

**Garland, Peter**

ORIGINAL: 2187

**To:** adele uhryniak

**Subject:** RE: revised standards

Dear Ms. Uhrniak:

Thank you for your e-mail of May 19, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

Peter H. Garland

Executive Director

cc: Members of the State Board

Senator Rhoades

Senator Schwartz

Representative Stairs

Representative Colafella

IRRC

-----Original Message-----

**From:** adele uhryniak [mailto:adele@atc-pa.com]

**Sent:** Saturday, May 19, 2001 12:52 PM

**To:** pgarland@state.pa.us

**Subject:** revised standards

Mr. Garland,

5/21/2001

RECEIVED  
MAY 22 AM 9:56  
INDEPENDENT  
REGULATORY  
REVIEW  
COMMISSION

I believe that the new standards would be fine. How can it hurt or be detrimental to teach all of the viewpoints on any issue? Isn't that what makes a well rounded graduate?  
Put me down for voting FOR the change to a new set of standards.

Sincerely  
Al Uhryniak

5/21/2001



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2001 MAY 23 AM 9:28

**PENNSYLVANIA ASSOCIATION OF  
AGRICULTURAL EDUCATORS**

REVIEW COMMISSION



May 18, 2001

**RECEIVED**

MAY 21 2001

**PA. STATE BOARD  
OF EDUCATION**

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

Dear Dr. Garland,

I am writing on behalf the leadership and members of the Pennsylvania Association of Agricultural Educators, regarding propose standards in Science and Technology and Environment and Ecology.

Subsequent to the inclusion of Agriculture to the Science and Environment regulations under old Chapter 5, the General Assembly passed legislation codifying instruction of students in Environment and Agriculture. After a great deal of work on Chapter 4 by the State Board and the administration the Board both failed to implement any of the Independent Regulatory Review Commission's recommendations regarding instruction and Agriculture. For the benefit of the members of the State Board the following constitutes IRRC's comments.

*Paragraph (g) Agriculture.*

*Paragraph (g) directs schools to provide instruction throughout the curriculum so that students may develop knowledge and skills in specific subject areas. Section (a)(1) of Act 26 (Act 26) (24 P.S. SS 15-1549(a)(1)) requires the Department:*

*... to develop and disseminate agricultural education materials for school entities...*

*and...*

*The materials shall incorporate agricultural concepts into the basic school curricula and shall be designed to educate the general student population about the importance of the agriculture industry and the role of agriculture in the students' lives.*

*Because agricultural production is one of the Commonwealth's top industries and the specific direction of Act 26, the Board should consider adding "Agricultural education" as a separate course of instruction within the listing of curricula in Paragraph (g). If the Board agrees, then the Board should develop accompanying standards for "Agricultural education" under Section 4.12.*

*The Board refers to "agriculture and agricultural sciences" in Section 4.21(f)(3) relating to planned instruction for science and technology at the elementary level; Section 4.22(c)(3) relating to planned instruction for science and technology at the middle level; and Section 4.23(c)(3) relating to science and technology at the high school level. However, a reference to "agriculture and*

*agricultural science" is lacking under the academic standard of science and technology in Section 4.12(a)(1). For consistency, we recommend that the Board add a reference to "agriculture and agricultural science" in Section 4.12(a)(1) relating to the academic standards for science and technology.*

*In addition, we note that the Board refers to "agriculture and agricultural sciences" in Section 4.21(t)(4) relating to planned instruction for environment and ecology at the elementary level and Section 4.22(c)(5) relating to planned instruction for environment and ecology at the middle level. However, a reference to "agriculture and agricultural science" is lacking under the planned instruction for environment and ecology at the high school level in Section 4.23(c)(5). To be consistent, we recommend that the Board add a reference to "agriculture and agricultural science" in Section 4.23(c)(5) relating to the planned instruction for environment and ecology.*

I believe the record will reflect that none of the IRRC's recommendations, as they appear above, were not considered necessary and were not approved by their board or it's writing committee.

As standards for science and technology moved through the process to the current draft, I have offered comment and provided written suggestion regarding the implementation of the regulations and the impact Act 26 has on the formulation of these regulations and standards. Again the members of their writing committee and the State Board set our suggestions aside.

If you track the history and evolution of the Science and Technology and Environment and Ecology standards and see that Environment and Ecology contains a standard for Agriculture and Society. While Agricultural Science, the oldest science does not appear in the Science and Technology standards.

With this history in mind, I strongly urge State Board to accept the changes we offer. Standard 3.9 Agricultural Science is consistent with existing Curriculum and Instruction regulations. (Chapter 4) We believe they complement the intent of Act 26 and are consistent with action previously taken by the State Board prior to the adoption of the Agriculture and Environmental Education Acts.

On behalf of PAAE I want thank you in advance for your reconsideration of our views. If you have any questions please feel free to contact me at 805.0584.

Sincerely,



LeRoy Dreibelbis Jr. President  
Pennsylvania Association  
of Agricultural Educators



Frederick C. Brown  
Association, Advisor

encl.



# 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><b>A. Know the significance of animal science.</b></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><b>A. Describe the significance of animal science.</b></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><b>A. Relate the significance of animal science.</b></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><b>A. Analyze the significance of animal science.</b></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>B. Know the significance and differences between agricultural engineering systems.</b></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>B. Describe the significance and differences between agricultural engineering systems.</b></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>B. Relate the significance and differences between agricultural engineering systems.</b></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>B. Analyze the significance and differences between agricultural engineering systems.</b></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>

<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>

**Garland, Peter**

ORIGINAL: 2187

To: brachio@geosc.psu.edu  
Subject: RE: Proposed Science Standards in Pennsylvania

Dear Dr. Patzkowsky:

Thank you for your e-mail of May 18, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

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Sincerely yours,

H. Garland

Peter

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Mark Patzkowsky [mailto:brachio@geosc.psu.edu]  
Sent: Wednesday, May 16, 2001 10:24 PM  
To: 00statbd@psupen.psu.edu  
Cc: gbollinger@state.pa.us  
Subject: Proposed Science Standards in Pennsylvania

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

Dear Dr. Garland,

I am writing in support of the letter that Dr. Rudy Slingerland sent you on behalf of the Geosciences faculty at the Penn State University Park campus. In that letter, he urged the Pennsylvania Board of Education to follow the National Science Education Standards pertaining to the evolution of life. Specifically he objected to the

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revisions inserted by the Board of Education to the ASLA 01-16 Proposed Science Standards in Pennsylvania. Standard 3.3.10.D.1 now reads, "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution." Evolution is a well-established scientific theory that has stood up to extensive scientific testing and verification. As Dr. Slingerland indicates, it is our best-substantiated statement to explain the development of the world around us. Thus the phrase "or do not support" in Standard 3.3.10.D.1 cited above should be removed because it leaves the door open to a discussion of hypotheses that have not met the standard of scientific testing and verification.

It is imperative that the citizens of Pennsylvania are well-versed in the theory of evolution. Evolution is not just an interesting theory about how the world operates. The theory of evolution underlies a wide range of important technological issues that the citizens of Pennsylvania confront everyday, such as the Human Genome Project, genetically-engineered foods and medicines, and the conservation of natural habitat and game species in Pennsylvania's forests and streams. Thus an understanding of evolution is essential to training a scientifically-literate work force for the 21st century.

I request that the Pennsylvania Board of Education follow the National Science Education Standards pertaining to the evolution of life.

Sincerely yours,

Mark Patzkowsky  
Associate Professor of Geosciences  
Mark E. Patzkowsky  
Dept. of Geosciences  
Penn State  
University Park, PA 16802-2714

Phone: 814-863-1959  
FAX: 814-863-7823  
email: brachio@geosc.psu.edu

ORIGINAL: 2187

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MAY 23 AM 9:24

REVIEW COMMISSION

232 South Third St.  
Lewisburg, Pa. 17837  
May 18, 2001

Peter H. Garland, Executive Director  
State Board of Education  
333 Market St.  
Harrisburg, Pa. 17126

Dear Mr. Garland:

It is mild to say that we were appalled when we read that the proposed Standards for Science and Technology states that teachers include "evidence that does not support" evolution. This can only be "creationism," a non-scientific view held only by members of extremely conservative religious organizations. The School Board of Kansas became a national (and international) joke when it made a similar proposal several years ago. As you know, that Board was soon voted out of office.

To impose, no matter how sneakily, religious views in a scientific curriculum would be a dreadful mistake. Here is the distinction that your agency and all legislators must consider: religion answers questions; science raises questions.

To be brief, we will adduce only two instances of the foolhardiness of slipping "creationism" into the curriculum:

The courts will reject such a "standard" as unconstitutional--even the current Supreme Court should a challenge rise that high.

Pennsylvania students have a hard enough time getting a good education. To shackle them intellectually with something as bogus as "creationism" will only make their opportunities for further schooling and good jobs that much harder.

These points alone should convince all but the blinkered few that the State Board of Education was on the verge of making a dangerous misstep, but fortunately there is still time for it to come to its senses.

Sincerely,

*Karl Patten* Isabelle Patten

Karl Patten, Isabelle Patten

CC: The Honorable Jess N. Stairs  
The Honorable Nicholas A. Colafella  
The Honorable James J. Rhoades  
The Honorable Allyson Y. Schwartz

**Garland, Peter**

ORIGINAL: 2187

**To:** ctwarog@hotmail.com  
**Subject:** RE: Science Education Standards

Dear Mr. Twarog:

Thank you for your e-mail of May 18, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

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Sincerely yours,

Peter

H. Garland

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

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2001 MAY 22 AM 9:56  
IRRC

-----Original Message-----

From: CHESTER TWAROG [mailto:ctwarog@hotmail.com]  
Sent: Friday, May 18, 2001 7:02 PM  
To: 00statbd@psupen.psu.edu  
Subject: Science Education Standards

To Whom It May Concern,

Biblical Creationism should not be incorporated in the teaching of Biological science or any sciences in the public schools. Biblical creationism belongs in studies of comparable religions--many other religions and cultures have several different "Creation" stories of their own and should be compared with the Hebrew Old Testament's versions of at least three plus the Gospel of John's Creationism in the New Testament. However, the Creationists just want their very own Creationism taught and all others excluded. Don't they teach it in their bible study classes, in the church day care centers, in sectarian



schools?

Additionally, there are many different Creationists in our nation. Some are the Young Earth Creationists believing the Earth and Cosmos was

created in a Seven Day period in 4004 B.C. Some are Old Earth Creationists who accept the 15 Billion Year dates but God has been in charge of it all. Some accept Evolution as God directed while others don't. There are those who are "literalist" and others who are "symbolists". The problem is all of these different Creationist groups don't agree with each other. They only seek to point out the "errors" of Evolution or try to totally discredit it with "out of context" quotes from scientists but they have never been able to provide any empirical evidence to support any their "Creationist" hypotheses. Frankly, it is not science but criticism.

Their objective is to return Biblical teaching, prayer and the Judeo-Christian traditions into public schools that have a diverse, mixed cultural population of students who are Buddhist, Hindu, Agnostic, Atheistic, Christian, Hebrew, Catholic, Islamic, Wiccan, Pagan, etc..

Another objective is to point out that rape, murder, chaos, atheism, declining morals, etc., are to be blamed on Secular Materialism and the Atheistic Darwinian Evolution being taught in our public schools and we must return to Biblical teaching. Well, you only need to read the Old Testament to "learn" that all of these "horrors" can also be found there, too. Plus, infanticide, patricide, genocide, pillaging, concubines, slaughter, eating of dung, "urinating (pisseth) on a wall", slavery, enslavement, etc., throughout the Old Testament. Didn't God destroy Sodom for these same reasons but then, also caused a mythical "flood" but that didn't change anything, either! I am sure you would want to read these passages to your children?

The "science", if any, in the Holy Bible might be considered a "science of 2000 B.C.". The sciences of the 20th and 21st Centuries have superseded and eclipsed the sciences of 2000 B.C.. I wonder if you would prefer the medical practices of the 20th/21st Centuries or the medical practices of 2000 B.C.?

And, then, you would need to go even further! You'd have to require teaching that the Earth is a flat, circular planet; that dragons and unicorns and a talking donkey are factual; that the Earth and stars and planets are immovable; that God causes earthquakes, lightning and thunder, rain, hail, plagues, drought, floods, tornadoes, hurricanes and all other natural disasters described in the Old Testament.

Biblical Creationism does not belong in a Science classroom in a public school because it is a particular religious belief. Biological evolution is the core of biological sciences and the best explanation that we have to describe all of the organic life forms on Earth. Every new discovery,

every  
experiment in molecular biology and evolution, every new fossil  
discovered,  
all support Evolution.

Another concept is that most people do not understand the difference  
between a scientific law, statement of fact, theory and an hypothesis  
and a  
religious belief. A scientific theory is not just a guess; it  
(Websters)  
"Systematically organized knowledge applicable in a relatively wide  
variety  
of circumstances, esp. a system of assumptions, accepted principles, and  
rules of procedure devised to analyze, predict, or otherwise explain the  
nature or behavior of a specified set of phenomena." A scientific  
theory is  
composed of many different testable hypotheses unified under the  
particular  
theory.  
Creationism is a "theology": the study of the nature of God and  
religious  
truth, esp, by an organized religious community. Creationism, then,  
should  
be a course of specialized religious study for the particular religious  
group  
that endorses it. Science is for all humanity regardless of religious  
belief, cultural traditions,  
and is consistent throughout the Universe.

Thank you for allowing my input against requiring Creationism or  
Intelligent Design Theology to be taught as science in our public  
schools.

Chet Twarog

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2001 MAY 21 AM 9:05



George Hagner  
201 W Evergreen Ave Apt 404  
Philadelphia, PA 19118-3831

PA. STATE BOARD  
OF EDUCATION  
REVIEW COMMISSION



Peter H. Garland  
Executive Director - State  
Board of Education  
Harrisburg, Pa

Dear Sir:

With respect to the recently proposed  
Academic Standards for Science & Technology  
I suggest that the teaching of creationism  
is hardly a scientific matter. More  
properly it belongs in the teaching of  
English - as a poetic concept.

Please do not make the  
Commonwealth the laughing stock of the  
scientific world

Very sincerely,  
George W. Hagner

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MAY 18 2001

PA. STATE BOARD  
OF EDUCATION



AMERICAN INSTITUTE OF BIOLOGICAL SCIENCES

2001 MAY 23 AM 9:28

REVIEW COMMISSION

18 May 2001

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

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MAY 21 2001

PA. STATE BOARD  
OF EDUCATION

via FedEx

Dear Dr. Garland,

The American Institute of Biological Sciences (AIBS) has reviewed the proposed changes to the Pennsylvania academic standards for science and technology and would like to express concern about the standards pertaining to the teaching of evolution. The American Institute of Biological Sciences comprises 79 scientific societies with a collective membership of over 240,000 scientists in disciplines spanning all of biology -- from basic to applied, from molecular to organismal, from agronomy to zoology. Our member societies include the National Association of Biology Teachers (NABT) and the Biological Sciences Curriculum Study.

The proposed standards introduce some very subtle but potentially significant changes in wording that would not only undermine the teaching of evolution but that could also open the door to the teaching of creationism or its modern-day descendant - "intelligent design." These changes in wording are found in the Grade 10 and Grade 12 standards.

