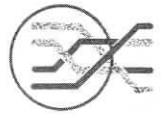


REPORTS

OF THE
NATIONAL CENTER FOR SCIENCE EDUCATION



Volume 18, Number 1

JAN/FEB, 1998



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NCSE REPORTS &
CREATION/EVOLUTION

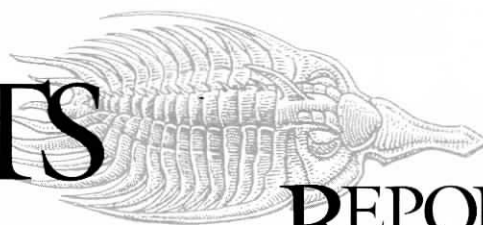
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Evolutionary
Thought

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Advice Still
Going the
Rounds

K-12 Science
Standards,
State By State

Who is
Fooling Pope
John Paul II?

CONTENTS



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COVER: THE BERLIN ARCHAEOPTERYX
(SEE RELATED STORY ON P 19).

3 From the Editor

NEWS

- 4 California Science Standards Raise Serious Questions
Molleen Matsumura
- 4 Answers in Genesis Tries Again for Museum
Eugenie C Scott
- 5 The Dating Scene
Andrew J Petto
- 5 The Legacy of Frank T Awbrey
- 6 NCSE Member Decides, "If You Can't Beat 'Em, Replace 'Em"
Molleen Matsumura
- 7 Sub-standard Standards in Arizona
Steve Rissing

UPDATES

- 9 NATIONAL AND LOCAL
- 10 NCSE Members Excel at Teaching
Eugenie C Scott
- 11 Thanks to Donors

ARTICLES

- 12 Changing the Public's Perception of Evolution—Christian
Origins of Evolutionary Thought
Karen Bartelt

FEATURES

- 19 Bird Evolution *John Cole*
- 20 When Creationists Visit Your School *Molleen Matsumura*
- 22 Outdated Advice Still Going the Rounds
Molleen Matsumura
- 23 Who is Fooling Pope John Paul II? *Andrew Petto*
- 24 Science Education Standards and Dr Seuss
Andrew J Petto
- 25 K-12 Science Standards, State By State *Lawrence S Lerner*
- 27 Scientific Expertise and the Media *Kevin Padian*

BOOK REVIEW

- 28 Huxley: From Devil's Disciple to Evolution's High Priest
review by John R Cole
- 29 *Darwin's Dreampond: Drama in Lake Victoria*
review by Danny Yee

30 INTERNET LOCATIONS VISITED IN THIS ISSUE

31 INSTRUCTIONS FOR CONTRIBUTORS

Welcome to volume 18 of *Reports of the National Center for Science Education*. In our first year's run with *RNCSE* we learned a lot, and so we continue to make changes to try to serve you better. Beginning with this number, here are the changes that we hope will benefit all our readers:

First, we are moving the printing and mailing operations back to the Bay Area. It seemed at first that the cost and time savings of having the whole operation in Madison would benefit both NCSE and our readers, but various production delays, printing errors, and mailing and labeling errors have added to our general tardiness in delivering *RNCSE* to you on time. Besides, recent cost increases have all but eliminated any significant financial benefit to NCSE. So, the printing and mailing goes back west with this issue.

Second, we have begun to exchange files between the editorial office and all those involved in the production process electronically. We are still playing with minor adjustments as we go from platform to platform and machine to machine, but so far, it seems that this move will greatly improve our ability to produce each issue in a shorter time—which is especially important as we try to get the production and mailing of issues to match the publication dates.

A third change that ought to be transparent to our readers is the move of the editorial office from Madison to Philadelphia. As I write this column, the details of the move are not final, but readers will notice the change of address and email in the masthead, on the back cover, and in an information sidebar in this issue. We are profoundly grateful to the Madison Area Technical College for its generous support of NCSE over the past 3 years. This support included *donated* office space, office furniture, telecommunications (phone, fax, email, voicemail), and photocopying services. Much of this support was due to the vision and dedication to good science education



embodied in the former Dean of the Division of Arts and Sciences (and current Vice President for Academic Affairs), Rose Ann Findlen. Rosie's leadership at MATC included active support of and collaboration with programs like ours.

Our new host is the University of the Arts in Philadelphia. The provost there is also very interested in NCSE's mission of improving scientific literacy, and especially in reaching out to those in non-science fields. We are still working out the arrangements with our new host, but we are looking forward to a mutually beneficial relationship.

During the time that the office is in transition, former NCSE editor John R Cole has agreed to take on *RNCSE* 18[3] as the guest editor. This will mean that weeks during which we are moving the office won't result in a further delay of our publication, and it means that the production of 18[2], 18[3], and 18[4] will overlap somewhat.

Finally, a number of you have commented on the apparent disagreement between the publication date on the issues you receive and the dates of events listed in the publication. It is true that an issue with a publication date of 1997 may include news that occurred in 1998. We debated how to handle this issue, and decided that it was better to give our readers the most current news, even if the dates on the publication and the dates in the article did not match. It seemed a better service to our readers to

provide up-to-date news, even if the publication of the issue was behind schedule.

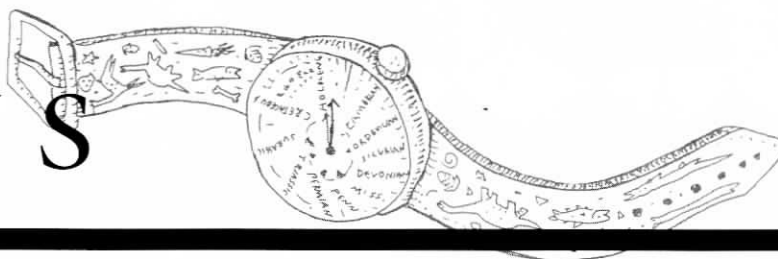
IN THIS ISSUE...

One of the biggest stories of 1997 was the development of model standards for education in science and other curricular areas. In this issue Larry Lerner tells us how well various states did in developing these standards. Steve Rissing provides some details about the Arizona standards and the struggle to keep evolution *in*. Andrew Petto writes about anti-evolutionist testimony at Wisconsin's Department of Public Instruction.

Our main feature is an article by Karen Bartelt of Eureka (IL) College. Karen reminds us that the evidence that we use to support evolution is *not* derived from "biased" studies or conspiracies by people who are already committed to the "evolutionary world view". Her article points out that the scientists who gave us the evidence that threw Genesis into doubt as a scientific record came from researchers who were themselves creationists!

Don't miss book reviews by John Cole and Danny Yee. Both have located very readable books that tell us important things about the study of evolution and its acceptance into the scientific mainstream. John Cole's review is of Adrian Desmond's latest book on Thomas Huxley who is well known for his role in promoting Darwin's theory. Danny Yee reviews Tijs Goldschmidt's *Darwin's Dreampond* and shows how the principles of natural selection and adaptation weave in and out of all the aspects of a biological community—including the humans in the vicinity of Lake Victoria.

Anj Petto



California Science Standards Raise Serious Questions

Molleen Matsumura
Network Project Director

In 1989 the state of California adopted the *California Science Framework (CSF)*, which has been a model to other states developing science curriculum standards. Anticipating the well-known *Benchmarks for Scientific Literacy* of the American Association for the Advancement of Science, and the more recent *National Science Education Standards (NSES)* published by the National Academy of Science in 1996, the *CSF* emphasized that the goal of science education should be deep understanding of major scientific concepts, rather than memorization of numerous facts. The inclusion of evolution as a major concept in the *CSF*—which represented a victory over strong political opposition—has also influenced education in other states. Because California is one of the largest markets for textbooks, the inclusion of evolution has made it possible for schools all over the country to use textbooks that cover the subject.

