).”

**Hence, there is no need for additional language that singles out the theory of evolution.**

Finally, we would like to have the Committee’s letter request further clarification on the following item:

4. The proposed Academic Standards for Science and Technology, academic standard 3.2.10.A.2 (Inquiry and Design, 10th Grade) states that students should “Know that science is limited to the study of observable aspects of the world and the universe.” The term “observable” is not clearly defined and can be interpreted in various ways. **We recommend that this language be clarified.**

cc: Members of the House Education Committee

SHEILA MILLER, MEMBER  
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## House of Representatives

COMMONWEALTH OF PENNSYLVANIA  
HARRISBURG

### COMMITTEES

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CHAIRMAN, CENTER FOR RURAL PENNSYLVANIA

ORIGINAL: 2187

May 20, 1999

Forthcoming  
Nyce \_\_\_\_\_  
Sandusky \_\_\_\_\_  
Gelnett \_\_\_\_\_

Mr. Peter H. Garland, Executive Director  
State Board of Education  
First Floor, Harristown 2  
333 Market Street  
Harrisburg, PA 17126-0333

Dear Mr. Garland:

I am writing to share concerns which have been voiced by my constituents regarding draft proposed standards for Science and Technology which are being developed by the Board. Specifically, in Section 3.1.10-C (biological sciences), evolution is listed as one of the proposed standards which all students will be expected to know.

These constituents do not feel the teaching of evolution should be mandated through statute or regulation. I ask that you consider the concerns raised to me by citizens living in the 129<sup>th</sup> Legislative District when finalizing these proposed standards for publication in the Pennsylvania Bulletin. I understand these proposed standards will undergo the review process of both the legislative committees and the Independent Regulatory Review Commission prior to being adopted. This will provide the public with a thirty day comment period. Please inform my office when these standards are published.

Sincerely,

A handwritten signature in cursive script that reads "Sheila Miller".

SHEILA MILLER  
State Representative  
129<sup>th</sup> Legislative District

SM/mlm

cc: Honorable Jess Stairs  
Honorable Robert Nyce  
Dave Dumeyer

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LEGISLATIVE COMMISSION