Our concerns are as follows:

- *Proposed standard: Explain the mechanism of the theory of evolution. (Standard 3.3.10.D)*
- *Proposed standard: Analyze the theory of evolution. (Standard 3.3.12.D)*

It is important that students learn that the scientific usage of the word "theory" is very different from the common usage. As AIBS President Judith Weis explained in the 13 May 2001 New York Times, "In science, the word *theory* refers to an underlying principle of observed phenomena that has been tested and verified. However, in common usage, it has come to mean 'hunch' or 'speculation' (what the word *hypothesis* means in science)." Unfortunately, those who oppose the teaching of evolution ignore this very significant difference and seize on the use of the word *theory* to insinuate that evolution is just scientific conjecture. Failing to teach students the meaning of the word *theory* as it is used in science will undermine not just the teaching of evolution, but all science education.

The Grade 12 standard is too vague. Asking students to analyze a theory, without any constraints

as to the nature of the analysis, is asking students to propound on alternate, non-scientific explanations for the natural world. It is more likely than not that students - or teachers - who have come to accept creationism or intelligent design will view this open-ended discussion as an opportunity to introduce their views into the science classroom. In addition to undermining the teaching of sound science, the State of Pennsylvania is inviting conflict in the classroom, legal challenges, and, very likely, embarrassing adverse publicity of the nature that rained upon the State of Kansas when that state proposed changes to its science standards that undermined the teaching of evolution.

• *Proposed standard: Analyze evidence of fossil records, similarities [sic] in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution. (Standard 3.3.10.D)*

This is the most problematic standard. It is entirely appropriate to assess scientific evidence. However, this assessment must be placed in context. Students must first learn about the scientific process. The very process of science requires the repeated challenging of ideas through hypothesis testing. Inevitably, some - even many - of these tests will fail to support the hypothesis. Over time, scientists re-examine earlier studies and experiments. Many times, the same experiments are repeated. We often find that earlier experiments were in some way flawed. Students must also learn that no one piece of evidence is conclusive.

Without this context, students are engaging in an exercise that fails to differentiate between the failure of test and the failure of a theory. In fact, the introductory material to the standards discusses this point at some length, but the standards fail to adequately incorporate this fundamental concept. Therefore, students reach Grade 10 without a solid grounding in the scientific process, and are then asked to start challenging accepted scientific theory. This situation would be untenable no matter what the subject matter of the analysis. It undermines the teaching of all science. When this kind of exercise is introduced in the context of the teaching of evolution, it is all the more inappropriate, because, unlike most other scientific theories, the challenge does not end with the assessment of individual pieces of evidence. Instead, the challengers rush to propose alternate, non-scientific explanations.

We suggest, given the persistent challenges to the teaching of evolution, that this particular intellectual exercise take place in the context of some other subject matter. We applaud the state's interest in encouraging the assessment of scientific evidence and the development of critical thought processes. However, one cannot ignore the fact that the opponents of the teaching of evolution continually seek ways to introduce discussion of creationism and intelligent design into science classrooms. By inviting students to challenge this particular subject - and no other in the curriculum - the State is inadvertently suggesting to students that this particular theory is somehow less robust than others. For instance, we see no suggestion that students examine the studies that do or not support the Kinetic Molecular Theory.

Further, this standard opens the door to the discussion of non-scientific ideas such as creationism and intelligent design. It is an unfortunate fact that the proponents of these concepts have distorted the scientific process by insisting that if some studies or experiments do not support a scientific theory, then the theory must fail. In establishing this dogma, they have attempted to

inextricably intertwine the valid assessment and re-assessment of scientific evidence with the notion that the only acceptable explanation is the supernatural creation of life and of species. The State of Pennsylvania should be sensitive to this fact and guard against the inadvertent introduction of religious or quasi-religious ideas into the science classroom. It is possible, if not probable, that some students and teachers have come to accept this anti-evolution dogma and will carry it with them into the discussions mandated by this standard. The science classroom is not the proper place for these discussions. That principle is well-established by the Supreme Court of the United States.

- *Proposed standard: Analyze the impact of new scientific facts on the theory of evolution (Standard 3.3.12.D).*

The theory of evolution does not change. This follows from the scientific definition of the word "theory." The National Academy of Sciences, in its 1999 publication *Science and Creationism: A View From the National Academy of Sciences*, stated, "Today, evolution is an extremely active field of research, with an abundance of new discoveries that are continually increasing our understanding of how evolution occurs." A better standard, then, might read, "*Analyze how new scientific studies are increasing our understanding of how evolution occurs.*"

- *Proposed standard: Compare modern day descendants of extinct species and propose possible accounts for their present appearance. (Standard 3.3.10.D)*

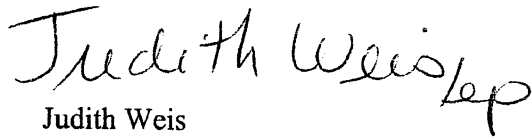
There are perfectly valid scientific explanations for changes in body plan and structure. However, there are also those who would say that there are no scientific explanations and that these changes - especially those resulting in more complex structures or significant changes - are evidence of "intelligent design." The standard, as written, would allow students to propose intelligent design as a possible account for the changes in body plan and structure. Although the intelligent design proponents do not specify the nature of the "intelligent designer," it is clear that the concept implies the existence of a supernatural, deity or deity-like force. Neither AIBS nor biologists oppose the teaching of religious material or the belief in God. Our objection is only that this subject matter is inappropriate in a science classroom - as has been stated clearly by the Supreme Court. The standard should be amended to read, "Compare modern day descendants of extinct species and propose possible *scientific* accounts for the present appearance."

The State of Pennsylvania should understand that by undermining the teaching of evolution, it is undermining the teaching of biology. We stand firmly behind the principle that "nothing in biology makes sense except in the light of evolution." We recognize, as did Theodosius Dobzhansky in making this statement in a 1973 issue of the *American Biology Teacher* (a publication of the National Association of Biology Teachers) that "biologic research shows no sign of approaching completion...disagreements and clashes of opinion are rife among biologists, as they should be in a living and growing science." Therefore, we encourage the continual re-evaluation of our knowledge. However, encouraging high school students - budding scientists - to re-evaluate *before* they have a firm grasp on that knowledge is not the best way to develop a solid understanding of science.

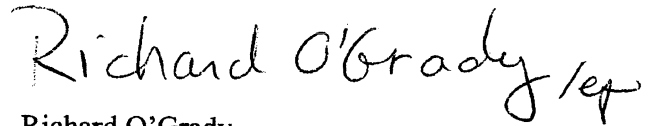
We strongly encourage the State Board of Educators to withdraw these proposed standards and revise them so as to preclude the inadvertent undermining of the teaching of evolution or the introduction of the teaching of creationism and intelligent design beliefs. The American Institute of Biological Sciences stands ready and willing to assist the State Board of Educators in this regard.

We hope these comments prove helpful to you and to the State Board of Educators. We thank you for considering our views.

Sincerely,

Handwritten signature of Judith Weis in cursive script.

Judith Weis  
President

Handwritten signature of Richard O'Grady in cursive script.

Richard O'Grady  
Executive Director

Replies to:

Ellen Paul  
AIBS Public Policy Representative  
(202) 628-1500 x250  
epaul@aibs.org

17 May 2001

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

RECEIVED  
MAY 21 2001  
PA. STATE BOARD  
OF EDUCATION

Dear Mr. Garland:

I would like to express my opposition to the revised language in the proposed Science and Technology Standards as published in the Pennsylvania Bulletin on 21 April 2001, which calls into question the theory of evolution, more specifically sections 3.310 D, 3.312 D, et al. This language appears designed to allow certain factions to promote a less than scientifically supported concept of origin.

There currently is no valid scientific theory to compete with evolution as the explanation of origin. While there may be debate about specific mechanisms of evolution, the theory is as well established as the theory of gravity or the atomic nature of matter. Such debate about new evidence is an essential part of the scientific process and accounts for the self-correcting quality of the scientific endeavor toward knowledge. It is a perversion of that process to examine bits of evidence, which appear to support a creation myth, and call it a competing explanation.

Creation mythology may be a worthwhile subject of study for Pennsylvania students, but that study does not belong in the science classroom. History, social studies, philosophy, logic, or comparative religions is the purview of the variety of creation myths. One hopes that fairness and thoroughness would demand that study cover more than just the pervasive Christian version.

If Pennsylvania students are to be successful in today's technological society, science education is a paramount concern. Given the substantial scientific illiteracy of the general population, such concern is of ever increasing importance, as science education competes with a growing variety of activities for the student's attention. To dilute valid science education with the teaching of essentially religious doctrine disguised as science is unconscionable, and I urge the State Board of Education to reject it.

Sincerely,



Richard Slade

304 North Third Street  
Halifax, PA 17032

RECEIVED  
2001 MAY 22 AM 9:49  
RECEIVED COMMISSION  
DB



William C. Walker  
216 N. 2nd St. Apt. 205  
Philipsburg, PA 16866  
Church/State-Separate

ORIGINAL: 2187

# Memo

LETTER

RECEIVED  
2001 MAY 22 AM 9:49

Date 5-17-01

TO PETER H. GARLAND  
333 MARKET ST.  
HARRISBURG, PA 17126-0333

Subject CREATIONISM IN  
PUBLIC SCHOOLS

DEAR MR. GARLAND, IT IS APPALING TO KNOW THAT THE  
TEACHING OF CREATIONISM IN PUBLIC SCHOOLS IS EVEN BEING  
CONSIDERED.

PLEASE DO ALL YOU CAN TO BRUSH ASIDE THIS ABSURDITY.  
PUBLIC SCHOOLS ARE THERE TO TEACH OUR CHILDREN,  
NOT INDOCTRINATE THEM IN ANY FUNDAMENTALIST  
BELIEFS.

RESPECTFULLY YOURS

*William C. Walker*

RECEIVED

MAY 21 2001

PA. STATE BOARD  
OF EDUCATION

☐ Please reply

☐ No reply necessary

SIGNED

To: fjp3@Lehigh.EDU  
Subject: RE: Science Education Standards

Dear Mr. Pazzaglia:

Thank you for your e-mail of May 14, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

H. Garland

Peter

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Frank J. Pazzaglia [mailto:fjp3@Lehigh.EDU]  
Sent: Monday, May 14, 2001 9:20 PM  
To: 00statbd@email.cas.psu.edu  
Subject: Science Education Standards

Dear Dr. Garland:

I am writing this email to express deep concern over the suggested changes in the in Science Education standards the PA Department of Education is currently accepting until May 21.

I am a professor of geology, educated at Penn State, and currently at Lehigh University following a five-year tenure at the University of New Mexico. I am passionate about science education as a way to see Pennsylvanians and Pennsylvania continue to grow economically and culturally and continue to be a leader in public education. While in New Mexico, I experienced first hand what happens when well-meaning, but

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frankly ignorant individuals attempt to damage science education by attacking the science standards - especially where it applies to the teaching of evolution. Such efforts are driven strictly by religion and have no place in science education. We maintain our economic and educational dominance over the rest of the world because of our wise separation of the religious and secular life. States, like New Mexico, have suffered and continue to suffer enormously because religiously-driven phrases like "Creationism is a science that should be taught on an equal footing with evolution", or "evolution is only one possible theory that explains the behavior and changes in life" have for a time made it into their science education standards. There is no true commitment to education or truth in these ideas and the economic price New Mexico is paying for its ignorance is measurable. Consider that the computer giant INTEL continues to have to recruit talent from outside the state to work in an industry that should be the envy of the country and stand as a model for what PA is trying to accomplish locally. In-state talent is not present in the sciences or engineering because of the overall lack of commitment to the highest education standards possible with an emphasis on science education.

Pennsylvania is my home state and my family and I jumped at the opportunity to return in large part because we wanted our children educated here, in PA's public schools. Now I see that the same, hackneyed creationist tactics for watering down Pennsylvania's science standards are in the proposed changes in front of the PA Department of Education. The changes are subtle, but mark my words, the tactics are a proven technique to slowly undermine the standards piece by piece. For example, I implore you to support the current standard of 3.3.10.D.1 where it says "...that support the theory of evolution", rather than the proposed change that states "...that support or do not support the theory of evolution". To do the latter invites critical and demoralizing ridicule of creationist (religious-based) ideas that have no scientific credibility and cannot or should not be held to the scientific method. The science classroom is not a place for presentation or debate of religion or religion-based doctrine.

I thank you for considering my thoughts on this subject. I and many of my colleagues dedicated to science education in this state will be watching this issue closely and with great anticipation that PA will do the right thing and not open the door to creationism.

I welcome your feedback, comments or questions.

Sincerely:

Frank J. Pazzaglia  
Associate Professor of Geology

--

\*\*\*\*\*  
\*\*\*\*\*  
Frank J. Pazzaglia (610) 758-3667  
Dept. of Earth and Environmental Sci. (610) 758-3677 FAX  
Lehigh University email: fjp3@lehigh.edu  
31 Williams ftp://fjp3.geo.lehigh.edu  
Bethlehem, PA 18015  
<http://www.lehigh.edu/~fjp3/fjp3.html>  
\*\*\*\*\*  
\*\*\*\*\*

# **Ursinus College**

**Collegeville, Pennsylvania 19426 • (215) 489-4111**

May 17, 2001

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

Dear Mr. Garland:

I have learned from the ACLU that in your Proposed Academic Standards for Science and Technology you provide for studies "that support or do not support the theory of evolution." Apparently noone in your department has disavowed that this proposed standard can be used to justify the teaching of creationism as science along with or in place of the theory of evolution.

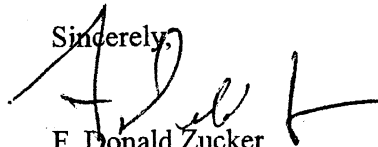
Creationism is not science. It is a religious doctrine. I do not say that students should not be familiar with the doctrine of creationism, just as an educated person should have some acquaintance with world religions, and perhaps even such historical notions as alchemy. But would we want alchemy taught instead of chemistry, or alongside of chemistry, in science classes?

Everyone knows that fundamentalist Christians have been struggling for years to displace evolution with creationism. Your proposed standard would give them a foothold in our schools, especially if it allowed creationism a share of the science curriculum. I am not antagonistic toward these religionists. They are entitled to their views and to seek to convert others to them. But not in the science classes of our public schools.

I offer a modest proposal. Make provision for a spokesperson for creationism to write a creationist manifesto in support of their position and/or a critique of evolution. Copies of this statement could then be made available to any student who wished to pick up a copy and read it. It would not under any circumstances be made required reading. Thus any student showing an interest in creationism would have an opportunity to learn about it.

In any event I earnestly ask that you seriously reconsider the implications for both science and religion of your proposed standards, and revise them accordingly.

Sincerely,



F. Donald Zucker

Professor of Political Science Emeritus

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MAY 21 2001

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OF  
EDUCATION

MAY 22 AM 9:50

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**Garland, Peter**

ORIGINAL: 2187

**To:** Benkovic, Susan  
**Subject:** RE: Pennsylvania's Science Standards

Dear Mr. Edinger:

Thank you for your e-mail of May 17, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

H. Garland

Peter

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Steven A. Edinger [mailto:steven.edinger.1@ohio.edu]  
Sent: Thursday, May 17, 2001 12:29 AM  
To: Garland, Peter  
Subject: Pennsylvania's Science Standards

16 May 2001

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

Dear Dr. Garland,

I am writing concerning Pennsylvania's proposed science standards. I have only had time to briefly examine them, and came away with a positive

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overall impression of them. I was impressed to see that GRADE 10 standard 3.3.10.D says, "Explain the mechanism of the theory of evolution." The emphasis on evolution by this and other standards is a wise decision since evolution is the unifying theory of all biology. Our freshmen at Ohio University need to understand evolution to understand our introductory biology sequence. Our second year curriculum consists of three classes essential to understanding modern biology: Genetics, molecular-cellular biology and evolution. Evolution is found in, taught in and interwoven throughout almost all of our biology classes here at Ohio University, and I think you will find a similar situation in the majority of colleges. All of our biology students, including those wishing to be doctors, dentist, wildlife biologists or any other type of biologist, must understand evolution to succeed as biology majors. Students who have not been taught evolution in primary school are at serious disadvantage at college!