California is now in the process of writing Academic Standards to provide the basis of statewide assessments in all subject areas. For 1998 the Academic Standards Commission has assigned committees to concentrate specifically on developing standards in science and social studies. Each committee will develop a draft for review by the full commission, which will then submit a proposal to the State Board of Education. Each step of the process presents new opportunities for opposition to evolution.

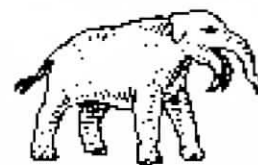
Even before the science committee released a first draft for public comment, they had been visited by Commissioner LaTanya Wright who "encouraged the committee not to dismiss the issue of creation. She contended...both [evolution and creation] should be included (or excluded) from the standards...[and]

that creation be included in the standards 'on a parallel track'." Committee members responded by discussing both legal issues and the nature of science, then passed a motion (with 8 "yes" votes and 2 abstentions) to exclude any aspect of creationism in the standards. The draft released for public comment in the last week of April included evolution at the middle and high school levels and in biology and geology. Many NCSE members wrote to the committee or attended public hearings to express their support for the inclusion of evolution in the standards.

NCSE anticipates struggles in the months ahead. The presence of a "creation science" supporter on the commission is just one cause for concern. Another is that, while the Science Committee has thus far included evolution, it has disregarded important features of the existing curriculum framework. In her April 27 letter to the Standards Commission, NCSE Executive Director Eugenie Scott commented, "It appears that little from either the *CSF* and other model state standards, or the national *Benchmarks* and the *NSES* has seeped into the Draft Content Standards." Bruce Alberts, President of the National Academy of Science, told the commission that the current standards fail to discuss "the methods of scientific inquiry and reasoning," and do not "meet or exceed" national standards. If the Science Committee can abandon the conceptual approach of the *California Science Framework*, the full commission and Board of Education could go further and yield to political pressure against evolution.

NCSE will continue to work with other science educators and concerned organizations to advise the Academic Standards Commission on the importance of evolution education.

[See a full report of the March 17 meeting of the Science Committee at <http://www.ca.gov/goldstandards/Meetings/Minutes/SciMinutes/Mar17.html>.]



Answers in Genesis Tries Again for Museum

Eugenie C. Scott
NCSE Executive Director

In 1996 Ken Ham's creationist ministry, "Answers in Genesis" (AIG) requested rezoning of property in northern Kentucky to permit the building of a creationist museum. AIG was unsuccessful in this endeavor; there was strong opposition from neighbors who did not want to see a creationist "Disneyland" in their quiet, rural environment. Critics joked about the "Fred and Wilma Flintstone Museum". Scientists from the University of Kentucky and the University of Cincinnati, supported by NCSE, protested the zoning change because they did not want to see a creationist museum only a few miles down the road from Big Bone Lick, a renowned Pleistocene mammal fossil site. There is only a modest museum at Big Bone Lick State Park, since resources have not been invested in the site for many years (see *NCSE Reports* 1996 Winter; 16[4]:8-9).

Now AIG has apparently found new land farther away from Big Bone Lick, but the property again requires a zoning change. According to the *Lexington Herald*, "Answers in Genesis wants to build one to three buildings, including a 30 000-square-foot museum based on the biblical view of creation. The museum would have exhibits on anthropology, archaeology, astronomy, biology, geology and paleontology—all from a creationist perspective—as well as one of the largest life-size dinosaur model collections in the country" (*Lexington Herald* 6/25/98). AIG hopes to relocate its headquarters to the site and include



a distribution center in addition to the museum. AIG currently is located in Florence, KY, adjacent to the Cincinnati airport, a major US distribution center. From the Cincinnati airport, it is possible to reach most major US population centers within three hours, so Cincinnati has become a major warehousing center.

This time, opposition to the construction focuses less on creation and evolution issues and more on water, sewage, roads, and growth. Neighbors again do not want their rural tranquillity disturbed by a 95 000-square-foot development and the necessary infrastructure, and expressed fears that, if AIG leaves, there will be no new occupants for such a specialized structure. The rezoning arguments will be heard in July.

[NCSE thanks member Dan Phelps for his help with this story.]



The Dating Scene

Andrew J Petto
NCSE Editor

One of the most common complaints by anti-evolutionists about evolutionary theories is that the events and processes on which they rely happened long before there were human observers or accurate instruments to record them. This objection *sounds* reasonable; after all, scientists are always saying that scientific knowledge is tentative and that we are willing to discard theories and ideas that are not supported or are contradicted by new discoveries. So, anti-evolutionists are fond of calling into question the validity of dates based on the predictable decay of radioactive elements, arguing in part that there can be no independent evaluation of the dates' accuracy.

Recent research with lava from the eruption of Mt Vesuvius which destroyed the Roman city of Pompeii has put that objection to rest. Paul Renne and colleagues from the University of California-Berkeley devised a study to test the accuracy of argon dating in relatively recent strata. Renne and colleagues dated the lava at about

1925 years old which would put the eruption at about 72 AD. Historians generally place the eruption at about 79 AD.

Associated Press science writer Paul Recer interviewed NCSE members Renne and G Brent Dalrymple:

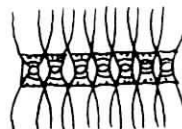
"We set out to date the very youngest thing we could in order to push the limits on this technique," said Renne. "This was kind of a ground truth test. We nailed the date to 5% on our first attempt, so we could probably get the error down to 1% or less," he said.

The new technique may make it possible to age-date samples as young as 1000 years, something that has not been possible before, said Renne.

"This is a very impressive accomplishment," said G Brent Dalrymple, Dean of Oceanography and an age-dating expert at Oregon State University in Corvallis. "They've pushed the dating technique back younger and to more accuracy than before." Dalrymple said the radioactive-argon dating system is already accepted by most scientists as one of the most nearly accurate now in use and the new work hasn't changed that view.

The basis of the potassium-argon dating method is that radioactive potassium-40 decays at a known, constant rate into argon-40. The result shows how long ago the sample was melted. According to the AP story, Renne and colleagues developed a new technique for dating the samples that converts the remaining potassium-40 in the sample into argon-39, which does not occur naturally. Then researchers can measure the ratio of naturally-occurring argon-40 to the converted argon-39. According to Renne, this process improves the dating technique because it eliminates potential errors caused by contamination of the sample.

[Readers will find the original article, Renne PR, Sharp WD, Deino AL, Orsi G, Civetta L. $^{40}\text{Ar}/^{39}\text{Ar}$ Dating into the Historical Realm: Calibration Against Pliny the Younger. *Science* 1997 Aug 29; 277: 1279-80. There is also a summary of the research in the same issue: A date with history. *Science* 1997 Aug 29; 277: 1177.]



The Legacy of Frank T Awbrey

Frank T Awbrey, Professor Emeritus, San Diego State University (SDSU), avid supporter of NCSE, and champion of the accurate representation of science, died of cancer on May 31, 1998. Until shortly before his death, Frank was actively pursuing research in bioacoustics, studying the sounds made by animals and the effects of human-caused sound on animal adaptation and survival.

Besides maintaining an active research program even after his retirement from SDSU in 1997, Frank devoted part of nearly every lecture he gave to explaining how science works. For Frank, the presentation of scientific facts and conclusions was a means toward the end of showing the workings of scientific methods and logic. In the syllabus for his introductory course he wrote, "Science is not just a body of facts; it is a process for understanding and explaining facts of nature. This science course, therefore, emphasizes critical thinking and understanding of basic concepts rather than accumulation of facts."

He was convinced that the primary purpose of science education is to protect against the harm done by pseudoscientific claims. We were fortunate to have someone who thought and taught as Frank did, when "scientific creationism" arose in the 1970s. Frank took an early and active interest in this movement and became one of a small circle of scholars who devoted considerable time and energy to investigating the science of creation "science". He helped found the journal *Creation/Evolution* and contributed many articles on topics as diverse as thermodynamics and "dust on the moon" as well as such biological topics as "kinds" vs species, and creationist biochemistry. His article, "Yes Virginia, there is a creation model" laid out the essence of young-earth creationism on page 1 of the very first issue of *Creation/Evolution* (see sidebar).

In 1995 he shared with William Thwaites the American Humanist Association's "Humanist Contributions to Science" Award for his efforts to combat creation "science".

Frank Awbrey was a formidable anticreationist debater—one of the few scientists successfully to confront the professional debaters from

Yes, Virginia, There Is a Creation Model by Frank Awbrey

Though creationists carefully avoid stating their model in debates, thereby keeping themselves off the defensive, they have one nonetheless. Here it is in bold outline as extracted from their books and publications.

I. The Creation

- A. Accomplished by a supernatural being.
- B. Everything created from nothing relatively recently.
- C. The Earth was perfectly designed for life:
 - 1. Protected by a vapor layer:
 - a. Uniform warm climate
 - b. Cosmic radiation could not penetrate
 - 2. No wind or rain.
 - 3. The land irrigated by water from under ground.
- D. All kinds created separately:
 - 1. Each kind is unique and fixed.
 - 2. Each kind is genetically highly variable.
- E. Humans were uniquely created.
- F. No decay occurred.

II. The Fall

- A. The Second Law of Thermodynamics invoked:
 - 1. Perfect order began to degenerate.
 - 2. Death, decay, and disorder began.
- B. People began to populate the Earth.
 - 1. All humans descended from the original couple.
- C. The vapor barrier enabled great longevity.

III. The Flood

- A. Simultaneous, worldwide cataclysm.
- B. All land was covered within 40 days.
- C. Flood water had two sources:
 - 1. The vapor barrier.
 - 2. Underground reservoirs.
- D. The Flood began 1656 years after creation.
- E. The Flood formed and deposited the geologic column.
- F. The Flood split the land mass into the present continents.
- G. The only survivors were aboard one boat:
 - 1. Eight humans.
 - 2. One pair of most kinds of animals.
 - 3. Aboard boat for 371 days.

IV. The Post Flood Period

- A. Left over flood energy caused the ice ages.
- B. Flood survivors repopulated the Earth.
- C. All living species are descendants of the survivors:
 - 1. They were modified by horizontal change to fill the Earth.
 - 2. The animals had original genetic variability.
- D. The vapor barrier was destroyed—longevity decreased.
- E. All species degenerate since disorder must increase.
- F. Present geological processes are different from those of the Flood.

[Reprinted from *Creation/ Evolution* 1980 Summer; 1(1) nr 1:1.]

the Institute for Creation Research. Thwaites and Awbrey pioneered the only debate strategy that has any hope of success: attacking creation "science" head on by analyzing and refuting the specific statements of creationists. Awbrey and Thwaites wrote in their 1993 *Creation/Evolution* article, "Our last debate: Our very last" that they began studying creation science hoping "there might be some small chance that a creationist would dig up a real biological paradox, one that would prove to be an interesting brain-teaser for the scientific community." Although they studied creationist literature for years, they never found one. But their efforts resulted in Frank's amassing an impressive series of over 1000 slides on creationism.

The collection contains hundreds of creationist claims along with their logical extensions and comparisons with original sources and data. Shortly before his death Frank donated this collection along with its associated database to the NCSE. Earlier, at the time of his retirement, he had donated his papers and creation/evolution library to NCSE's archives.

His long-time friend Bill Thwaites writes, "I know that I am only one among many who will sorely miss Frank's advice, seemingly infinite knowledge, counsel, and boundless good humor. I suspect that the more perceptive of creationists will also miss him."

Donations may be sent to NCSE in Frank's memory.

[NCSE Executive Director Eugenie C. Scott and long-time NCSE member William Thwaites contributed to this obituary.]



NCSE Member Decides, "If You Can't Beat 'Em, Replace 'Em"

Molleen Matsumura
Network Project Director

For over two years, concerned scientists in New Mexico have been working hard to improve science education in their state. Members of New Mexicans for Science and Reason (NMSR) took an active part in the development of

state science curriculum standards, commenting on early drafts by Department of Education staff, and making a point of testifying at Board of Education hearings. When the board decided in 1996 to eliminate references to evolution from the content standards, substituting language that opened the door to teaching "creation science", NMSR didn't give up (*NCSE Reports* 1996 Summer; 16 [2]: 18). Members testified in favor of a bill that would have required state standards to comply with the National Science Education Standards (which only passed one house before the legislature adjourned), pressed for a survey of citizens' opinions of the omission of evolution from the content standards (the board ignored the results), and found scientists and teachers to participate in the committee charged with writing student performance standards (*RNCSE* 1997 Jan/Feb; 17[1]: 4). Several members founded a new organization devoted to supporting science education, the Coalition for Excellence in Science Education (CESE).

CESE, whose President, Marshall Berman, is an NCSE member, obtained a non-profit status permitting some political activity. Berman went to work on building a coalition of scientists, educators, clergy, and concerned citizens who wished to improve science education generally, as well as addressing the evolution/creation controversy.

Early in 1998 several members of NMSR and CESE applied for appointment by the Board of Education to the state's textbook selection commission. According to an editorial in the May 4 *Albuquerque Journal*, "[T]he New Mexico Board of Education has selected 10 new members for its 20-member state textbook commission in a convoluted process that has cast doubt on what commissioners' priorities will be when they select the math and science textbooks to be used in state public schools over the next six years. And the process has once again put the spotlight on creationism vs evolution..."

The editorial goes on to explain that the board had extended its original application deadline, ostensibly to seek a more diverse group of applicants, but

[O]f the 10 eventually chosen, seven applied after the "diversity" deadline. All are from the Albuquerque area; 5 of the 7 are Anglos.... [P]aradoxically, they say they also wanted to achieve a "balance" of the two factions. To achieve this bal-

ance, they eliminated from consideration award-winning public high school teachers.... Of the 10 finally selected, only two are teachers, both of whom say they have reservations about evolution. Significantly, neither teaches in public schools.... In the final tally, the 10 new textbook commissioners include four creationists, three Darwinists and three who say their main concern is improving science instruction in general. Lost in all this positioning is the fact that Darwin's theory of evolution is the only theory widely accepted in scientific circles on the biological origins of species...."

Many others who had applied before the deadline were scientists belonging to NMSR or CESE.

The results of the appointment process came as no surprise to Berman, a scientist employed at Sandia National Laboratories. He had already decided that if he couldn't convince Board of Education members to improve science education, he'd try to do the job himself. Spurred by a Fordham Foundation study that gave an "F" rating to New Mexico's curriculum standards in several subjects, Berman ran in state primaries for the Republican nomination to represent his district on the Board of Education [See "K-12 science standards, state by state," p 25]. The incumbent, who had supported anti-evolution policies, lost the nomination to Berman, who will run unopposed in November, 1998.

Berman's supporters note that another anti-evolution incumbent was also displaced by a candidate who had publicly expressed her support for maintaining church-state separation in public education. They also report that the term of another appointed member is about to expire, and they plan to urge his replacement with someone more committed to good science education.

Berman wrote to NCSE, "We now have an excellent opportunity to undo some of the damage that's been done. Even more importantly, we have added members to the state board whose interests are in academic excellence and achievement, rather than support for a particular minority religious viewpoint. I'm not looking for quick fixes or silver bullets. Rather, we need to build an

innovative and hard-working coalition of people dedicated to making New Mexico's schools the best in the world."