I was very disappointed to read under GRADE 10 standard 3.3.10.D the outcome stating, "Analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that support or do not support the theory of evolution." The phrase "that support or do not support the theory of evolution" is one of the latest "code words" used by creationists. Creationists interpret the phrase "that support or do not support the theory of evolution" as a green light to teach creationism under the disguise of "evidences against evolution". Who ever suggested or adopted this phrase either knowingly or unknowingly opened a loophole for creationists to introduce creationism into Pennsylvania's public schools. I strongly urge you to remove this loophole and any others that may have been inserted in otherwise good science standards. I would suggest changing this standard to the following or something similar to it:

"Analyze how evidence from fossil records, similarities in body structures, embryological studies and DNA studies shape and change our understanding of how evolution occurs."

Part of what such a standard gets at is that there is the fact evolution has and does occur; and the theories explaining how it occurs. Understanding this point about biology is a very important part of understanding science, and is part of what all students should know by the time they graduate from high school.

I am happy to make my time available to discuss this matter with you if

you wish and, again, would urge you to close this loophole before these standards are implemented and before the loophole is used.

Sincerely,

Steven A. Edinger, M.S.  
Physiology Lab Instructor

\*\*\*\*\*  
"Every time you stop a school, you will have to build a jail. What you gain at one end you lose at the other. It's like feeding a dog on his own tail. It won't fatten the dog."  
-- Mark Twain, Speech, 11/23/1900

"The true method of knowledge is experiment."  
-- William Blake

"Education that consists in learning things and not the meaning of them is feeding upon the husks and not the corn."  
-- Mark Twain

"All great truths begin as blasphemies."  
-- George Bernard Shaw, Irish playwright and novelist

"Nothing in biology makes sense except in the light of evolution."  
-- Theodosius Dobzhansky, 1973

\*\*\*\*\*

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---  
Steven A. Edinger, Physiology Lab Instructor

064 Irvine Hall  
Department of Biological Sciences  
steven.edinger.1@ohio.edu  
Ohio University  
Athens, Ohio 45701-2979

Office: (740) 593-9484  
Fax: (740) 593-0300  
-----  
---

**Garland, Peter**

ORIGINAL: 2187

To: stec@uwp.edu  
Subject: RE: Comment on PA State Science & Technology Standards

Dear Dr. Boyer:

Thank you for your e-mail of May 17, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

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Sincerely yours,

Garland

Peter H.

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Benkovic, Susan  
Sent: Thursday, May 17, 2001 11:40 AM  
To: Garland, Peter  
Subject: FW: Comment on PA State Science & Technology Standards

-----Original Message-----

From: Paul D. Boyer, Ph.D. [mailto:stec@uwp.edu]  
Sent: Thursday, May 17, 2001 11:38 AM  
To: 00statbd@psupen.psu.edu  
Subject: Comment on PA State Science & Technology Standards

Dear Dr. Garland:

As Director of the University of Wisconsin-Parkside Science & Technology Education Center, I study the teaching/learning of science and technology in

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grades K-12. One great strength of the National Research Council's "National Science Education Standards" is its focus on ongoing changes that occur throughout the physical and natural world.

The finalization of your state's standards has come to my attention, and I am most interested in making a comment. I am extremely concerned about the education of Pennsylvania's youth, should the language of your standard 3.3.10.D.1 be changed from:

"Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support the theory of evolution."

to:

"Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution."

No scientific theory can ever be "proven" in the sense that most people consider proof. In fact, that's the very nature of science. We conduct experiments to test hypotheses to help us explain the unknown using the entire body of scientific evidence available. We rule out hypotheses that we disprove through experimentation, but this does not "prove" any other hypothesis is "true!" Should debate over the interpretation of data ever cease, so shall the process of science. It is part and parcel of the generation of knowledge through science and constitutes an extremely effective system of checks and balances.

Today, we face an ever-growing challenge to the understanding of how scientific knowledge forms the basis of our world view. Imagine someone telling us that since the concept of gravity has never been proven (only that other explanations have been disproved), we must simply choose not to believe in it. In the case of gravity, there has been such widespread testing without ever finding exception that we accept gravity as a "law."

This is NOT to say that in some corner of the universe this law will NOT hold true! Thus, we can never say that anything is "proven" because ALL possible circumstances will never be tested--the possibilities are essentially infinite.

To suggest that science classes (where understanding of the nature and process of science is generally learned) should analyze evidence that "do(es) not support the theory of evolution" is to suggest that science is NOT a way of knowing in our culture. "Moral" debate notwithstanding, science classes exist to teach science, and in science the theory of evolution is as fundamental to the study of life as Newton's laws are to the study of the physical world.

I'd like to share a method I've found very helpful in facilitating young people's conception of evolution. My students are all pre-service teachers, and most are non-science majors. There are quite a few of these students who enter my classroom saying they "don't believe in evolution." Before I ever get into the subject, I spend several class periods helping students to

build an understanding of how the process of science informs our world view.  
As we then open the discussion about the ever-changing nature of life, I specifically tell them that the only content I am qualified to teach in my courses is SCIENCE. Science is always based upon evidence, \*NEVER\* upon faith or belief. I tell them that the two spheres, science and faith, are mutually exclusive, simply because science--as defined--cannot test anything that lies beyond the range of our five senses (with or without the aid of technology). This is NOT to say that anything that may exist beyond our five senses is not REAL, simply that being a scientist does not qualify one to make any statements about anything beyond the natural realm of science.  
I then continue by saying that for me personally, there is no conflict between science and faith, not only because of the definition of science as a process for knowing, but also because the REALLY big question out there is where did it all begin? Science, at this point in our history anyway, has no evidence of any kind to answer that question--there's no way to test it.  
Is there a role for a higher power or supreme intelligence here? As a scientist, I can honestly say that I "believe" there is. Science simply can't disprove that, and since it cannot even test this hypothesis, faith reigns supreme!

As many as 90% of the students who came in saying they didn't "believe" in evolution leave my classes acknowledging that the need to teach evolution in science classes is clear. They may still claim not to "believe" in it--that's something I continue to work on. I judge the progress they've made already as impressive, and I do trust that they'll go into their classrooms and teach that life is constantly undergoing change. Many still argue that at the very least, all "creation" stories that exist should also be taught in school. Few (if any) continue to insist that this be done in science class. Many become strong advocates for keeping everything dealing with issues that science cannot test out of the science classroom. I'm proud of those students, very proud.

In closing, teaching K-12 students that one can choose to "believe" in either evolution or "other explanations" for life's origins is very likely to undermine their future success in science. It instills in them a strong misconception about the nature of science. We cannot "choose" whether or not to "believe" in gravity, because we "know," through the process of science, that gravity is the best explanation for why our feet remain on the planet, according to the body of evidence. If Pennsylvania or other states decide to rob their youth of this elementary understanding of science, the nation's future is surely in danger. Our future DEPENDS on science.

Thank you for the opportunity to comment.

Paul D. Boyer, Ph.D.

=====

Director, Science & Technology Education Center  
and Asst. Professor of Biological Sciences  
University of Wisconsin - Parkside  
Box 2000 (900 Wood Road)  
Kenosha, WI 53141-2000  
mailto:stec@uwp.edu  
WWW: <http://uwp.edu/~boyer/>

Garland, Peter

ORIGINAL: 2187

To: lkump@psu.edu  
Subject: RE: Science standards

Dear Mr. Kump:

Thank you for your e-mail of May 17, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

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Sincerely yours,

H. Garland

Peter

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Lee R. Kump [mailto:lkump@psu.edu]  
Sent: Thursday, May 17, 2001 8:00 AM  
To: 00statbd@email.cas.psu.edu  
Subject: Science standards

Dear Dr. Garland,

I attach (and append) a letter I just faxed to Hon. Lynn Herman expressing my concern about the subtle rewording to the science standard affecting the teaching of evolution. I hope you reconsider the addition of the offending phrase to the standard in the spirit of maintaining a clear definition of what science is in the minds of our students. Science must be testable through observation and experimentation. Religion is ultimately based on faith, and creationism is religion, not science. We are a religious family, but we do not believe

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in creationism.

Pennsylvania has a strong religious heritage, but it does itself a disservice when it teaches creationism as science.

Thank you for your time.

Lee Kump  
Professor of Geosciences

Text of letter:

Hon. Lynn B. Herman  
301 S. Allen Stree, Suite 102  
State College, PA 16801

fax: 863-3898 and 717-783-0143

Dear Mr. Herman,

I'm writing this letter as a science educator at Penn State and as a parent of two children in the public school system of Pennsylvania. I am deeply disturbed by the subtle change of wording that has occurred in the new state science and technology education standards. The new standard 3.3.10.D.1 reads "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support OR DO NOT SUPPORT the theory of evolution." (CAPS are mine to highlight the addition to the old standard.)

At face value, this addition seems in keeping with the scientific approach: assess all data in terms of a theory or hypothesis, whether or not it supports a theory. However, in this case the wording change is almost certainly intended to open the door to teaching of creationism as science in our public schools. As you know, creationism is not science, it is religion. It is based on faith, not the methods of science. It poses no testable hypotheses. In contrast, the theory (no longer considered an hypothesis) of evolution has survived a century of intense investigation, and is now strongly supported by work in genomics and molecular (DNA and RNA) phylogeny.

I don't think Pennsylvania wants to suffer the disgrace Kansas did by promoting the teaching of creationism as science. Your and Governor Ridge's attempts to portray Pennsylvania as a leader in science and technology will suffer long-lasting damage if this standard is adopted as amended by the Board of Education. Please do everything in your power to have the offending phrase removed from the standard. Thank you.

Sincerely,

Lee R. Kump  
Professor of Geosciences

cc: Dr. Peter Garland, PA Board of Education

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

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2001 MAY 22 AM 9:52

5/17/2001

REVIEW COMMISSION

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MAY 21 2001

PA. STATE BOARD  
OF EDUCATION

Dear Mr. Garland,

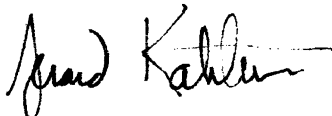
I am writing to comment on the proposed academic standards for science and technology.

I am **strongly against** the provision allowing science teachers to introduce theories that "support and do not support the theory of evolution."

I earned my degree in Electrical Engineering from the United States Naval Academy at Annapolis, and I do not think it is appropriate for science teachers to be able to **arbitrarily introduce theories that may not be scientifically supportable**. That is the reason we taxpayers pay all the money for textbooks -- our elected officials review and approve them, and the teachers should be teaching the material in the books, not pushing their own individual agendas.

I strongly urge you to leave out this provision from the new academic standards for science and technology.

Best regards,



Gerard Katilius

Garland, Peter

ORIGINAL: 2187

To: Gary.Dean@uc.edu  
Subject: RE: Pennsylvania's GRADE 10 Science Standard 3.3.10.D

Dear Dr. Dean:

Thank you for your e-mail of May 17, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

Peter

H. Garland

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Gary E. Dean [mailto:Gary.Dean@uc.edu]  
Sent: Thursday, May 17, 2001 10:45 AM  
To: 00statbd@email.cas.psu.edu  
Subject: Pennsylvania's GRADE 10 Science Standard 3.3.10.D

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

Dear Dr. Garland:

I would like to strongly echo Dr. Edinger's letter to you (below) in support of either reinstating the original GRADE 10 standard 3.3.10.D or changing it to reflect the wording Dr. Edinger has suggested. As a Professor of Molecular Genetics, Biochemistry, and Microbiology, I have instituted a program in the local (Cincinnati) schools that attempts to bring life science alive in the K - 12 classroom. I have been appalled at

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the poor state of comprehension of life science by the teachers of these very life sciences at all levels of instruction in our Cincinnati schools and I suspect that this is a reality in many of our nation's schools. There is no excuse for muddying the already murky waters of life science education by permitting pseudo-scientific creationists to gain a foothold in these same classrooms.

Thank you,

Dr. Gary E. Dean  
(signature below)

16 May 2001

>  
>  
>  
>Dr. Peter Garland, Executive Director  
>PA State Board of Education  
>333 Market Street  
>Harrisburg PA 17126-0333  
>  
>Dear Dr. Garland,  
>  
> I am writing concerning Pennsylvania's proposed science standards. I have only had time to briefly examine them, and came away with a positive overall impression of them. I was impressed to see that GRADE 10 standard 3.3.10.D says, "Explain the mechanism of the theory of evolution." The emphasis on evolution by this and other standards is a wise decision since evolution is the unifying theory of all biology. Our freshmen at Ohio University need to understand evolution to understand our introductory biology sequence. Our second year curriculum consists of three classes essential to understanding modern biology: Genetics, molecular-cellular biology and evolution. Evolution is found in, taught in and interwoven throughout almost all of our biology classes here at Ohio University, and I think you will find a similar situation in the majority of colleges. All of our biology students, including those wishing to be doctors, dentist, wildlife biologists or any other type of biologist, must understand evolution to succeed as biology majors. Students who have not been taught evolution in primary school are at serious disadvantage at college!  
>  
> I was very disappointed to read under GRADE 10 standard 3.3.10.D the outcome stating, "Analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that support or do not support the theory of evolution." The phrase "that support or do not



support  
>the theory of evolution" is one of the latest "code words" used by  
>creationists. Creationists interpret the phrase "that support or do  
not  
>support the theory of evolution" as a green light to teach creationism  
under  
>the disguise of "evidences against evolution". Who ever suggested or  
adopted  
>this phrase either knowingly or unknowingly opened a loophole for  
creationists  
>to introduce creationism into Pennsylvania's public schools. I  
strongly  
urge  
>you to remove this loophole and any others that may have been inserted  
in  
>otherwise good science standards. I would suggest changing this  
standard to  
>the following or something similar to it:  
>  
> "Analyze how evidence from fossil records, similarities in body  
> structures, embryological studies and DNA studies shape and  
change our  
> understanding of how evolution occurs."  
>  
>Part of what such a standard gets at is that there is the fact  
evolution has  
>and does occur; and the theories explaining how it occurs.  
Understanding  
this  
>point about biology is a very important part of understanding science,  
and  
is  
>part of what all students should know by the time they graduate from  
high  
>school.  
>  
> I am happy to make my time available to discuss this matter with  
you if  
>you wish and, again, would urge you to close this loophole before these  
>standards are implemented and before the loophole is used.  
>  
>Sincerely,  
>  
>  
>  
>  
>Steven A. Edinger, M.S.  
>Physiology Lab Instructor  
>  
>-----  
-----  
>Steven A. Edinger, Physiology Lab Instructor  
>  
>064 Irvine Hall  
>Department of Biological Sciences  
steven.edinger.1@ohio.edu  
>Ohio University  
593-9484  
>Athens, Ohio 45701-2979  
>-----  
-----

Office: (740)

Fax: (740) 593-0300

Gary E. Dean, Ph.D.  
Associate Professor, Dept. Molec. Genetics, Biochem., and Microbiology  
Interdisciplinary Program of Cell Biology, Neurobiology, and Anatomy  
Interdisciplinary Program in Neurosciences

University of Cincinnati College of Medicine  
231 Bethesda Avenue  
Cincinnati, OH 45267-0524  
513.558.0065 (Tel)  
513.558.8474 (FAX)  
<http://www.molgen.uc.edu/cv/dean/dean.html>  
<http://myprofile.cos.com/deang59>

To: SchmidtF@health.missouri.edu  
Subject: RE: Proposed science standards

Dear Dr. Schmidt:

Thank you for your e-mail of May 17, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

H. Garland

Peter

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Schmidt, Frank J. [mailto:SchmidtF@health.missouri.edu]  
Sent: Thursday, May 17, 2001 9:40 AM  
To: '00statbd@psupen.psu.edu'  
Subject: Proposed science standards

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

To Dr. Garland and the Board:

As a former resident of Pennsylvania, I have heard with some distress that the proposed Science and Technology Education standards contain false and misleading language, especially with regard to the scientific theory of evolution, for example:

Old standard 3.3.10.D.1 "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies

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INDEPENDENT REGULATORY REVIEW COMMISSION

that support the theory of evolution."

New standard 3.3.10.D.1 "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution."

The addition of the phrase "do not support" regarding the theory of evolution implies that there is some scientific dispute about the reality of Darwinian evolution as a mechanism for the origin of biological diversity. In an effort to push their own variety of religion in the classroom, creationists often conflate the popular meaning of theory (guess) with the scientific meaning (general mechanism for a wide variety of phenomena). It is important that the science standards correct this misimpression, for there is no scientific dispute on this topic. Darwinian evolution is not simply a guess; it is an important paradigm that explains a wide variety of phenomena, from the molecular through the organismal.

The theory of evolution has been tested in a number of ways. We can observe instances of speciation. We have examined a number of apparent instances of non-Darwinian evolution in the laboratory; in every case Darwinian explanations have accounted for the phenomena. Furthermore, Darwinian evolution applies beyond the initial observations that were used in its formulation, thus fulfilling the most important test of a scientific theory. It explains the similarity of DNA sequences, new findings in microbiology, and the ability to evolve molecules in the test tube (this last is my own field of research).

The Commonwealth of Pennsylvania has an enviable biotechnological infrastructure, involving academics, industry, and the financial sector. It isn't always apparent how firmly all this activity rests on Darwin, but it does. While I appreciate that the Board is under pressure from special interest groups, I hope you will take into account the need for students to be taught the best possible science in science class, and restore the previous language into the standards.

Thank you for your consideration.

With best regards,

Francis J. (Frank) Schmidt  
Professor of Biochemistry  
University of Missouri-Columbia  
Columbia MO 65212

573-882-5668  
573-884-4597 (fax)  
schmidt@missouri.edu

ORIGINAL: 2187

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2001 MAY 16 AM 9:36

REVIEW COMPLETED



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

Bloomsburg  
UNIVERSITY

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MAY 17 2001

PA. STATE BOARD  
OF EDUCATION

Dear Dr. Garland:

I write these comments on the "proposed" science standards as a practicing biologist and professor, and as a parent with two daughters in the PA public school system.

I was greatly disappointed to learn that the proposed science and technology standards have included language that allows creationism disguised as nonreligion-based anti-evolutionism to be included in the standards. It is evident that the board has been influenced by political pressure from "Biblical" and/or "Intelligent Design" style creationists to include these words (I watched the hearings on TV). On the surface, these phrases seem to be fair and encourage broad-mindedness – in reality they are a clever tactic that creationists are employing to avoid separation of Church and State issues.

In short, there is no valid scientific evidence to refute the single most unifying principle of biology – the Theory of Evolution. The statement of standard 3.3.10.D "...studies that support or do not support the theory of evolution," give the wrong impression on the operation of the scientific method. If there are data or observations which do not fit a conceptual framework **WE CHANGE THE FRAMEWORK**. The theory changes to accommodate scientifically valid contradictory evidence. Therefore, there shouldn't be any so-called evidence lying around that contradicts evolutionary theory. Science should absorb ALL evidence.

Why is the same qualifier NOT used with reference to the theory of gravity, or atomic theory in the standards? Evolutionary theory is no less substantiated! The answer is that evolution is found to be objectionable to a minority of politically active individuals. It would be a travesty if you allow these individuals to water-down otherwise fine science standards.

I strongly believe that the State of Pennsylvania is embarking down a road that will lead to a decrease in science competency. You may also be opening the door to lawsuits involving 1st Amendment – although creationism is not mentioned in the standards – after the standards are adopted (which I am afraid is a “done deal” and this comment period is for show only) some teachers will use these standards as “permission” to openly endorse Biblical or Intelligent Design Creationism and will sooner or later involve a suit. The passages listed above give carte-blanche to creationist teachers to present religion disguised as science. Have we not learned from the Supreme Court decisions in the 1980’s (Arkansas and Louisiana)?

While the standards do not mention creation, creationism, the supernatural, or the Bible, the wording was obviously added to allow pseudoscientific ideas to be taught in the science classroom. To anyone who has studied this issue (I have been since 1974), the code words are obvious. If these standards pass, they will, in time, be reversed, just as anti-evolution standards were recently reversed in Kansas.

Please do the right thing and remove passages that will open the door to the permitted teaching of anti-evolution propaganda. Attached is blurb from the Pittsburg Post-Gazette, which accurately identifies the pertinent passages.

Thank you for your time and consideration.

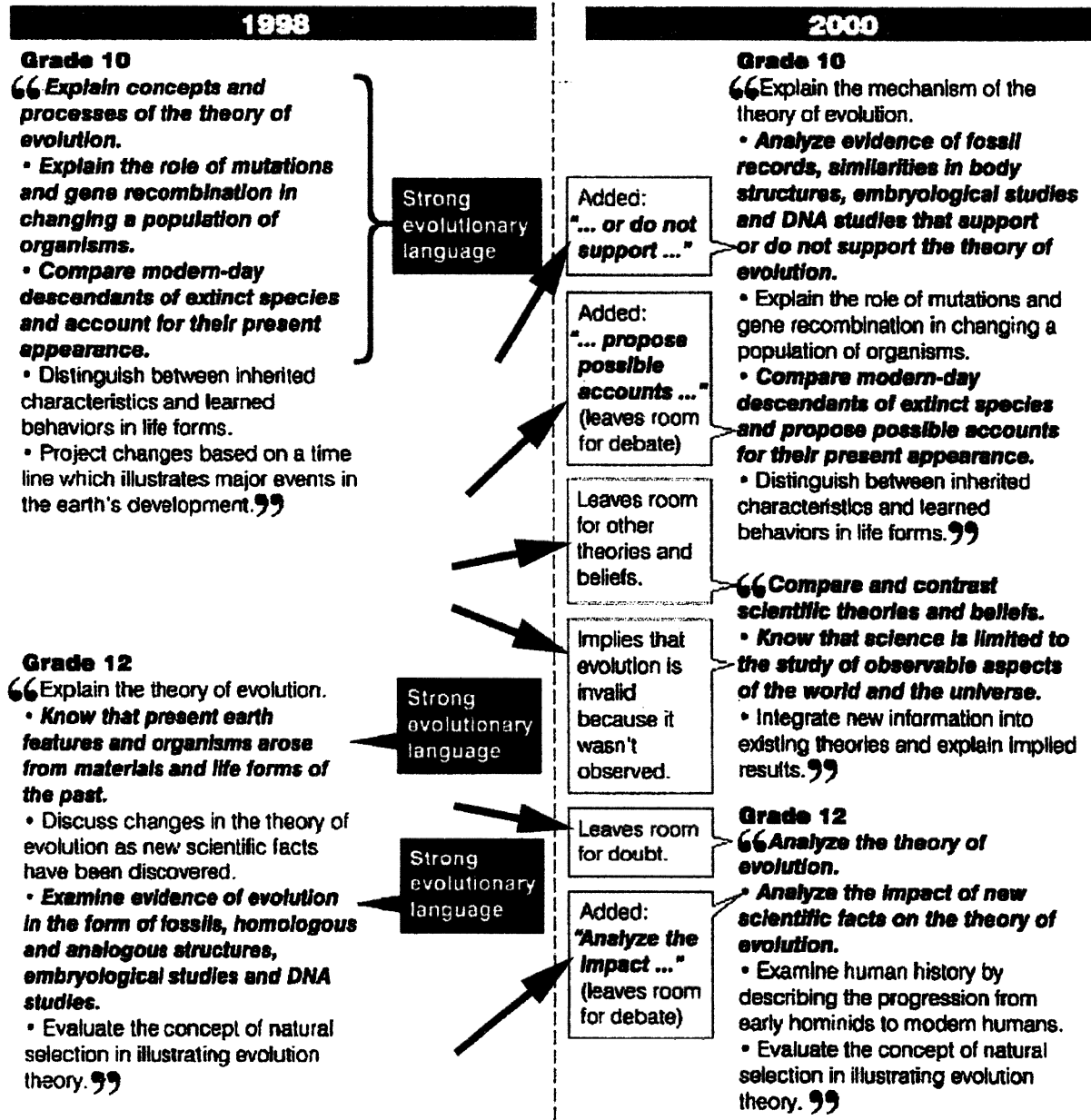
Sincerely,

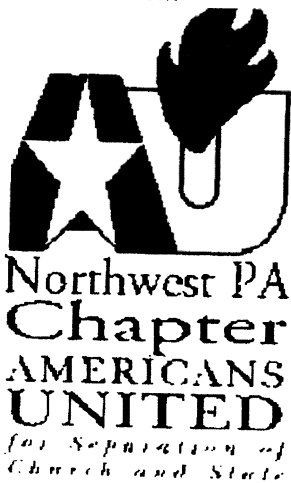
A handwritten signature in black ink that reads "George P. Chamuris". The signature is written in a cursive, flowing style.

George P. Chamuris, Professor  
chamuris@bloomu.edu  
570.389.4735

# Proposed changes in state's science standards

A comparison of the 1998 version of the Pennsylvania science standards and the version released in July shows, according to scientific experts in evolution, that creationist language has subtly crept into the standards.





ORIGINAL: 2187

P.O. Box 6579, Erie, PA 16512

May 17, 2001

2001 MAY 21 AM 9:06

Dr. Peter Garland, Executive Director  
PA State Board of Education

333 Market St.

Harrisburg PA 17126-0333

via Fax 717/787-7306

Dear Dr. Garland,

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REVIEW COMMISSION

The Pennsylvania Board of Education's proposed Academic Standards for Science and Technology raise grave constitutional and public policy concerns. We urge you to revise these new standards to reflect sound constitutional law and appropriate science education.

## OVERVIEW

The new standards state that teachers may present "studies that support or do not support the theory of evolution" (grade 10, see 3.3.10.D) and that schools may also "analyze the impact of new scientific facts on the theory of evolution" (grade 12, see 3.3.12.D). We believe these words have been carefully chosen to allow the promotion of religious concepts in public school science classes (see Elaboration, pg. 2).

Fundamentalist Christian groups and their Religious Right allies are pressing for the inclusion of creationism in the public school curriculum under the guise of science. In reality, creationism is not science, but rather a religious concept drawn from a literal interpretation of the Book of Genesis. That work is a theological document, not a science book.

The U.S. Supreme Court and lower federal courts have been diligent in requiring that public education remain neutral on religious matters and ensuring that our schools do not get into the business of preaching instead of teaching. In 1968 the Supreme Court struck down a religiously motivated Arkansas law prohibiting the teaching of evolution in public schools. In 1987 the Supreme Court ruled that a Louisiana law requiring "balanced treatment" between evolution and creationism was unconstitutional.

Because the courts have erected barriers to prevent fundamentalist theology from being taught as science in public schools, advocates of creationism have moved to a new strategy. They now are focused on teaching the "flaws" in evolutionary science, while offering "intelligent design" as an alternative "scientific" theory. In fact, "intelligent design" is merely a new version of creationism, a religious concept cloaked in a transparently thin veneer of science.

The proposed science standards under consideration by the Board clearly open the door to religious intrusion into the public school science curriculum. If local school districts follow these standards -- and alter their curricula to conform to religious tenets -- lawsuits are certain to result. We strongly urge you not to give bad advice to school administrators and science teachers through poorly worded science standards.

This issue can also have important non-legal ramifications. You will recall the controversy that erupted in Kansas in the summer of 1999 when the state board of education there voted to downplay evolution in the state science standards. It engendered divisiveness and a pitched political battle that resulted in Kansas voters rejecting several creationist board members in favor of moderates who had vowed to restore evolution to the standards.

We strongly believe that Pennsylvania does not need a divisive controversy of this type and certainly does not need a costly, drawn-out legal battle -- which could easily be the result if these standards are adopted. Instead, Pennsylvania needs science and technology standards that are free from sectarian dogma, that instruct its children in the fundamental principles of modern biology and that spur all of the state's public school children to aspire to excellence.

Pg. 1 of 2

An affiliate of **Americans United for Separation of Church and State**  
518 C Street NE • Washington, DC 20002 • 202/466-3234

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## ELABORATION

Evolution needs to be taught in public schools — not only in a biological sense but also at all levels of sustained change, such as evolution of the universe and our solar system, geological change through plate tectonics, and changes in the composition of the atmosphere. Evolution should be included in the new standards. Nevertheless, the first requirements listed under 3.3.10.D and 3.3.12.D, respectively, are inappropriate and should be deleted.

In 3.3, the Biological Sciences section of the proposed standards, the word “theory” is used for only three scientific concepts — the theory of evolution, the big bang theory, and the kinetic theory of matter. These concepts are neither more recent nor more controversial than other science concepts that the standards specify in much more certain language (e.g., “Illustrate and explain plate tectonics as the mechanism of continental movement and sea floor change”). The word “theory” is denigrating to all three of these well-established concepts.

The 3.3.12.D requirement to “analyze the impact of new scientific facts on the theory of evolution” is both guileful and redundant; it should be deleted. In context, it suggests that somehow evolution is less well established as a science than theories governing other sciences for which no similar requirements appear in the standards. Evolution in truth is one of the most powerful explanatory tools in science today, and its influence reaches far beyond explaining the origins of humans.

While skepticism is the very heart of science, there is no need to single out evolution for special attention. All evidence that does or does not support any extant scientific theory or law should of course be analyzed, as acknowledged in 3.2 of the proposed standards: “Explain how new information may change existing theories and practice” (3.2.7.A.4) and “Integrate new information into existing theories and practice” (3.2.10.A.4).

The 3.3.10.D requirement to “analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that support or do not support the theory of evolution” is unique to evolution in the proposed standards. No other scientific concept is treated this way. For the above reasons, it too should be deleted. In addition, the language “... or do not support” the theory of evolution would open the door for creationism, or so-called “creation-science,” to be taught as science — which it is not.

Scientific concepts, like evolution and relativity and plate tectonics, are hypotheses that have survived extensive testing and repeated verification. They are the best substantiated statements that scientists can make to explain the organization and operation of the natural world. A scientific theory is not equal to a belief, a hunch, or an untested hypothesis.

“Creation science” is based on faith and is not supported by scientific observations of the natural world. Creationism is not science and does not have a legitimate place in any science curriculum.

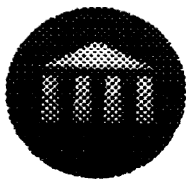
Furthermore, the concept of “intelligent design” should not be taught as a scientific explanation of observed patterns of similarity and difference. Intelligent design is unnecessary — evolutionary thought has proceeded just fine without it. It is not testable. It is not a hypothesis and therefore is not scientific and does not belong in science class. It would be unscientific to fill any gap in our knowledge of evolution with theistic explanations.