Berman's advice is useful for all supporters of good science education, and his candidacy is a reminder that, as general elections approach, we as voters need to find out where candidates stand on evolution/creation issues.

[NCSE thanks Kim Johnson and Marshall Berman for material used in this article.]



Sub-standard Standards in Arizona

Steve Rissing
Department of Biology
Arizona State University, Tempe

In June 1997, the Arizona State Board of Education adopted science education standards which generally followed the *National Science Education Standards (NSES)* of the National Research Council. Late in 1997 my colleague Joseph Graves, a geneticist at Arizona State University (ASU)-West, and John Banister-Marx, a high school biology teacher, began calling attention to the absence of the word "evolution" and other deficiencies in the standards. They also called for help.

Comparing the *NSES* and Arizona standards is difficult. The *NSES* is massive and partitioned by grade level; Arizona's is brief and partitioned by process or content standard, and within those, grade levels differ from the *NSES*. Nonetheless, a careful comparison revealed that the Arizona standards are almost always taken verbatim from the *NSES*; both list these broad categories:

Table 1

<i>NSES</i>	<i>Arizona</i>
"Systems, order and organization"	"Systems, order, and organization"
"Evidence, models, and explanation"	"Evidence, models and explanation"
"Change, constancy and measurement"	"Change, constancy, and measurement"
"Form and function"	"Form and function"
"Evolution and Equilibrium"	nothing

When it came to evolution, the *NSES* standards were simply dropped or fudged:

Table 2

<i>NSES</i>	<i>Arizona</i>
"Species evolve over time"	nothing
"The great diversity of organisms is the result of more than 3.5 billion years of evolution..."	nothing
"...fossils...provide evidence about the plants and animals that lived long ago"	nothing
"Everything tends to become less organized...over time"	nothing
"Biological classifications are based on how organisms are related"	"Use and construct a variety of classification systems."
"The 'big bang' theory places the origin [of the universe] between 10 and 20 billion years ago..."	"Explain prominent scientific theories of the universe...."

I prepared a table comparing the two sets of standards line-by-line. When we presented our concerns and my table to state Superintendent of Public Instruction Lisa Graham Keegan, she seemed shocked and upset. One seat on the Arizona state board rotates among the presidents of the three state universities and is currently held by ASU President Lattie Coor. His response to my table was similar to Keegan's. The deletions and rewording of the state standards were so subtle that, unless one was familiar with the *NSES*, they seemed reasonable. I think Keegan and Coor understood that the process used by the board to generate the standards had been co-opted.

The state's two largest newspapers were notified that a group of concerned scientists and teachers would use the public comment session of the February board meeting to criticize omissions in the standards; we began posting list-serve messages asking for help (including through the NCSE). Favorable editorials appeared as well as letters and world-wide e-mail.

At the board meeting, Superintendent Keegan circulated my table to the board and announced her intention to correct the standards. Comments in favor of adding evolution came from ASU and University of Arizona faculty, physicians, geologists and others; comments opposed came from a professional creationist and others (including one who smashed a glass jar and argued that it couldn't reform itself in 10 billion years). One board member distributed copies of a creationist text to other members, arguing that it provided "compelling evidence for

creation and the Flood" (the book's subtitle).

The board appointed a committee to review the standards for omissions and suggest changes. Each board member appointed one committee member, so our committee reflected the board's split of 3 creationists and 6 evolutionists. I was Superintendent Keegan's appointee.

The committee consisted of faculty members from the University of Arizona and ASU, legal counsel from the Maricopa Community College District, a representative from industry, and a retired high school physics teacher (in the majority); and a physician, a local school board member, and Dr Walter Brown, the director of the Center for Scientific Creation. Meetings were educational (for me, at least). Vast amounts of "compelling evidence" were cited, along with invitations to debate that evidence. The minority protested that theirs was a scientific position, not religious ("it's a great flood, not *The Great Flood*").

When the time came to vote on changes to the life science standards (which would obviously pass), the majority offered a compromise in an attempt to provide a committee consensus, thus strengthening our recommendations to the board. In return for acceptance of evolution in the life science content standards, we would add to the "history and nature of science" standard the following wording: "Some scientific hypotheses and theories are unpopular, e.g. heliocentrism/geocentrism, evolution/creationism in its many forms." While some minority members were interested (and some majority members uncomfortable), the professional creationist would not hear of it. After that, we voted (always split) to add evolution to all standards; it was impossible to obtain consensus.

LESSONS LEARNED

Our committee's recommendations will be considered by the board on 24 August. The battle may be won, but the war is far from over. The board must accept our recommendations and then develop "performance objectives" for each. Nonetheless, I have learned a number of lessons from this experience that are useful for those trying to assure that evolution will be taught in their state or local schools.

1) When presented with clear evidence that a process (such as development of state science standards) was co-opted by a determined minority, policy-makers *may* do the right thing. ASU President Coor and

Arizona State School Superintendent Keegan were determined to correct the state standards once they understood how they differed from the *NSES* standards.

2) How information is presented to decision-makers is important. It needs to be clear and unambiguous, and a visual presentation is very helpful. I developed the line-by-line comparison of the *NSES* and state standards because I was confused by their differences; I needed to see them on an equal basis. My motivation was the same as when I try to understand something complex to explain to an introductory biology class; my experience as a teacher/scientist served me well. The visual presentation of similarities/differences made it clear to everyone else as well.

3) A professor at a major university is taken seriously by policy-makers and the press, especially if s/he can avoid seeming arrogant when making a point (again, skills learned through teaching).

4) Early in this process, when we were preparing op/ed pieces, drafting resolutions, contacting newspapers and organizing meetings, a colleague suggested I alert the ASU administration that we might draw attention to the evolution issue and, indirectly, the university. This hadn't occurred to me, but I called an associate dean I knew and said: "I know academic freedom means I don't have to ask for permission..., but I can still give you a friendly 'Heads up, possible incoming!' call." That advance notice generated support and helpful advice from administrators with experience in dealing with public officials.

5) The new National Academy of Sciences report on teaching evolution (*Teaching About Evolution and the Nature of Science*) draws attention to differences in the scientific and common meanings of the word "theory" as in "evolution is just a theory." It was helpful to ask creationists on our committee which meaning they wanted to use in our discussions, and to be sure that a scientifically-acceptable definition appeared in the standards.

UNDERSTANDING THE OPPOSITION

Never underestimate a creationist, especially a professional one. They're clever, motivated, and smart. I was challenged to many debates in this process. I pointed out that debating is a poor pedagogical tool, and I don't do it. I discovered I was grateful for the expertise of my committee colleagues from other scientific fields to counter salvos of cre-

ationist "evidence". Legal expertise—a skill not commonly found among scientists—was also valuable.

Science is a process to minimize bias in our interpretation of the natural world. We admonish students to consider alternative hypotheses and avoid "favorite hypotheses"; we design experiments with controls to avoid bias.

Creationists embrace bias, they have their starting position (Genesis), and then all subsequent interpretations of the natural world are made to fit. So, if the geological time scale doesn't match the biblical one, then obviously the speed of light has decreased (10 billion fold) since creation.

In a move that would please PT Barnum, creationists ignore (defend?) their bias by attributing greater bias, even outright fraud, to the other side. At several points in board and committee hearings, the scientific community was accused of "suppressing" creationists' "compelling evidence". With the paranoia of the best "conspiracy theorists", their writings envision a vast fraud perpetrated upon society by scientists, teachers, and academic journals.

For example, consider the following from the text distributed by a creationist board member at the February meeting:

"Teachers, textbooks, and the media frequently convey the attitude that evolution is the only scientifically and intellectually respectable view of origins. Students are implicitly presented...with a false dichotomy—religion vs science. Evolution is thus protected from competent criticism, and students are kept ignorant of its many shortcomings. Valid scientific explanations are ignored. Students who were taught this way are now teachers, professors, publishers, and textbook writers. Their position, prestige, and income are threatened by the creation movement, so they choose to ignore the scientific evidence..." (Brown WT. 1980. *In the Beginning: Compelling Evidence for Creation and the Flood*, Center for Creation Science, p 167).