Sincerely yours,

/s/ Al Richardson, President  
Northwest PA Chapter of Americans United

cc: Dr. G. Kip Bollinger, PA Science Advisor — PA Dept. of Education  
Dr. James Barker, Superintendent, Erie School District  
Hon. Jane Earll, Hon. James Rhoades, Hon. Allyson Schwartz,  
Hon. Linda Bebko-Jones, Hon. Karl Boyes, Hon. Italo Cappabianca, Hon. John Evans,  
Hon. Theresa Forcier, Hon. Tom Scrimenti, Hon. Nicholas Colafella, Hon. Jess Stairs

ORIGINAL: 2187



**University of the Arts**  
320 S Broad St  
Philadelphia PA 19102-4994

## TELEFAX TRANSMISSION

*Please Deliver to the Addressee As Soon As Possible*

**To:** Dr. Peter Garland, Executive Director, PA State Board of Ed.  
**From:** Andrew Petto  
**Date:** May 18, 2001  
**Re:** PA Draft Standards for Science and Technology

Number of pages including this one: 4

Comments on the PA Draft Standards for Science and Technology follow.

Andrew J. Petto, PhD

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NEW YORK COMMISSION  
DP

AJ Petto, PhD  
PA Standards in Science and Technology  
May 18, 2001  
Page 4

correct the misleading phrases and relates this standard in the manner that it is properly understood in the current scientific consensus.

The second example also misleads students into thinking about the *directions* specified in DNA and other cellular compounds as *information*. This usage of "information" is both non-standard and incorrect according to current scientific research. There is a well-developed literature in information theory, and "information" as used in that field is a measure of the structure and complexity of the system, not the content of the message. The suggested changes are both more accurate and more in keeping with the current scientific consensus.

Standard	Text	Suggested Revision
3.3.12.D	[A]nalyze the impact of new scientific facts on the theory of evolution.	Delete this standard.

This proposed standard is redundant and repeats the error in 3.3.10.D. The critical thinking skills that it means to produce are already included in the standards in section 3.2 (Inquiry and Design), so there is no need to repeat the standard here. Furthermore, this proposed standard gives the mistaken impression that evolutionary theory is more vulnerable or susceptible than other scientific theories to changes due to new facts. Since that impression is false, this standard should be deleted.

The consequences of undermining the role of education as a foundation for the life sciences cannot be understated. If Pennsylvania's students do not learn that evolution is the current scientific consensus on the diversity of life on Earth, they will not be competitive for admission to higher education or as successful in life sciences courses. Officials of the Kansas State University System told that state's legislature and school board that the removal of evolution from the state's science education standards would cause them to question the preparedness for university study of students graduating from Kansas high schools. Several biotechnology and life-sciences-based companies also told government officials that they would cancel plans to relocate to the state if evolution were not retained in the standards, because they could not be assured of an appropriately educated workforce.

In my judgment as a scientist and science educator, it is clear that the items I have specified above will harm the life-sciences education of Pennsylvania's students and have negative educational and economic consequences for the state and its citizens. I urge the State Board of Education to implement science education standards that reflect the current scientific consensus in all disciplines — and for the life sciences, that means standards that clearly place evolution as the theoretical framework for all the life sciences.

I would be pleased to contribute to the development of these standards and the curricular framework that will be based on them. Please feel free to contact me.

Yours Very Truly



Andrew J. Petto, PhD  
Associate Professor

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2001 MAY 22 AM 9:51  
EDUCATION COMMISSION  
CD

AJ Petto, PhD  
PA Standards in Science and Technology  
May 18, 2001  
Page 3

electron, all modern communications and much of our current entertainment rely on theories about how these unseen entities behave. It is more appropriate to specify that science concerns itself with the natural world and the observable effects of natural phenomena.

### Section 3.3: Biological Sciences

Standard	Text	Suggested Revision
3.3.10.D	Analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that support <i>or do not support</i> the theory of evolution.	Analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that <b>scientists use to</b> support the theory of evolution.

The insertion of the phrase "or do not support" is problematic in several ways. First, the interpretation that some evidence does not support evolution is not found in standard science education materials. This standard would require that school districts buy and use sectarian religious material, since these are the only sources of such teaching material. Schools that did not buy and use such sectarian materials would find themselves out of compliance with the state's science education standards. The constitutional issues should be obvious.

The second problem with this phrase is that it unreasonably singles out evolution among all scientific theories for special attention. This would give Pennsylvania's students the mistaken impression that evolution is less well accepted and established than other scientific theories.

Furthermore, even if the educational goal is to promote critical thinking in the sciences, there is still no need to insert this phrase specifically with respect to evolution, since Section 3.2: Inquiry and Design devotes several standards to this goal. Removing this phrase from Standard 3.3.10.D would provide an accurate view of biological sciences as they are understood by practicing scientists. It would also rationalize the critical thinking standards, making them apply equally to all scientific theories presented in the curriculum.

Standard	Text	Suggested Revision
3.3.10.A	Explain the structural and functional similarities and differences found among living things.	<b>Know how scientists</b> explain the causes of similarities and differences found among living things.

This standard is overly vague. The original asked students to know the *causes* of these changes; these causes are presumably those accepted by the consensus of the scientific research community. The suggested revision directs teachers to present current scientific consensus and asks students to be aware of how the scientific community currently explains the causes of the pattern of similarities and differences in living things.

Standard	Text	Suggested Revision
3.3.10.B	Describe the relationship between the structure of organic molecules and the function they serve in living organisms.	Describe <b>how</b> the structure of organic molecules <b>affects</b> the functions they serve in living organisms.
3.3.10.B	Explain how cells store and use information to guide their functions.	Explain how cells store, <b>interpret and follow directions</b> to guide their functions

Both of these represent new standards with no comparable items in previous versions. They are both poorly phrased and run the risk of misleading Pennsylvania's students. In the case of 3.3.10.B the standard gives the mistaken impression that there is a single, strict relationship between the structure and function of an organic molecule. However, much of pharmacology — especially the neuropharmacology of addiction — is based on the fact that the relationship between structure and function can be a flexible one. Some important biological chemicals, such as acetylcholine and noradrenalin, have more than one function, depending on which part of the molecule is being used. Others, including acetylcholine and adrenaline, can have more than one action, depending on the amount in circulation and the cellular receptors bound. While these functions are a result of specific chemical interactions, the current proposed standard gives the mistaken impression that there is one and only one function for each organic molecule — an impression that contributes to the mistaken notion that this biochemical specialization makes evolution at the molecular level impossible. The suggested changes



**University of the Arts**  
**320 S Broad St**  
**Philadelphia PA 19102-4994**

May 15, 2001

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

RE: Draft Standards for Science and Technology Education

Dear Dr. Garland:

This comment is in response to the April 21, 2001 announcement in the *Pennsylvania Bulletin* requesting reactions to the latest draft of Standards for Science and Technology Education. Overall, the revisions made in July 2000 make the standards clearer and easier to implement. There is, however, a significant concern over the changes in the standards that relate to evolution education, and I wish to address those in this letter. The changes that I will specify are troubling on educational, scientific, and constitutional grounds.

**Section 3.2: Inquiry and Design**

Standard	Text	Suggested Revision
3.2.7.A	Explain how new information may change existing theories and practice.	Explain how new information <b>from scientific research</b> may change existing theories and practice.
3.2.10.A	Integrate new information into existing theories and practice.	Integrate new information <b>from scientific research</b> into existing theories and practice.

These proposed standards are deficient in several ways. The most important is the failure to specify that it is information from the scientific research literature that is the basis for a change in existing theories and practices. As written, the standards overlook the essential fact that new ideas must be tested in the peer-reviewed scientific literature before they attain scientific consensus and that this scientific consensus is the essential ingredient for any change in existing theories and practices to occur. The suggested revisions add the qualifying phrase that would limit new information to that produced by scientific research.

Standard	Text	Suggested Revision
3.2.10.A	Know that science is limited to the study of observable aspects of the world and the universe.	Know that science is limited to the study of <b>natural</b> aspects of the world and the universe <b>and their observable effects</b> .

In this case, the adjective "observable" may be misunderstood. Some "observations" are indirect and many phenomena of interest to scientists (and students of science) cannot be observed directly. Some theories — such as the inverse square rule that governs the experience of gravitational attraction — are supported by inference from indirect observations. Even though no one has ever directly observed an



Andrew J. Petto, PhD, Editor  
 National Center for Science Education  
 215/717-6276  
 Fax: 215/717-6620  
 editor@ncseweb.org

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ORIGINAL: 2187

May 16, 2001

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

RECEIVED  
2001 MAY 21 AM 9:05  
PENNSYLVANIA  
LEGISLATIVE  
REVIEW COMMISSION

Dear Sir:

I understand that in the recently published "Proposed Academic Standards for Science and Technology" there lurks a provision which cites the acceptability of studies "that support or do not support the theory of evolution." I further understand that a spokesman for the Department of Education has admitted that the language quoted above would allow for the teaching of "creation" theory in the public schools.

Does anyone up there understand that "creationism" is a religious notion, and that it has no scientific credibility whatsoever?

Does anyone up there understand that such a provision puts the state in the business of sanctioning religious instruction in the public schools?

Does anyone up there understand that such an activity is prohibited by the Constitution of the United States?

I suggest that you get everybody together who had anything to do with this crack-pot idea and bring them back to the conference room along with your Law Director, the Attorney General, and copies of the Constitution, and see if they still want to put their names on this witless proposal.

Sincerely yours,



Richard Arnesen / 202 South Wilson Lane / York / Pennsylvania / 17406

Copies:

The Honorable Jess M. Stairs, Pennsylvania House of Representatives  
The Honorable Nicholas A. Colafella, Pennsylvania House of Representatives  
The Honorable James J. Rhoades, Senate of Pennsylvania  
The Honorable Allyson Y. Schwartz, Senate of Pennsylvania  
Mr. Larry Frankel, ACLU of Pennsylvania

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MAY 13 2001

PENNSTATE



Department of Geosciences

2001 MAY 21 AM 9:08

RECEIVED

The Pennsylvania State University  
503 Deike Building  
University Park, PA 16802-2714

(814) 865-6711

REVIEW COMMISSION



May 16, 2001

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

Dear Sir:

I am writing to express the concern of our Geosciences faculty regarding the ASLA 01-16 Proposed Science Standards in Pennsylvania. We object to the revisions inserted by the state Board of Education in July concerning standards for evolution. For example, standard 3.3.10.D.1 now reads, "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution." The phrase "or do not support" is only appropriate for hypotheses yet to be scientifically tested and should be deleted from this standard. Evolution is a scientific theory, not an hypothesis. Scientific theories, like evolution and relativity and plate tectonics, are hypotheses that have survived extensive testing and repeated verification. Scientific theories are therefore the best-substantiated statements that scientists can make to explain the organization and operation of the natural world. Thus, a scientific theory is not equal to a belief, a hunch, or an untested hypothesis. Our understanding of Earth's development over its 4.5 billion-year history and of life's gradual evolution has achieved the status of scientific theory. While one might think that we would want to also search for evidence that does not support the theory of evolution, it would be as nonsensical as including a standard that seeks refutations of mass conservation. This level of science is way beyond our expectations for high school seniors.

We request that the Pennsylvania Board of Education follow the National Science Education Standards pertaining to the evolution of life.

Sincerely yours,

Rudy Slingerland  
Professor of Geology

cc: Dr. G. Kip Bollinger

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2001 MAY 18 AM 9:44

REVIEW COMMISSION

66

ORIGINAL: 2187

REC'D

MAY 16 2001

Mr. Barland,

This letter is in reference to proposals that will allow, in any way, for the teaching of creationism. It is vitally important that we, as a nation, continue to keep the separation of the church and the government separate. Otherwise, we could easily repeat the past mistakes of governments our ancestors escaped.

What is taught in homes and places of worship is open and free to choice. What is taught in schools should not be spiritually or religiously based. Thank you.

Sincerely,

Lisa Hantman



# Ohio University

Department of Biological Sciences  
Ohio University  
Irvine Hall  
Athens, Ohio 45701-2979

740-593-2290  
FAX: 740-593-0300

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

Dear Dr. Garland,

I am writing concerning Pennsylvania's proposed science standards. I have only had time to briefly examine them, and came away with a positive overall impression of them. I was impressed to see that GRADE 10 standard 3.3.10.D says, "Explain the mechanism of the theory of evolution." The emphasis on evolution by this and other standards is a wise decision since evolution is the unifying theory of all biology. Our freshmen at Ohio University need to understand evolution to understand our introductory biology sequence. Our second year curriculum consists of three classes essential to understanding modern biology: Genetics, molecular-cellular biology and evolution. Evolution is found in, taught in and interwoven throughout almost all of our biology classes here at Ohio University, and I think you will find a similar situation in the majority of colleges. All of our biology students, including those wishing to be doctors, dentist, wildlife biologists or any other type of biologist, must understand evolution to succeed as biology majors. Students who have not been taught evolution in primary school are at serious disadvantage at college!


I was very disappointed to read under GRADE 10 standard 3.3.10.D the outcome stating, "Analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that support or do not support the theory of evolution." The phrase "that support or do not support the theory of evolution" is one of the latest "code words" used by creationists. Creationists interpret the phrase "that support or do not support the theory of evolution" as a green light to teach creationism under the guise of "evidences against evolution". Who ever suggested or adopted this phrase either knowingly or unknowingly opened a loophole for creationists to introduce creationism into Pennsylvania's public schools. I strongly urge you to remove this loophole and any others that may have been inserted in otherwise good science standards. I would suggest changing this standard to the following or something similar to it:

"Analyze how evidence from fossil records, similarities in body structures, embryological studies and DNA studies shape and change our understanding of how evolution occurs."

Part of what such a standard gets at is that there is the fact evolution has and does occur; and the theories explaining how it occurs. Understanding this point about biology is a very important part of understanding science, and is part of what all students should know by the time they graduate from high school.

I am happy to make my time available to discuss this matter with you if you wish and, again, would urge you to close this loophole before these standards are implemented and before the loophole is used.

Sincerely,



Steven A. Edinger, M.S.  
Physiology Lab Instructor

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College of Arts and Sciences  
16 May 2001

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PA. STATE BOARD  
OF EDUCATION

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May 16, 2001

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REVIEW DIVISION



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

518 C Street, N.E.

Washington, D.C. 20002

(202) 466-3234 phone

(202) 466-2587 fax

americansunited@au.org

www.au.org

Re: Proposed Rule Making On Academic Standards

Dear Mr. Garland:

We are submitting the comments below on the State Board of Education's draft "Standards for Teaching Science." Members of the Americans United legal staff and I have reviewed the document and offer the following comments. Please note that we have limited our comments to sections 3.3.10.D and 3.3.12.D, which concern the teaching of evolution, since these sections are the most relevant to our organization's interests. Our recommendation is that you maintain the 1998 version of these sections because adoption of the revised version unnecessarily would open the door to the unconstitutional teaching of creationism in Pennsylvania public schools.

The 1998 versions of both 3.3.10.D and 3.3.12.D contain strong language supporting the teaching of evolution. In fact, Professor Lawrence Lerner, a professor of natural sciences and mathematics at California State University at Long Beach, awarded the 1998 science standards a grade of "A," in part because of the evolution curriculum.<sup>1</sup> According to evolution experts, the proposed language would weaken Pennsylvania's scientific standards by undermining the theory of evolution.<sup>2</sup>

The proposed language does not just raise concerns because of its effect on the student's science education. The proposed language is also objectionable because it appears to invite the teaching of creationism in the public schools.<sup>3</sup>

---

<sup>1</sup> See Lawrence Lerner, *Good Science, Bad Science: Teaching Evolution in the States*.

<sup>2</sup> See Phillip Taylor, *Pennsylvania Education Board Considers Rules Allowing Teaching of Creationism* (quoting two evolution experts who believe that the standards undercut the teaching of evolution and, therefore, weaken the scientific standards).

<sup>3</sup> See Pamela R. Winnick, *Proposed Rules Boost Teaching of Creationism*, *The Pittsburgh Post-Gazette*, Nov. 29, 2001 (citing Dan Langan, a spokesman for the state Department of Education, as having stated that the standards would permit the teaching of creation theory).

*Your voice in the battle to preserve religious liberty*

In Edwards v. Aguillard, 482 U.S. 578 (1987), the United States Supreme Court struck down a state statute that required "balanced treatment" of creation science and evolution in the public schools. The Court reasoned that creation science is unequivocally a religiously-based doctrine, and that the Establishment Clause of the United States Constitution forbids public school teaching to "be tailored to the principles or prohibitions of any religious sect or dogma." Id. at 591 (quoting Epperson v. Arkansas, 393 U.S. 97, 106 (1968), in which the Court struck down a statute that prohibited the teaching of evolution).

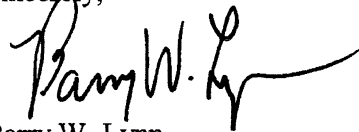
In accordance with this decision, the lower courts have consistently found that creationism cannot be included as a scientific theory in the public schools. See McLean v. Arkansas Bd. of Educ., 529 F. Supp. 1255, 1258-64 (E.D. Ark. 1982) ("creation science has no scientific merit or educational value as science;" teaching creation science in the public schools is unconstitutional because it advances religion); Peloza v. Capistrano Unified Sch. Dist., 37 F.3d 517, 521 (9<sup>th</sup> Cir. 1994) (teacher was properly forbidden from teaching creation science because students have a right "to be free of religious influence or indoctrination in the classroom"); Webster v. New Lenox Sch. Dist. No. 122, 917 F.2d 1004, 1008 (7<sup>th</sup> Cir. 1990) (by forbidding the teaching of creation science, a school "successfully navigated the narrow channel between impairing intellectual inquiry and propagating a religious creed"); see also LeVake v. Independent Sch. Dist. No. 656, C8-00-1613, 2001 WL 477130 (Ct. App. Minn. May 8, 2001) (school district acted properly in prohibiting a teacher from teaching biology after he refused to teach evolution without also teaching criticisms of evolution).

The proposed science standards should be rejected, therefore, because they would promote the unconstitutional practice of teaching religion in the public schools.

Furthermore, under the proposed standards, evolution would be the only theory in the science curriculum about which the students would have to learn both "studies that support or do not support" accepted science. The fact that "[o]ut of many possible science subjects taught in the public schools, the [Board] chose[s] to affect the teaching of the one scientific theory that historically has been opposed by certain religious sects" in a way that permits the introduction of religious dogma demonstrates that the purpose of the proposed amendments is to "conform with religious viewpoint." Edwards v. Aguillard, 482 U.S. at 593. Such actions are impermissible, as revising standards to conform with religious beliefs violates the Constitution. Id.

Accordingly, we urge you to reject proposed sections 3.3.10.D and 3.3.12.D, and to reinstate the 1998 versions of these sections. I hope you find these comments useful. Thank you for taking our concerns into consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Barry W. Lynn", with a stylized flourish at the end.

Barry W. Lynn  
Executive Director

# Tredyffrin/Easttown School District

738 First Avenue, Berwyn, PA 19312-1779 • Phone: 610/240-1905 • Fax: 610/647-7428

May 15, 2001

Independent Regulatory Review Commission  
14<sup>th</sup> Floor, 333 Market Street  
Harrisburg, PA 17101

Dear Sir or Madam:

The recent publication of Science and Technology and Environment and Ecology standards in the *Pennsylvania Bulletin* prompts this letter of concern. As an educational organization, Tredyffrin/Easttown School District is a proponent of the concept of academic standards that support the strong programs that we have in place. However, the sheer volume and detail of the standards as they are evolving is a concern to our community. We have taken the opportunity on a number of previous occasions to voice our reservations about the status of standards in the state, and we again raise a number of concerns.

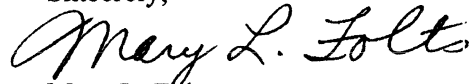
Among the issues that relate specifically to the Science and Technology and Environment and Ecology standards is the fact that the standards focus a disproportionate amount of attention on the life sciences, leaving other areas of scientific study, namely the chemical and physical sciences, shortchanged. As testing programs are put in place to measure accomplishment of these standards, it will be necessary for Tredyffrin/Easttown School District to make expensive, time-consuming changes in the sequence in which scientific topics are presented at our middle and high school levels in order to match the standards and the assessments. As a result, our students may be denied the opportunity to take advanced classes in chemistry and physics as they study topics including "integrated pest management" and "agriculture and society" in more detail than is currently the case in our curriculum. We have noted that the applied nature of many of the standards does not prepare students for the rigorous programs they expect at the university level. Furthermore, our current Advanced Placement courses, with their nationally recognized, prescribed curriculum, do not lend themselves to significant additions of content material.

By commonly accepted measures, including nationally normed test scores, the richness and variety of the academic program, the number of Advanced Placement courses and student achievement on AP tests, the percentage of graduates who go to college and many other indicators, Tredyffrin/Easttown School District is a successful district that enjoys the support of

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INDEPENDENT REGULATORY  
REVIEW COMMISSION

its community. The intrusion of state standards into our local control in order to compel curricular changes when no data suggest that our district is deficient in these areas is a great concern to us. We appreciate the difficult task before the Department of Education and the State Board of Education in attempting to improve schools and prepare all Pennsylvania children for a productive future. However, taking action that requires the successful districts to allocate resources to change for the sake of changing should not be a part of the state's improvement plan.

Sincerely,

A handwritten signature in cursive script that reads "Mary L. Folts". The signature is written in black ink and is positioned above the printed name and title.

Mary L. Folts

Director of Curriculum

**Garland, Peter**

ORIGINAL: 2187

**From:** Garland, Peter  
**Sent:** Wednesday, May 16, 2001 12:21 PM  
**To:** 'vsnyder@oak.kcsd.k12.pa.us'  
**Subject:** RE: Revisions to the proposed PA Science Standards

Dear Mr. and Mrs. Snyder:

Thank you for your e-mail of May 15, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

Peter H. Garland  
Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

-----Original Message-----

From: Benkovic, Susan  
Sent: Wednesday, May 16, 2001 8:48 AM  
To: Garland, Peter  
Subject: FW: Revisions to the proposed PA Science Standards

-----Original Message-----

From: Virginia Snyder [mailto:vsnyder@oak.kcsd.k12.pa.us]  
Sent: Tuesday, May 15, 2001 2:04 PM  
To: 00statbd@email.cas.psu.edu  
Subject: Revisions to the proposed PA Science Standards

Dear Sir,

We are writing to express our opinion, as parents, of the revisions that are being evaluated to the proposed PA Science Standards. The

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IRRC

exclusion of an exploration of creation in the standards in contrast to the sole examination of evolution is a disappointment to our family. Evolution is a theory--not a proven truth. Darwin, himself, backed down on this 'theory' at the end of his life. Many of the current findings in science are also beginning to erode the foundation of this theory. In light of this, we are pleased that there have been some revisions added to the initially proposed standards. We would urge you to pass the standards with the revisions and not return to the original draft.

One element of the standards remaining is worded as though human evolution from early hominids is an accepted fact. It reads, "Examine human history by describing the progression from early hominids to modern humans." (Section 3.3.12.D)

We would urge the state board to change that standard to something like:

"Critically evaluate the validity of the hominids that evolutionists claim to be ancestral to modern man."

We are requesting that you express our opinion to the PA State Board of Education and ask them to modify the hominid standard as recommended above and ask them to keep all of the elements of the standards that encourage a critical, objective approach to the teaching of origins.

We appreciate your careful consideration of our concerns.

Sincerely,  
Mr. & Mrs. Kirk (Virginia) Snyder



# Tredyffrin/Easttown School District

738 First Avenue, Berwyn, PA 19312-1779 • Phone: 610/240-1905 • Fax: 610/647-7428

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MAY 21 2001

PA. STATE BOARD  
OF EDUCATION

May 15, 2001

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

Dear Mr. Garland,

The recent publication of Science and Technology and Environment and Ecology standards in the *Pennsylvania Bulletin* prompts this letter of concern. As an educational organization, Tredyffrin/Easttown School District is a proponent of the concept of academic standards that support the strong programs that we have in place. However, the sheer volume and detail of the standards as they are evolving is a concern to our community. We have taken the opportunity on a number of previous occasions to voice our reservations about the status of standards in the state, and we again raise a number of concerns.

Among the issues that relate specifically to the Science and Technology and Environment and Ecology standards is the fact that the standards focus a disproportionate amount of attention on the life sciences, leaving other areas of scientific study, namely the chemical and physical sciences, shortchanged. As testing programs are put in place to measure accomplishment of these standards, it will be necessary for Tredyffrin/Easttown School District to make expensive, time-consuming changes in the sequence in which scientific topics are presented at our middle and high school levels in order to match the standards and the assessments. As a result, our students may be denied the opportunity to take advanced classes in chemistry and physics as they study topics including "integrated pest management" and "agriculture and society" in more detail than is currently the case in our curriculum. We have noted that the applied nature of many of the standards does not prepare students for the rigorous programs they expect at the university level. Furthermore, our current Advanced Placement courses, with their nationally recognized, prescribed curriculum, do not lend themselves to significant additions of content material.

By commonly accepted measures, including nationally normed test scores, the richness and variety of the academic program, the number of Advanced Placement courses and student achievement on AP tests, the percentage of graduates who go to college and many other indicators, Tredyffrin/Easttown School District is a successful district that enjoys the support of

its community. The intrusion of state standards into our local control in order to compel curricular changes when no data suggest that our district is deficient in these areas is a great concern to us. We appreciate the difficult task before the Department of Education and the State Board of Education in attempting to improve schools and prepare all Pennsylvania children for a productive future. However, taking action that requires the successful districts to allocate resources to change for the sake of changing should not be a part of the state's improvement plan.

Sincerely,

A handwritten signature in cursive script that reads "Mary L. Folts". The signature is written in dark ink and is positioned above the printed name and title.

Mary L. Folts  
Director of Curriculum

**Garland, Peter**

ORIGINAL: 2187

**To:** Benkovic, Susan  
**Subject:** RE: PA Science & Technology Standards and the Environment and Ecology Standards

Dear Mr. Kohman:

Thank you for your e-mail of May 15, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

H. Garland

Peter

Executive Director

cc: Members of the State Board  
Senator Rhoades  
Senator Schwartz  
Representative Stairs  
Representative Colafella  
IRRC

---Original Message----

From: Truman P Kohman [mailto:tk11+@andrew.cmu.edu]  
Sent: Wednesday, May 16, 2001 1:47 PM  
To: Peter Garland  
Subject: PA Science & Technology Standards and the Environment and Ecology Standards

Dr. Garland,

I wish to comment on the proposed changes in the standards.

The wording of the new standards should reflect that evolution is not a theory but is a well established fact, and is the basis for biology and anthropology.

Recognition of this would eliminate most of my objections to the proposed revisions of the standards.

Respectfully,

Truman Kohman  
Professor of Chemistry Emeritus  
Carnegie-Mellon University

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2001 MAY 21 AM 9:08

PA. STATE BOARD OF EDUCATION  
REVIEW COMMISSION



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

May 15, 2001

Dear Dr. Garland:

This letter is in reference to the state education standards for science and technology in it's final approval stage, in which the theory of evolution is seriously discounted.

As a museum educator in a natural history museum, I am appalled at the prospect of diminishing the education provided in this field to the children of Pennsylvania. The United States is falling behind the rest of the world in the education it provides its children in the field of science and technology, and the state of Pennsylvania is now considering adding to this plight. It is the responsibility of the state to ensure that it's children receive the most complete education possible, by giving them the tools to become well educated, reasoning, thinking adults ready to deal with the complexities of this century. The state should not deny them that opportunity.

Further, as a grand-mother I am distressed that I may no longer encourage my children to return to Pennsylvania to raise my grand-children. I could not possibly promote their receiving a highly flawed education that will put them at an enormous disadvantage with the rest of the United States and in the world at large.

Finally, I am sure you are aware that not too long ago the state of Kansas passed such standards, became the laughing stock of the country, and reversed itself as quickly as possible. Does history again have to repeat itself?

Sincerely,

Shirley Rust.

5505 Sunnyside St.  
Oft. Ca 15217-1014

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MAY 18 2001

PA. STATE BOARD  
OF EDUCATION

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MAY 16 2001 9:44  
REVIEW COMMISSION

300 Highland Drive  
Pottsville, PA 17901

May 15, 2001

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

RECEIVED  
MAY 16 2001  
PA. STATE BOARD  
OF EDUCATION

**Re: Proposed amendments to Chapter 4 Academic Standards  
For Science and Technology and Environmental and Ecology**

Dr. Garland:

I would like to comment on the proposed changes to the standards to be achieved by students in Pennsylvania's public schools.

I am a geologist with the Commonwealth, educated in Pennsylvania public schools and universities. I also have a young child that I plan to send to Pennsylvania public schools. I commented favorably on the original standards a long while ago. But, since then, changes have been proposed, some of which are disturbing to me.

I dislike the language in the standards that singles out the theory of evolution - our firm foundation of the biological sciences. To me, these proposed changes are clearly indicative of a religious agenda worming its way into the Pennsylvania schools. I distinctly support the separation of church and state. The wording presented in Section 3.3.10.D,

*"Analyze evidence of fossil records...that support or do not support the theory of evolution"*

provides a hole for certain educators to elaborate on the poor science done by those whose goal it is to promote a literal interpretation of the Bible or inject a religious-based belief into science where it does not belong. I have seen many cases of anti-evolution propaganda that uses pseudoscience, unacceptable to the professional scientific community, as evidence for their position.


While I support most wording in the standards that encourage scientific, and therefore critical, thinking, I feel that the singling out of evolution undermines that policy. This provides a skewed view of how science works and portrays the theory of evolution as weak which it is not. Why put evolution under a microscope, subjecting it to intensive criticism when it is exceptionally supported by reams of valid evidence from many fields. It is the core theory of agriculture, animal husbandry, pest control, all medical disciplines, geology, biotechnology and dozens of other specialties. These studies are crucial to human population yet we train our children inadequately in the basic fundamentals of biology. I see

no such scrutiny of the theories of gravity, thermodynamics, relativity, etc. that have many more holes and unanswered questions than evolution.

I did not have a strong education in evolution throughout my secondary education. I had to learn much of the principles in college and through my own reading. That should not be. Evolution is the underlying principle of life and should be stressed as such. Any related religious beliefs or conflicts should be taken up in religious instruction chosen by the parents and attended outside of school time.

I encourage you not to let a religious agenda creep into the science standards. Keep the standards rock solid against this type of rot from within and remove the dubious language.

Sincerely,

A handwritten signature in cursive script that reads "Sharon Hill". The signature is fluid and elegant, with a large initial 'S' and a long, sweeping underline.

Sharon Hill, P.G.