"(R)efereed science journals...are controlled by evolutionists....(They will not) publish any research questioning evolution and supporting creation. The publishers of these journals would be severely

criticized by many of their clientele and advertisers if they did" (p 176).

Such charges are nothing new to those who deal regularly with creationists, but it took me some time to understand the magnitude of the fraud they propose.

My experience on the committee to revise the Arizona standards was time-consuming and sometimes frustrating, but very worthwhile. If the board agrees to accept our recommendations, Arizona teachers will have a strong wall to stand behind when they are challenged over teaching evolution. We anticipate that anti-evolutionists will protest the changes at the board meeting August 24, but we also plan to have supporters present.



UPDATES

Arizona: The Grand Rapids (MI) *Lakeshore Press* reports that Jay Van Andel, a Michigan philanthropist who is co-founder of Amway, has donated over \$500,000 to the Van Andel Creation Research Center (CRC) in Arizona's Chino Valley. The CRC is a "young earth" organization which argues that the Grand Canyon was cut by Noah's Flood.

Idaho: During the spring, 1998 primary, four Republican candidates for Superintendent of Public Instruction in Idaho were queried on their opinions as to whether creationism should be offered in the public school classroom. Incumbent Anne Fox and candidates Ron Black and Ryan Kerby favored "equal time for the biblical account of how the world was created and the theory of evolution in public schools" (*Idaho Statesman* 5/19/98, p 1A). Candidate Tom Morley opposed it, commenting, "There are many different religions that address origins. I have a problem with that coming in as an issue in the classroom." Democratic candidates were not asked their opinion on this subject. Incumbent Fox won the Republican primary

and will seek election against the Democratic candidate in November.

Idaho, Boise: Biology teacher Mark Lung, citing a survey finding that 39% of Idahoans support teaching both evolution and creationism, decided to offer sophomores at Boise High School a "fact-gathering, research-based unit to foster objectivity, tolerance, and reason". Students were formed into four research groups; the four student papers Lung judged best were published in the local newspaper.

The "best" essay on "Evidence of Creationism" concluded, "And after weeks of research independently and from studies in school, it appears that neither side has overwhelming evidence. At this point, we find ourselves indifferent. In this research experience, it seems that egos are more important than the truth." An essay on "Creation Stories" concluded, "We may never find out the whole truth of how we got here but these stories show that maybe it is best that we don't know the truth so that these wonderful accounts will live and not be lost." (*The Idaho Statesman* May 25, 1998, p 4B). NCSE members in the area are taking an active part in the debate sparked by Lung's action and keeping NCSE informed.

Idaho, Post Falls: Some residents of this district near Coeur d'Alene have presented the school board with a resolution calling for teaching both evolution and "creation science" on an equal basis. Community members and teachers have expressed strong opinions on both sides of the issue. On May 11, the superintendent reported to the board of education that his survey of other districts in the state found none teaching "creation science", and that he was still waiting for comments from the state's schools attorney on a resolution on teaching creation science. The board voted to wait for more information before taking action.

New York, Monroe County: During the spring of 1998 a community group, the Monroe Coalition for Democracy, conducted a poll of attitudes of school board members in this suburban area outside Rochester, asking their opinions on church-state separation issues including the teaching of creationism. Of those school board members in various districts for whom data are available, almost one in three (10 out of 36, 29%) support teaching creationism in biology class. Most of the important decisions affecting curricula—whether evolution is taught, whether "alternatives" are introduced—are made at the school

board level. NCSE residents in upstate New York should monitor decisions made in these and other local school districts and keep NCSE informed.

Washington, Burlington: Burlington-Edison High School teacher Roger DeHart continues to skip a textbook chapter on evolution, and substitute readings from the "intelligent design" textbook *Of Pandas and People*, despite letters from NCSE and the American Civil Liberties Union (ACLU) explaining the scientific and constitutional objections to using the book. District Superintendent Paul Chaplik dismissed these concerns, based on discussions with DeHart and students, though he had not read any of the materials himself. Chaplik's successor has not yet commented on the issue. Hoping to avoid legal action, the ACLU has notified the board of education of the problem.

[NCSE thanks Mike Banach, Robert W. Collins, Barbara Forrest, Jack Friedman, Garvin Chastain, Martha Laites and Howard Pellett for news clips used in this report.]

International Dinosaur Month

The second annual International Dinosaur Month—IDM98—is October 1-31, 1998. Learn more about IDM98 by connecting to <<http://www.dinosaur.org/IDM98.htm>>. You can get on their email list by sending a message to <IDM98@Juno.com>.

What are YOU going to do for IDM98?

[Announcement from the Dinosaur Interplanetary Gazette, Newsletter #5 - June 1, 1998].



NCSE Members Excel At Teaching

Eugenie C. Scott
NCSE Executive Director

Three NCSE members have recently been recognized for their excellence in teaching. Gordon Uno will be familiar to many NCSE members as the former editor of NCSE's textbook review newsletter, *Bookwatch Reviews*. A professor of botany at the University of Oklahoma, Uno has also served as past-president of the National Association of Biology Teachers. In early 1998, he was presented with a named professorship, the David Ross Boyd Professorship, in recognition of his teaching excellence. He also received the annual award of the Oklahoma Foundation for Excellence, in recognition of his university-level teaching. In summer, 1998, Gordon will leave for Washington, DC, where he will become Program Director of the National Science Foundation's Division of Undergraduate Education.

Member Jerry Waldvogel, biology professor at Clemson University, has also been recognized for his teaching ability. The student body voted to award him the 1997 Alumni Master Teacher Award, given to one professor each year. He also received the 1997 Student Government Excellence-in-Teaching Award (this one comes with a trip to France—courtesy of Michelin!) Finally, in 1998, Jerry received the Trustees Award for Faculty Excellence.

NCSE member, former NCSE Board member, and former leader of the Massachusetts Committee of Correspondence Laurie R Godfrey was awarded the Distinguished Teacher Award at the University of Massachusetts-Amherst. Candidates are nominated by their departments, and the selection is made on the basis of responses from colleagues, students, and former students. Laurie has been nominated for this very competitive campus-wide award previously.

We congratulate these members on their accomplishments, and encourage readers to tell us when fellow-members receive such awards. Many of our members are too modest to notify us themselves.

In Celebration/In Memory

Donations to NCSE are a way to honor the memory of loved ones and to celebrate significant events in our lives. In the past year members and friends have made the following donations to NCSE in the names of...

Jack and Betty Friedman, in celebration of their 51st wedding anniversary:

Ralph and Rosalie Whitehill
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Kevin and Nancy Padian, in celebration of their 25th wedding anniversary, by Jack and Betty Friedman

Frank Awbrey, in memoriam:
Eugenie C Scott
William B. Lindley

CREATION AND EVOLUTION IN THE GRAND CANYON!

Come with NCSE on a very special "Creation/Evolution Tour of the Grand Canyon", August 7-14, 1999. Led by (genuine, competent) geologist Dr. Wilfred Elders, presenting the evidence for evolution, and (fake, incompetent) "geologist" Dr. Eugenie C. Scott, presenting the evidence for Flood Geology, NCSE members won't want to miss this trip! Member price \$1825, nonmember price \$1875. A \$400 deposit sent by October 15 will hold your place. Call us! 1-800-290-6006

Check out the "Research" section of the ICR webpage; it has an article by L. Vardiman on seafloor sediments. The URL is <<http://www.icr.org/research.htm>>.

[Contributed by Bob Schadewald.]



CAUTION:
WHEN ON
GEOLOGIC
TIME THE
EARTH BEGINS
TO SHIFT
BENEATH YOU.

NCSE THANKS YOU FOR YOUR GENEROUS 1997 SUPPORT

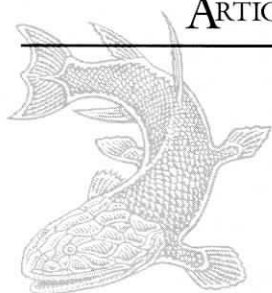
The NCSE Board of Directors and staff would like to acknowledge and extend a warm thank-you to all the individuals, organizations, and firms that donated to NCSE during 1997. We also extend a special thanks for their much-appreciated support to the following people who donated \$100 or more (* indicates an NCSE board member or supporter). Those in the Patron's Circle (indicated by a +) donated \$1000 or more—a level of support we consider heroic and which allows us a firm foundation for our efforts. Thank you to all donors!

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Changing the Public's Perception of Evolution—Christian Origins of Evolutionary Thought

Karen Bartelt

DEFINING THE PROBLEM

Evolution, declares a self-proclaimed "creation-science-evangelist" is "just a pagan religion that has been mixed in with science for nearly a century" (Hovind 1993). A college student responds to a biology lecture on evolution by editorializing in the college newspaper, that "to say that humans evolved from primates is not in accordance with Genesis and is unfriendly to Christian teachings" (Elmendorf 1995). At the same college, another student abruptly leaves a lecture when the human fossil record is discussed.

The evangelist, the students, and often the general public, harbor two misconceptions concerning evolution. First, they believe that the theory of evolution was a recent event precipitated by the 1859 publication of *The Origin of Species*. Second, they see the theory of evolution as solely the work of atheists, and consistent only with a naturalistic philosophy. Young earth creationists exacerbate the situation with their own misinformation; in *Men of Science, Men of God*, Henry Morris states that in the eighteenth century "geology was beginning to lead people back to the long-age concepts of ancient pagan philosophies" and evolution, "though long out of fashion among scientists, had been advocated by various liberal theologians...and it was beginning to creep back into the scientific literature" (Morris 1982: 51).

While I agree that such rhetoric flourishes in the atmosphere of scientific illiteracy, there is an ignorance of history here as well. The general public knows very little about the theory of evolution beyond the knee-jerk reaction that it makes them uncomfortable. Most are unaware that the theory of evolution has had a long history, and many

Christian—often creationist—scientists contributed significantly to the development of the theory of evolution. They are unaware that the entire worldview of unchanging, specially-created species, a creation event lasting six 24-hour days, and a 6000-year old earth had already been abandoned by even religious scientists in the years prior to 1859—the publication date of Darwin's *Origin of Species*.

A POSSIBLE SOLUTION

I propose that we can improve the public's perception of evolution by presenting a more complete picture of its development, emphasizing the contributions of Christian—often creationist—scientists from the pre-Darwinian era. I recently presented this information to a general college audience. To assure that the young-earth creationists who attended would agree that I picked "Bible believing scientists", I concentrated on those scientists whom creationist Henry Morris describes as having been a "professing Christian (any denomination) who...believed that the universe, life, and man were directly and specially created by the transcendent God of the Bible" (Morris 1982: 14). To make events and names easier to follow, each person in attendance received a timeline complete with significant dates (Figure 1).

INTRODUCTION

Many of the scientists of the 15-1800s adhered to a belief in special creation because there was little evidence to support evolution (Diamond 1985: 83). Additionally, because there was no method of determining the age of the earth except from literary sources, and because the Holy Scriptures were thought to be among the most ancient literary sources, biblical chronologies were used as a method of estimating the age of the earth (Haber cited in Glass 1959: 4). The Bishop Ussher date—creation in 4004 BC—was only one of many estimates of the earth's age using biblical chronologies

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(Dalrymple 1991: 14).

DIFFICULTIES WITH THE GENESIS ACCOUNT

Many hundreds of years before the publication of Darwin's *Origin*, data that challenged the scientific authority of Genesis began to accumulate in at least four areas that impacted upon the theory of evolution. First, the processes that shape the earth were studied, and scriptural accounts were called into question. Second, exploration of new continents led to the discovery of new animals and plants, many more than were described in ancient texts. Third, it became possible to estimate the age of the earth. Fourth, the geologic column was explored and the fossils were systematically analyzed. New questions arose: Was the earth shaped by catastrophes? Was the Flood of Noah the catastrophe? What were fossils? Was there a relationship between fossils and sedimentary strata? How did modern species originate?

CONTRIBUTIONS FROM SCIENTISTS PRIOR TO THE 18TH CENTURY—A WORLDWIDE FLOOD?

Even today many Christians believe that God once flooded the entire world and that fossils are evidence of life destroyed by this Noachian Flood. Prior to the year 1700, at least four devout Christian men were not convinced by this literal interpretation of Genesis and proposed alternate scientific explanations.

Leonardo da Vinci (1452-1519) observed that the fossil shells in the Alps were frequently found in pairs and rows and stated, "if the shells had been carried by the muddy deluge they would have been mixed up, and not in the regular steps and layers, as we see them now in our time" (quoted in Gohau 1990: 34). Leonardo noted that the Alpine strata showed no evidence of a single violent episode of deposition (Newell 1985: 36-7), and in 1508 rejected the idea of a universal flood (Dean 1985: 95). Though Morris features Leonardo as one of his "men of science, men of God" and discusses his contributions to art, engineering, architecture, anatomy,

physics, optics, biology, and aeronautics, Morris makes no reference to Leonardo's theories concerning fossils or his rejection of the Genesis flood!

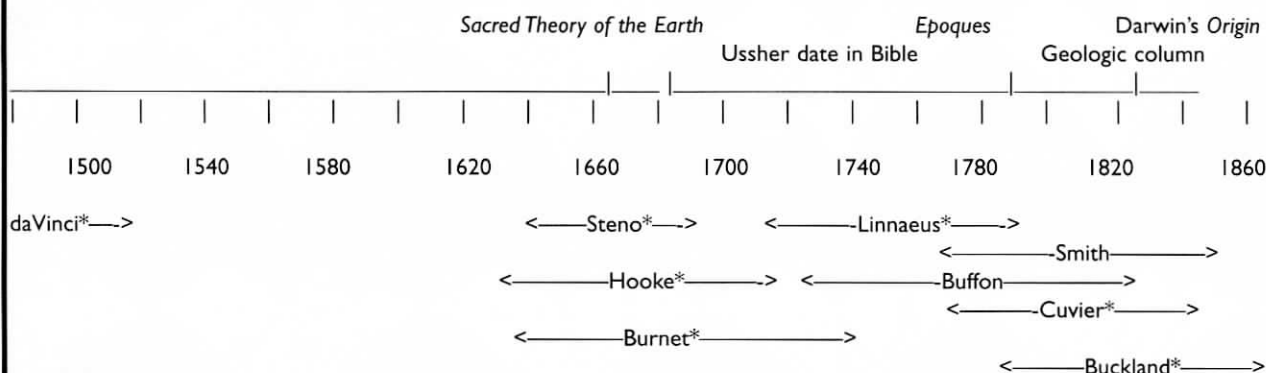
Nicolaus Steno (1638-86) described many fundamental geological principles including the process of sedimentation and the law of superposition. Morris asserts that Steno "interpreted the strata—unlike modern evolutionary stratigraphers—in the manner of flood geologists, attributing formation in large measure to the Great Flood" (Morris 1982: 41). In fact, Steno stated that the strata of earth were laid down as sediment from seas or rivers (Geikie 1905: 55). He ruled out the "Great Flood" as a means of depositing fossils although he felt that the Flood was a factor in the folding and disruption of strata (Haber cited in Glass 1959: 22).