ORIGINAL: 2187

May 15, 2001

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

2001 MAY 23 AM 9:21

REVIEW COMMISSION



RE: Draft Standards for Science and Technology Education

Dear Dr. Garland:

There are several important errors in the proposed Standards for Science and Technology. The most serious is the weakening of the role of evolution as a foundation for the life sciences. Curriculum that follows the current proposed standards will give students a deficient and faulty life-sciences education that will leave them ill-prepared for higher education and for careers in life-sciences-related professions.

As written, there are three main problems with the proposed standards regarding evolution as currently written.

1. In the scientific arena, evolution explains the pattern of similarity and difference among living things throughout the Earth's history and in its many environments and habitats. More important, though, evolution provides the basis for scientific research in medicine, agriculture, biotechnology, pharmacology, and dozens of related fields. It is this record of supporting productive research that gives evolution its place among the sciences. Evolution has earned its place at the foundation of the biological sciences.
2. In the educational arena, if we are seriously want our students to be the best in the world in science and mathematics, then we need to teach them what 21<sup>st</sup>-century science really is and does. There are many rejected ideas in the history of science that we no longer take seriously — that the Earth is flat or that the Sun, Moon, and stars revolve around us — yet which some people continue to proclaim. These are simply not a part of the "scientific" debate and therefore have no place in the science curriculum.
3. In the constitutional arena, a series of state and federal court rulings have repeatedly found that science is what scientists do and that attempts to legislate interpretations of data that follow particular religious or philosophical traditions is unconstitutional, tantamount to violating the Establishment Clause of the First Amendment.

It is simply in the best interests of our children's education that what they learn in the classroom reflects the current consensus of scholars and practitioners in the appropriate fields — whether it is science or some other discipline. Singling out evolution for a special challenge among all other theories — electromagnetic theory, quantum theory, the theory of gravitational attraction, germ theory, and so on — is not warranted on any scientific grounds. Moreover, it gives students the false impression that evolution itself, is under attack or in crisis within the biological sciences. If it is debate and critical thinking that we desire, then let our students debate real issues in the sciences — such as how various evolutionary models and mechanisms have produced the history and diversity of life that we observe around us.

Eliminate the standard that calls for "evidence that does not support" evolution and other standards that show bias against evolutionary theory by singling it out among all other scientific theories for special criticism within the standards. Ensure that Pennsylvania's students will have a complete, up-to-date, and competitive science education.

Sincerely Yours,

*Robert A. Samuels*  
2904 Union Ave  
Altoona PA 16602

RECEIVED DATE : 05/21 09:51'01 FROM : 2155921343

ORIGINAL: 2187

May 15, 2001

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

RECEIVED  
2001 MAY 22 AM 9:53

REVIEW COMMISSION



RE: Draft Standards for Science and Technology Education

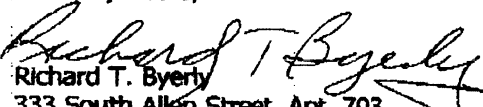
Dear Dr. Garland:

I am writing to comment on the proposed Standards for Science and Technology Education. I am particularly concerned with the poor treatment of the standards on evolutionary theory. My concerns are in 3 main areas.

1. The main concern is that some of the proposed changes in the science education standards present Pennsylvania's students with an inaccurate representation of science as it is practiced and understood by professionals in scientific disciplines.
2. In particular there is a problem with the definition of science — limited to observable aspects of the world; the word "observable" can be misunderstood to limit science and scientists to what they can see and directly witness. Much of science — in the physical as well as biological sciences — is based on indirect observation and inference.
3. It is also inappropriate and incorrect to single out evolution from all other scientific theories as deserving of special criticism or debate. Evolution is well accepted in the sciences as being at the foundation of our current understanding of biology and all fields dependent on the biological sciences. No other scientific theory is identified for specific criticism in this way, and this situation gives the mistaken impression that (a) evolution is weaker or less well accepted than other scientific theories; and (b) that no other scientific theories are subject to revision and modification from new research. Both these impressions are erroneous and potentially harmful to our students' education.
4. The educational goals that Department of Education officials have put forward in defense of these criticisms of evolution are already met elsewhere in the proposed standards under section 3.2, Inquiry and Design. In this section, students learn how scientists establish and test theories, and how those theories are modified by ongoing research. This is the proper place and the proper context for such "critical thinking" standards.

It is clear that the sections on evolution, in particular, in the proposed Standards for Science and Technology Education will give the Commonwealth's students an inaccurate and substandard understanding of current theory and practices in the sciences — particular in the life sciences. To let these stand is to harm the future of our students and citizens, by making them less competitive for higher education and for employment in life-sciences-related fields. I urge the State Board of Education to restore evolution to its appropriate place within the life sciences and remove the requirement to teach evidence "that does not support" evolution from the standards. I also urge the Board to remove all language in the standards that singles out evolution for special criticism that is not also applied to all other scientific theories.

Sincerely Yours,

  
Richard T. Byerly  
333 South Allen Street, Apt. 703  
State College, PA 16801  
mfgrtb@earthlink.net





# NORTHWESTERN PENNSYLVANIA SYNOD

108 Seneca Professional Building  
P.O. Box 338  
(814) 677-5706  
(800) 338-6166

Route 257, Salina Road  
Seneca, PA 16346-0338  
Fax: (814) 676-8591  
E-mail: nwpa@csonline.net

May 15, 2001

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

Dear Mr. Garland,

As bishop of the Northwestern Pennsylvania Synod, Evangelical Lutheran Church in America, I write with concern about the section of the State Board's proposed Academic Standards for Science and Technology that could permit the teaching of creationism in the science curriculum of local school districts.

Our church acknowledges the crucial importance of the state in the realization of religious and other liberties and declares its support of the proper exercise of governmental power to that end. In determining academic standards for public schools, the State Board has an obligation to give equal protection to all religious views. Since creationism is believed by many, but not all, as a matter of faith, opening the door to its teaching in public school class rooms, in our view, violates the equal protection standard.

Specifically, I would recommend that the words "or do not support" in the first paragraph of section 3.3.10.D, and the entire first paragraph of section 3.3.12.D be deleted from the proposed language.

The Evangelical Lutheran Church in America strongly supports the right of any religious body to teach creationism as part of its doctrine. This is clearly the responsibility of the church, synagogue, mosque or other places of worship.

I urge you to retain the traditional neutrality of public education in matters of religion by removing the above-cited language.

Thank you for your consideration.

Truly yours,

The Rev. Paull E. Spring  
Bishop

PES/lhm

cc: Ms. Kathleen Daugherty

RECEIVED

MAY 18 2001

PA. STATE BOARD  
OF EDUCATION

RECEIVED  
2001 MAY 21 AM 9:08  
STATE BOARD OF EDUCATION  
HARRISBURG, PA



ORIGINAL: 2187  
NORTHEASTERN PENNSYLVANIA SYNOD  
EVANGELICAL LUTHERAN CHURCH IN AMERICA

The Rev. DAVID R. STROBEL  
Bishop

May 15, 2001

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

Dear Mr. Garland,

As Bishop of the Northeastern Pennsylvania Synod of the Evangelical Lutheran Church in America, I write to express my concern about the State Board's proposed Academic Standards for Science and Technology that could permit the teaching of creationism in the science curriculum of local school districts.

Our church acknowledges the crucial importance of the state in the realization of religious and other liberties and declares its support of the proper exercise of governmental authority to that end. In determining academic standards for public schools, the State Board has an obligation to give equal protection to all religious views. Creationism is a religious teaching accepted by many as a matter of faith; however, not all religions subscribe to the tenets of creationism. Therefore, permitting the teaching of creationism is, in our opinion, a violation of the equal protection standard.

Specifically, I would recommend the deletion of the words "or do not support" in the first paragraph of section 3.3.10.D as well as the entire first paragraph of section 3.3.12.D.

The Evangelical Lutheran Church in America strongly supports the right of any religious body to teach creationism as part of its doctrine. Clearly this is a legitimate option for churches, synagogues, mosques or other religious communities, not for our public schools.

I urge you to maintain Pennsylvania's traditional neutrality of public education in matters of religion by removing the above-cited language.

Thank you for your consideration.

Sincerely,

David R. Strobel, Bishop

RECEIVED

MAY 17 2001

PA. STATE BOARD  
OF EDUCATION

RECEIVED  
REVIEW COMMISSION

2001 MAY 18 AM 9:36

RECEIVED

ORIGINAL: 2187

**LOWER SUSQUEHANNA SYNOD**

Evangelical Lutheran Church in America

900 S. Arlington Ave., Suite 208, Harrisburg, PA 17109

(717) 652-1852, ext. 16 • (800) 692-7282 (PA only) • FAX (717) 652-2504



The Rev. Guy S. Edmiston  
Bishop

May 15, 2001

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

**RECEIVED**

MAY 17 2001

PA. STATE BOARD  
OF EDUCATION

Dear Mr. Garland:

As bishop of the Lower Susquehanna Synod, Evangelical Lutheran Church in America, I write with concern about the section of the State Board's proposed Academic Standards for Science and Technology that could permit the teaching of creationism in the science curriculum of local school districts. I am certain you are hearing from others who share my concern with similar letters.

Our church acknowledges the crucial importance of the state in the realization of religious and other liberties and declares its support of the proper exercise of governmental power to that end. In determining academic standards for public schools, the State Board has an obligation to give equal protection to all religious views. Since creationism is believed by many, but not all, as a matter of faith, opening the door to its teaching in public school classrooms, in our view, violates the equal protection standard.

Specifically, I would recommend that the words "or do not support" in the first paragraph of section 3.3.10.D, and the entire first paragraph of section 3.3.12.D be deleted from the proposed language.

The Evangelical Lutheran Church in America strongly supports the right of any religious body to teach creationism as part of its doctrine. This is clearly the responsibility of the church, synagogue, mosque or other places of worship.

I urge you to retain the traditional neutrality of public education in matters of religion by removing the above-cited language.

Thank you for your consideration.

Sincerely,

Guy S. Edmiston

Bishop

GSE:jw

Cc: Kathleen S. Daugherty, Executive Director  
Lutheran Advocacy Ministry in Pennsylvania

RECEIVED  
2001 MAY 18 AM 9:36  
LUTHERAN ADVOCACY  
MINISTRY IN PENNSYLVANIA

ORIGINAL: 2187

May 15, 2001

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

RE: Draft Standards for Science and Technology Education

Dear Dr. Garland:

There are several important errors in the proposed Standards for Science and Technology. The most serious is the weakening of the role of evolution as a foundation for the life sciences. Curriculum that follows the current proposed standards will give students a deficient and faulty life-sciences education that will leave them ill-prepared for higher education and for careers in life-sciences-related professions.

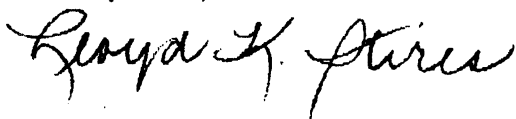
As written, there are three main problems with the proposed standards regarding evolution as currently written.

1. In the scientific arena, evolution explains the pattern of similarity and difference among living things throughout the Earth's history and in its many environments and habitats. More important, though, evolution provides the basis for scientific research in medicine, agriculture, biotechnology, pharmacology, and dozens of related fields. It is this record of supporting productive research that gives evolution its place among the sciences. Evolution has earned its place at the foundation of the biological sciences.
2. In the educational arena, if we are seriously want our students to be the best in the world in science and mathematics, then we need to teach them what 21<sup>st</sup>-century science really is and does. There are many rejected ideas in the history of science that we no longer take seriously — that the Earth is flat or that the Sun, Moon, and stars revolve around us — yet which some people continue to proclaim. These are simply not a part of the "scientific" debate and therefore have no place in the science curriculum.
3. In the constitutional arena, a series of state and federal court rulings have repeatedly found that science is what scientists do and that attempts to legislate interpretations of data that follow particular religious or philosophical traditions is unconstitutional, tantamount to violating the Establishment Clause of the First Amendment.

It is simply in the best interests of our children's education that what they learn in the classroom reflects the current consensus of scholars and practitioners in the appropriate fields — whether it is science or some other discipline. Singling out evolution for a special challenge among all other theories — electromagnetic theory, quantum theory, the theory of gravitational attraction, germ theory, and so on — is not warranted on any scientific grounds. Moreover, it gives students the false impression that evolution itself, is under attack or in crisis within the biological sciences. If it is debate and critical thinking that we desire, then let our students debate real issues in the sciences — such as how various evolutionary models and mechanisms have produced the history and diversity of life that we observe around us.

Eliminate the standard that calls for "evidence that does not support" evolution and other standards that show bias against evolutionary theory by singling it out among all other scientific theories for special criticism within the standards. Ensure that Pennsylvania's students will have a complete, up-to-date, and competitive science education.

Sincerely Yours,



RECEIVED DATE : 05/21 09:49'01 FROM : 2155921343

47 Shady Dr.  
Indiana, PA 15701

ORIGINAL: 2187

RECEIVED

2001 MAY 10 AM 9:38

700 Gross Street  
Conway, PA 15027-1339  
May 15, 2001

REVIEW COMMISSION

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

RECEIVED

MAY 17 2001

PA. STATE BOARD  
OF EDUCATION

Dear Dr. Garland:

It is my understanding that the Department of Education is currently accepting input from the public regarding proposed science standards, including the treatment of the controversial theory of evolution. As a retired public school teacher and lifelong Pennsylvania citizen, I would like to offer the following comments.

My information indicates that, despite the zealotry of hard-line proponents of evolution who would like to present the topic as if it were proven fact, there is a great deal of skepticism within the scientific community that is not widely reported. For example, John D. Morris, Ph. D., of the Institute for Creation Research recently cited an article by George Caylor of The Ledger, Lynchburg, Virginia in which Caylor interviewed a molecular biologist working on identifying genetic controls for diseases. The researcher, who for obvious reasons was not identified, reportedly confessed, "To be a molecular biologist requires one to hold on to two insanities at all times. One, it would be insane to believe in evolution when you can see the truth for yourself. Two, it would be insane to say you don't believe in evolution. All government work, research grants, papers, big college lectures - everything would stop. I'd be out of a job, or relegated to the outer fringes where I couldn't earn a decent living." While justifying his intellectual dishonesty by pointing to the good that would someday result from his research, he lamented having to live with the "elephant in the living room...Creation design. It's like an elephant in the living room. It moves around, takes up an enormous amount of space, loudly trumpets, bumps into us, knocks things over, eats a ton of hay, and smells like an elephant. And yet we have to swear it isn't there!"

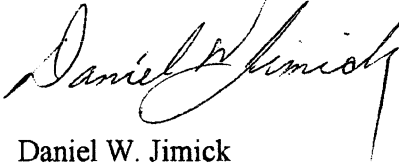
This, I'm sure you will agree, is not a situation consistent with the proper goals of science and education which are to discover and teach objective truth. I am heartened that the Board seems to be taking a more honest approach as evidenced by recent revisions in the standards.

I believe evidence both for and against evolution should be objectively examined and every effort made to avoid presenting conjecture as fact. One section that still does the latter is Section 3.3.12D, "*Examine human history by describing the progression from early hominids to modern humans.*" This clearly implies that the progression actually

happened. I suggest it be changed to something like, "*Examine the evidence for and against the theory that man progressed from early hominids to modern humans.*"

It is my hope that the young people of Pennsylvania will be given access to all available information on this important topic, for what a person believes about the origin and nature of life determines the value he or she places on life.

Sincerely,

A handwritten signature in cursive script, reading "Daniel W. Jimick". The signature is fluid and stylized, with a prominent loop at the end of the last name.