Robert Hooke (1635-1703), another of Morris's religious scientists, did not doubt that the Flood of Noah was a real event, but did not believe that it was responsible for the deposition of strata. He thought that the sea would have had to have been in place much longer than the one year implied in Genesis to deposit the thick sedimentary strata seen in England (Geikie 1905: 69). Hooke did not consider the Noachian Flood responsible for the placement of fossils either and suggested earthquakes as a possible factor (Haber cited in Glass 1959: 25). A statement from his "Discourse on Earthquakes" portends the concepts of extinction and evolution: "there have been many other species of Creatures in former Ages, of which we can find none at present; and 'tis not unlikely also but that there may be divers new kinds now, which have not been from the beginning" (cited in Faul and Faul 1983: 42).

One of the earliest theories of the formation of the earth came from Thomas Burnet (1636-1715)

Many hundreds of years before the publication of Darwin's *Origin*, data that challenged the scientific authority of Genesis began to accumulate...

TIMELINE: SCIENTIFIC CREATIONISTS IN THE PRE-DARWINIAN ERA



*Featured in Henry Morris' *Men of Science, Men of God*

who Morris says, "took the scriptural account of creation and the Flood as providing the basic framework of interpretation for earth history, showing it to be confirmed by known facts of physics and geology" (Morris 1982: 47). In *Sacred Theory of the Earth* (1681), Burnet depicted the Noachian Flood as the defining event in planetary history (Geikie 1905: 66). However, he realized that the volume of water needed for a universal flood was much greater than that present in the oceans, and his solution was to place much of the water in the atmosphere or under the crust and to dispose of it in underwater caverns (Newell 1985: 37). In Burnet's account, a smooth, sealess, mountainless, paradise world was destroyed as it collapsed into the waters below. The deluge ruined the world, and the earth's axis tilted due to the uneven distribution of debris (Faul and Faul 1983: 49). Burnet is important to this historical perspective because he was one of the first scientists whose explanation of the earth's origin and geophysical features abandoned a literal reading of Genesis — a sealess perfect sphere, for example, does not square well with the Genesis creation accounts. His theory was certainly not literal enough for one Bishop Croft, who called Burnet "besotted with his own vain and heathenish Opinions" (cited in Faul and Faul 1983: 50).

At the end of the 17th century the Flood of Noah was considered by many scientists to have been a real event, but was not universally accepted as the defining geological event, and certainly not responsible for depositing fossils. Even the religious scientists of the era proposed theories of the origin of the earth that did not adhere to a literal reading of Genesis.

An investigation of Linnaeus' prolific writings shows that his creation account did not come directly out of Genesis, and his views on the fixity of species changed with time.

THE 18TH CENTURY—A CROWDED ARK AND AN ANCIENT EARTH

The explorations of the American, African, and Australian continents posed severe problems for those who believed that modern species were descendants of those animals rescued from the Flood by Noah. When the kinds of animals were restricted to those found in Europe and the Near East, it was not inconsistent to propose that all of them had fit into the Ark. When the Ark became crowded with koalas, llamas, and bison, scientists of this era were forced further to amend the Genesis account of the origin of species.

One of these scientists was Carl Linnaeus (1707-1778), the son of a Lutheran minister and one of the founders of modern taxonomy. He is described in creationist literature as "a man of great piety" who "attempted...to equate his 'species' category with the 'kind', believing that variation could occur within the kind, but not from one kind to another kind. Thus he believed in 'fixity of species'..." (Morris 1982: 49). Other biographers disagree. An investigation of Linnaeus' prolific writings shows that his

creation account did not come directly out of Genesis, and his views on the fixity of species changed with time.

Linnaeus proposed that the Garden of Eden was an island near the Equator in the middle of an ocean and that the earth was covered by "the vast ocean with the exception of a single island...on which...all animals could have their being and all plants most excellently thrive" (cited in Hagberg 1953: 198). In time the seas receded and this small Eden became a large mountain with all types of climates. The plants and animals slowly made their way to an appropriate environment first at the time of creation, and again after the Noachian Flood.

Linnaeus believed that fossils were not products of a supernatural flood, but formed naturally in the open ocean. He proposed a unique process to form the sedimentary limestone and shale layers: large mats of sargasso in the ocean prevented wave formation and thus allowed limestone to precipitate. Later on, the sargasso decomposed and was converted to shale, in which fossils were trapped. This was but one of the gradual mechanical processes that Linnaeus thought were responsible for shaping the earth: a "*temporis filia*, child of time" (quoted in Frangsmeyer 1983: 143).

Early in his career Linnaeus insisted that each species was a separate creation, stating "We count as many species as there were different forms created" (quoted in Frangsmeyer 1983: 86). Doubts began to arise in 1744 as Linnaeus described a type of toadflax which he called *Peloria* (malformation). It had been produced from *Linaria*, but was so extremely different from the parent plant that he assigned it not to just a new species or genus, but to a new class (Frangsmeyer 1983, p 94-5). He was forced to consider the concept of evolution, and by 1751, produced a list of plants, *Plantae Hybridae*, which were assumed to have two different species as parents, stating, "It is impossible to doubt, that there are new species produced by hybrid generation" (cited in Glass 1959: 149). In *Fundamenta Fructificationis* (1762) Linnaeus proposed that at creation there were only a small number of species, but that they had the ability to fertilize each other—and did (Frangsmeyer 1983: 97). By 1766 the words "no new species" were removed from the 12th edition of *Systemae Naturae*. In a comment published posthumously Linnaeus asserted that "Species are the work of time" (cited in Glass 1959: 150). After his death, Linnaeus was accused of atheism by the German theologian Zimmerman, to which his son replied "He believed, no doubt, that species *animalium et plantarum* and that genera were the works of time; but that the *ordines naturales* were the works of the Creator; if the latter had not existed the former could not have arisen" (cited in Hagberg 1953: 200).

Georges-Louis Leclerc, Comte de Buffon (1707-1788), made significant contributions to biology and geology, but perhaps his greatest contributions were a mechanism to determine the age of the earth, and an estimate for the age of the earth that differed significantly from the 6000 years or so calculated from biblical chronologies.

In *Epoques de la Nature* (1778) Buffon pro-

posed that the earth had cooled from a molten state, and suggested that earth's age might be deduced by determining the time it took to cool to its present temperature. By constructing a series of iron spheres, heating them to a near molten state, then measuring the cooling times and extrapolating these data to a body the size of earth, he deduced that the earth was in excess of 75 000 years old, with an unpublished manuscript proposing a 3 000 000 year age for the earth (Gohau 1990: 94). Buffon's method of escaping the literalism of Genesis 1:11 was to interpret creation "days" as indefinite periods: "The sense of the narrative seems to require that the duration of each 'day' must have been long, so that we may enlarge it to as great an extent as the truths of physics demand" (cited in Geikie 1905: 91).

Lest one suppose that Buffon was increasing the age of the earth to promote evolutionary theories, one has only to look at his contributions in the area of biology to show that this is false. Though by 1753 he considered the possibility of evolution and even saw some supporting evidence, he concluded that "...production of a species by degeneration from another species is an impossibility for nature..." (Lovejoy 1959: 99). Buffon offered three lines of argument against evolution (some of which are still used by young-earth creationists): 1) no new species were known to have occurred within recorded history; 2) hybrid infertility was a barrier to speciation; 3) no "missing links" between groups had been discovered. However, by the 1778 publication of *Epoques*, Buffon no longer mentioned the simultaneous creation of all species, adopting the notion of gradual appearance instead. (Lovejoy 1959: 98-103). Ernst Mayr wrote: "Even though Buffon himself rejected evolutionary explanations, he brought them to the attention of the scientific world" (Mayr 1982: 335).