Daniel W. Jimick

ORIGINAL: 2187

May 15, 2001

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

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MAY 23 AM 9:25

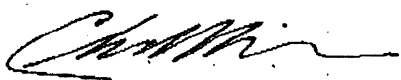
REVIEW COMMISSION

RE: Draft Standards for Science and Technology Education

Dear Dr. Garland:

I am writing to comment on the proposed Standards for Science and Technology Education. I am particularly concerned with the poor treatment of the standards on evolutionary theory. My concerns are in 3 main areas.

1. The main concern is that some of the proposed changes in the science education standards present Pennsylvania's students with an inaccurate representation of science as it is practiced and understood by professionals in scientific disciplines.
2. In particular there is a problem with the definition of science — limited to observable aspects of the world; the word "observable" can be misunderstood to limit science and scientists to what they can see and directly witness. Much of science — in the physical as well as biological sciences — is based on indirect observation and inference.
3. It is also inappropriate and incorrect to single out evolution from all other scientific theories as deserving of special criticism or debate. Evolution is well accepted in the sciences as being at the foundation of our current understanding of biology and all fields dependent on the biological sciences. No other scientific theory is identified for specific criticism in this way, and this situation gives the mistaken impression that (a) evolution is weaker or less well accepted than other scientific theories; and (b) that no other scientific theories are subject to revision and modification from new research. Both these impressions are erroneous and potentially harmful to our students' education.
4. The educational goals that Department of Education officials have put forward in defense of these criticisms of evolution are already met elsewhere in the proposed standards under section 3.2, Inquiry and Design. In this section, students learn how scientists establish and test theories, and how those theories are modified by ongoing research. This is the proper place and the proper context for such "critical thinking" standards.



Cheryl M. Ripner  
118 Ruby St.  
Lancaster, PA  
17603

RECEIVED

2001 MAY 21 AM 9:05

LABORATORY  
REVIEW COMMISSION



**Carole Karash**

211 Valley Rd.  
Merion Station, Pa 19066  
Home Phone 610-664-9904

May 15, 2001

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

Dear Mr. Garland:

I strongly object to the provision in the Proposed Academic Standards for Science and Technology that discusses the use of studies that "support or do not support the theory of evolution." This provision can be used as justification for the teaching of creationism in our public schools. Creationism is a religious concept, and the US Supreme Court has ruled that teaching creationism in the public schools violates the First Amendment.

I urge the adoption of a final version of standards for teaching science which will not infringe on constitutional rights but will qualify our students for careers in scientific disciplines such as genetics, medicine and biotechnology and will prepare our students to meet the demands of the real world. Observations support the theory of evolution, and therefore evolutionary theory, not creationism, is properly included in a sound science curriculum.

Sincerely,

*Carole Karash*

Carole Karash, MS

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MAY 18 2001

PA. STATE BOARD  
OF EDUCATION





AMERICAN ASTRONOMICAL SOCIETY

Anneila I. Sargent  
President

2001 MAY 21 AM 9:06

REVIEW COMMISSION



May 15, 2001

RE: Changes to PA Teaching Standards

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

Dear Dr. Garland,

I am writing to express my concern over the recent proposed changes to the State of Pennsylvania's education standards, specifically the Science & Technology Standards and the Environment and Ecology Standards.

The proposed changes would weaken Pennsylvania's scientific education system. The American Astronomical Society does not support these changes, especially as they specifically include modifications that call the theory of evolution into doubt. Evolution is a fundamental concept in science, well proven over many decades and serves as a framework for more detailed inquiries. There is simply no evidence available, which casts enough doubt on the theory to remove it from the core of your State's curriculum.

Our Society has a statement on the teaching of evolution, originally created in response to developments in Kansas last year and I have included it for your review.

As you review the many comments you are sure to receive on this issue I hope you will conclude that the proposed revisions lessen the overall quality of the curriculum in Pennsylvania and opt to leave the standards as they are now.

Sincerely,

Dr. Anneila Sargent  
President

RECEIVED

MAY 18 2001

PA. STATE BOARD  
OF EDUCATION

Office of the President

California Institute of Technology, Department of Astronomy, 105-24, Pasadena, CA 91125  
Telephone: 626-395-6622 ♦ FAX: 626-568-9352 ♦ E-mail: afs@astro.caltech.edu

NSF by providing, at a minimum, \$5.1 billion for FY 2002, and work to double the NSF's budget by 2006."

---

## **AAS Statement on the Teaching of the History of the Universe**

Adopted 11 January 2000, Atlanta, GA

"The American Astronomical Society (AAS) is the largest organization of professional astronomers in the United States. Its 6,000 members are men and women of all convictions and a variety of religious faiths. They work in ALL fields of astronomy, including the study of planets, of stars and of the Universe as a whole. Research in each of these areas, and in many other areas of astronomy, has produced clear, compelling and widely accepted evidence that astronomical objects and systems evolve. That is, their properties change with time, often over very long time scales.

Specifically, the scientific evidence clearly indicates that the Universe is 10 to 15 billion years old, and began in a hot, dense state we call the Big Bang.

Given the ample evidence that change over time is a crucial property of planets, including our own, of stars, of galaxies and of the Universe as a whole, it is important for the nation's school children to learn about the great age of, and changes in, astronomical systems, as well as their present properties.

More generally we believe that it is important to teach students the nature of the scientific method. Scientific inquiry involves the development and testing of hypotheses based on a systematic collection and analysis of data acquired through observations, experiments, and computer simulations. Science is not a collection of facts but an ongoing process, with continual revisions and refinements of concepts necessary in order to arrive at the best current views of the Universe. Science is unified; it is not possible to make use of scientific laws in one context, and then deny them in another. The same laws of science that govern --or empower-- our advanced technology also underlie changes in time of astronomical systems. Science is not based on faith, nor does it preclude faith. Whatever personal beliefs teachers, students, parents or administrators may hold, the teaching of important scientific concepts, such as the formation and aging of planets, stars, galaxies and the Universe, should not be altered or constrained in response to demands external to the scientific disciplines.

The astronomical discoveries of the past century, many made by American scientists, are among the great triumphs of the human intellect, and we deeply regret any attempt to ignore them or deny them.

Children whose education is denied the benefits of this expansion of our understanding of the world around us are being deprived of part of their intellectual heritage. They may also be at a competitive disadvantage in a world where scientific and technological literacy is becoming more and more important economically and culturally."

This Statement was distributed to the AAS Membership in *Newsletter* #100, June 2000. A [PDF version](#) is also available for printing and distribution.

---

**The Executive Committee of the American Astronomical Society endorsed the following statement On National Security and Open Conduct of Science in July 1999**

postdoctoral offers will not be required earlier than February 15th of a given year."

---

## On Creationism

Adopted January 10, 1982, Boulder, CO

"During the past year, religious fundamentalists have intensified their effort to force public school science classes to include instruction in "creationism." As defined in publications of the Institute for Creation Research and in laws passed or under consideration by several state legislatures, this doctrine includes the statement that the entire universe was created relatively recently, i.e less than 10,000 years ago. This statement contradicts results of astronomical research during the past two centuries indicating that some stars now visible to us were in existence millions or billions of years ago, as well as the results of radiometric dating indicating that the age of the earth is about 4 1/2 billion years.

The American Astronomical Society does not regard any scientific theory as capable of rigorous proof or immune to possible revision in the light of new evidence. Such evidence should be presented for critical review and confirmation in the appropriate scientific journals. In this case, no such evidence for recent creation of the earth and universe has survived critical scrutiny by scientific community. It would therefore be most inappropriate to demand that any science teacher present it as a credible hypothesis.

We agree with the findings of Judge William Overton that the Arkansas creationism law represents an unconstitutional intrusion of religion doctrine into the public schools, that "creation science" is not science, and that its advocates have followed the unscientific procedure of starting from a dogmatically held conclusion and looking only for evidence to support that conclusion.

The American Astronomical Society deplores the attempt to force creationism into public schools and urges Congress, all state legislatures, local school boards and textbook publishers to resist such attempts."

---

[AAS Home Page](#)

Copyright, American Astronomical Society

Contact: [webmaster@aaas.org](mailto:webmaster@aaas.org)

ORIGINAL: 2187



RECEIVED

MAY 16 2001

PA. STATE BOARD  
OF EDUCATION

Peter H. Garland  
Executive Director of the State Board of Education  
333 Market Street  
Harrisburg, PA 17126-0333  
May 14, 2001

Dear Mr. Garland,

I am writing to comment on the proposed amendments to Chapter 4, Academic Standards and Assessment, that would include additional standards in science and technology and environment and ecology.

In general, I am pleased that the Board is planning to institute these additions. As an educator at one of Pennsylvania's institutions of higher education, Thiel College, I am confronted daily with college age students who are not well prepared with knowledge about the natural world. These standards, when implemented properly, should go a long way in helping prepare the commonwealth's students with what they need to know to live in today's rapidly changing natural and technological world.

I have an objection to the wording of the standards for the Biological Sciences as written in Sections 3.3.10.D and 3.3.12.D. Section 3.3.10.D states that students need to "Analyze evidence of fossil records, similarities in body structures, embryological studies and DNA studies that support or do not support the theory of evolution," while Section 3.3.12.D states that students need to "Analyze the impact of new scientific facts on the theory of evolution." Both statements, when interpreted loosely, can be taken to mean that there is doubt regarding the veracity of the theory of evolution through natural selection, and that this doubt should be taught to the students of the commonwealth. There is, however, no doubt among the overwhelming majority of scientists as to the validity of the theory of evolution through natural selection. There is also serious doubt among the same overwhelming majority of scientists as to the validity of so-called competing theories that explain the origin of species through other mechanisms.

By allowing the teaching of such competing theories without indicating that most scientists have concluded that they are invalid, we run the risk of confusing the students of the commonwealth unnecessarily, even to the point where they risk being at a disadvantage with students from other states in science education. At the very least, the standards should be revised to indicate that the commonwealth's students should understand that the theory of evolution through natural

selection has been accepted by the vast majority of the scientific community. The students should also understand that serious objections have been raised to competing theories by the same scientific community, and that if such theories are taught in the public schools, the objections of the scientific community at large should be communicated to the students at that time. I believe that this is the best way to remove the possible confusion that would be the result of the standards as currently written, short of removing those phrases altogether.

My thanks for your attention to this matter.

Sincerely,

A handwritten signature in cursive script that reads "Michael T. Balas". The signature is fluid and includes a long, sweeping horizontal flourish at the end.

Dr. Michael T. Balas  
Associate Professor of Biology  
Thiel College

cc: Rod E. Wilt, State Representative  
Robert D. Robbins, State Senator

941 WEST WALNUT STREET  
LANCASTER PENNSYLVANIA 17603  
U.S.A.

Tel: (717) 397-7345

Fax: (717) 397-0579

E-mail: s\_wank@acad.fandm.edu

May 14, 2001

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

Dear Mr. Garland:

Pennsylvania's educational system enjoys a well deserved reputation for its science standards. Proposed changes in the Science and technology standards, if officially sanctioned would undo that reputation. The proposed changes represent nothing more than an attempt to allow the teaching of Creationism in the public schools. Creationists talk about introducing students a range of theories that call evolution into question, but the only alternative presented is Creationism which is a religious belief that the book of Genesis is literally true.

Every time the issue has come before a federal court , Creationism has been ruled a religious belief , having none of the characteristics of modern science. Therefore, *teaching Creationism in science classes would violate the Establishment Clause of the First Amendment's*. Requiring science teachers to present evidence against evolution would be like asking geography teachers to teach the flat earth theory as evidence against the view that the Earth is round,. If the proposed changes are adopted they would expose Pennsylvania to the same kind of ridicule that greeted Kansas's short lived attempt to mix religion and science.

Properly understood, the teaching of evolution is not a threat to religion. It may force religious people to abandon some beliefs, but as the philosopher Alfred North Whitehead,wrote, scientific progress has long spurred the amendment of religious doctrines--"to the great advantage of religion" --while religion's essence remained intact.. The proposed changes in the Science and Technology standards would lead to the corruption of both religion and science. They should be rejected.

Sincerely,

  
Solomon Wank

**RECEIVED**

MAY 15 2001

PA. STATE BOARD  
OF EDUCATION

ORIGINAL: 2187

**Garland, Peter**

**To:** kas354@psu.edu

**Subject:** RE: ASLA 01-16 Science Standards in PA

RECEIVED

2001 MAY 17 AM 9:48

INDEPENDENT REGULATORY REVIEW COMMISSION

Dear Karsten:



Thank you for your e-mail of May 14, 2001 on proposed 22 Pa. Code, Chapter 4, Appendix B (academic standards for Science and Technology).

Your e-mail is considered as official public comment and is being shared with all members of the Board. Pursuant to the provisions of the Regulatory Review Act, copies of your comments are also being provided to the Independent Regulatory Review Commission (IRRC) and the Chairmen of the House and Senate Education Committees.

Be assured that your comments will be considered carefully in the development of the final-form of these regulations.

The Regulatory Review Act provides that information on the final-form of regulations be mailed to public commentators at their request. If you would like to receive the final-form of these academic standards when they are submitted to the Education Committees and IRRC, please make your request in writing to the State Board of Education, First Floor, 333 Market Street, Harrisburg, PA 17126-0333.

Sincerely yours,

Peter H. Garland

Executive Director

cc: Members of the State Board

Senator Rhoades

Senator Schwartz

Representative Stairs

Representative Colafella

5/14/2001

IRRC

---Original Message-----

**From:** Karsten A. Sedmera [mailto:kas354@psu.edu]

**Sent:** Monday, May 14, 2001 11:03 AM

**To:** 00statbd@psupen.psu.edu

**Subject:** ASLA 01-16 Science Standards in PA

Honorable members of the State Board of Education,

I'm a student at Penn State University pursuing a Ph.D. in civil engineering hydrosystems and already have a minor in geology. I am also a member of the American Geophysical Union or AGU, which is a national organization for the advancement of physical science. AGU just sent me an alert informing me that there are new science standards being proposed with the following language changes:

*Old standard 3.3.10.D.1 "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support the theory of evolution."*

*New standard 3.3.10.D.1 "Analyze evidence of fossil records, similarities in body structures, embryological studies, and DNA studies that support or do not support the theory of evolution."*

I just want you to know that while the AGU does not support what they term "open(ing) the door for creationism proponents to teach alternatives to evolution," I personally am pleased that such language changes are occurring. You see, I have been exposed to a lot of "science" myself over the years, including historical geology (where evolution is taught as literal history), and I've found that there are a LOT of irreconcilable errors in the macro-evolution theory. I stress the prefix "macro" because most scientist do not properly distinguish the theory of micro-evolution (which is perfectly consistent with "creation science," as some call it) from macro-evolution (which is not consistent with "creation science," and which has been *scientifically* refuted many times over).

As a professional hydrologist, I find it disturbing that "scientific" organizations, such as AGU, can not maintain proper objectivity in their goals. They unfortunately use dogma, rather than true science, to fight "creationists" because they see "creationism" as a threat to "science." This perceived threat to the scientific community is absolutely ridiculous, of course. **Thus, I just want you to know that not all scientists are opposed these proposed language changes, so long as they are consistent with teaching true scientific facts and the dominant theories that help explain them.** It's high time that we stop the humanist movement from using pseudoscientific dogma to hinder the teaching of true science. Science, if it is to be objective and unbiased (which helps prevent error), has to be freed from all dogmatic leashes (including macro-evolution or humanist dogma).

I encourage you to share my comments with everyone in your committee who are addressing this issue.

Respectfully yours,

Karsten A. Sedmera  
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5/14/2001



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