Buffon's early belief in special creation did not prevent him from getting into trouble with the theology faculty at Sorbonne. In 1751, after studying *Histoire Naturelle* for two years, the faculty noted the discrepancies between his text and Genesis, and demanded that he retract. Though there is good reason to doubt his sincerity, Buffon replied that he "had no intention to contradict the text of the Scriptures" (cited in Gohau 1990: 93). Twenty-five years later, Buffon found himself in front of the same faculty for his treatment of the age of the earth in *Epoques*, but he was older, richer, more politically connected, and never did get around to recanting (Faul and Faul 1983: 77).

Before the birth of Charles Darwin, the concepts of a 6000-year-old earth and the special creation of species were being questioned and rejected by scientists who creationists themselves describe as devout Christians.

THE 19TH CENTURY—FOSSILS AND THE GEOLOGIC COLUMN

The industrial revolution and the steam engine contributed much to the elucidation of the earth's structure early in the 19th century simply by exposing more of it during mining and the building of canals and roads (Newell 1985: 92). Some contem-

porary creationists claim that the geologic column was constructed after the publication of *Origin* to bolster the theory of evolution. In fact, the geologic column was deciphered early in the 19th century, by contributors who were either ignorant of the concept of evolution or opposed to it.

William Smith (1769-1839) was a land surveyor and civil engineer who participated in building projects all over England. He constructed a geological map of England in 1799, observing that England was constructed of strata which were never inverted, and that even at great distances "each stratum contained organized fossils peculiar to itself, and might, in cases otherwise doubtful, be recognized and discriminated from others like it, but in a different part of the series, by examination of them" (cited in Geikie 1897: 233). His results, published in 1816 in *Strata Identified by Organized Fossils*, demonstrated that fossils were not randomly buried, as in a flood, but always occurred in a definite order in the geologic column. Marine species were often found between strata containing terrestrial species—a real blow to flood geology. Smith never formulated a theory of fossil deposition and was, in fact, a literal creationist. "Neither Smith nor [Rev Joseph] Townsend [a publisher of Smith's results] grasped the idea that time was involved in laying down the successive strata, and thought they had contributed support to Mosaic cosmogony" (Haber cited in Glass 1959: 248).

Georges Cuvier (1769-1832), was a French Lutheran anti-evolutionist and founder of comparative anatomy. He is described by Morris as the "chief advocate of multiple catastrophism, believing the Flood to be the last in a series of *global* catastrophes in earth history" (Morris 1982: 57; *italics added*). Cuvier was aware of the sequential nature of the fossil record from his own research on the geologic column of the Paris Basin. His paper comparing present day elephants to fossil elephants from Siberia provided evidence that fossils were the remains of extinct animals. Nevertheless, Cuvier was convinced that "species were fixed, immutable and independent" on the basis of scientific observations, not scripture. He examined a number of mummified creatures filched from the graves of Egyptian pharaohs, and found these 3000 year-old specimens to be taxonomically identical to living species (Faul and Faul 1983: 139). To reconcile the obvious changes seen in the fossil record with his belief in fixity of species, Cuvier proposed that the sequential nature of the fossil record was the result of five localized catastrophes. These "revolutions", to use his (time appropriate) word, were caused by the influx of ocean water or transient floods. He further believed that animals were replaced in a flooded area by migration from other areas (Gohau 1990: 131-3). Cuvier never suggested that the floods were global, and it was

[T]he geologic column was deciphered early in the 19th century, by contributors who were either ignorant of the concept of evolution or opposed to it.

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by Tom McIver.

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resource for anyone who wants to learn more about the modern "creation science" movement. Euan G. Nisbet wrote in *Nature*, "...a splendid bestiary of anti-evolution ideas..." 385 pages, paperback. *List price \$15.95, member price \$12.75.*

by Michael Shermer.

Editor of *The Skeptic*, Shermer has a long record of experience and scholarship in confronting paranormal ideas. Here he takes on alien abductions, near-death experiences, the pseudohistory of holocaust denial, Frank Tipler, Duane Gish and creationism, and other "weird things". "Weird things are like pornography—difficult to define but obvious when you see them!" Shermer discusses the differences between science and pseudoscience and errors of reasoning that lead us into uncritical thinking, and gives an answer to the title's question. Eminently readable and an excellent price for a quality hardback. 306 pages, hardback. *List price \$22.95, member price \$18.00.*

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by James Moore.

Did Darwin make a “deathbed confession” to Lady Hope, recanting his theory of evolution by natural selection? Nope! Historian of science Moore (co-author with Adrian Desmond of the Darwin biography *Darwin, the Life of a Tormented Evolutionist*) puts to rest the oft-repeated saga. (For a full review of this book by NCSE president Kevin Padian, see *RNCSE* 17[3] or visit the NCSE website at www.natcensci.org/padrev.htm). *List price \$11.95, member price \$9.50.*

edited by David B Wilson with the assistance of Warren D Dolphin.

Praised by the *Quarterly Review of Biology* and *Journal for the History of the Behavioral Sciences*, this practical, comprehensive collection of essays covers the historical background, legal, religious, and scientific issues in the evolution-creation controversy. The authors "are not merely rejecting creationism but, at a deeper level, employing it as a handy foil to help explain aspects of modern science and scholarship to a nonspecialist audience. We...[also hope] that those who make...public policy decisions involving the creation-evolution controversy will be as well-informed as possible on relevant matters." 240 pages, paperback. *List price \$19.95, member price \$17.95.*



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Jameson's translation into English which suggested that the final catastrophe was the Flood of Noah (Strahler 1987: 190). Out of Cuvier's doctrine of abrupt extinctions and successive "revolutions" his students, especially D'Orbigny, inferred the necessity of up to 27 special creations (Lovejoy cited in Glass 1959: 386).

Cuvier objected to evolution for two reasons. He believed that species were designed for a particular environment, a specific place, until a "revolution" occurred. He also pointed out the lack of transitional forms: "If species have changed by degrees, we should find some traces of these gradual modifications; ... This has not yet happened" (cited in Mayr 1982: 368), and "Fossil man does not exist" (cited in Milner 1990: 105). Both of these statements were accurate during Cuvier's lifetime. The theories proposed by Cuvier and his students were hardly in line with a literal view of Genesis, but instead lent scientific support to both "gap-theory" and "day-age" creationism.

William Buckland (1784-1856) was an Anglican priest and author of the 6th Bridgewater Treatise. He is described by Henry Morris as a "strong creationist" who "did accept the geologic significance of the worldwide Flood" (Morris 1982: 64). Buckland mounted attacks on earlier evolutionary theorists and was a diluvialist early in his career; his first lecture at Oxford was a defense of the Noachian Flood. His book *Relics of the Flood* described evidence supporting a universal deluge: fossil bones found in the Andes and Himalayas, river gorges, huge boulders obviously not transported by rivers, and large gravel deposits. Eventually, his own research on the alluvial deposits in caves forced him to reconsider his position on the timing of the Flood. He was disturbed not to have found human remains in caves and so moved the date of the Deluge to before the creation of humans (Hallam 1983: 41-3). By 1840, Buckland accepted Louis Agassiz' theory of continental glaciation as an explanation of the gravel deposits and "erratic" boulders previously attributed to the Noachian Flood. His proposed 1840 revision of his earlier work was to have had the title *Relics of Floods and Glaciers*, and all references to the biblical Flood were to have been omitted (Dean 1985: 90). Buckland became one of the early "gap theory" creationists after he gave up flood geology.

CONCLUSION

Long before Darwin dreamed of publishing *Origin*, devout Christians made fundamental discoveries concerning the classification of species, the formation and age of the earth, and the geologic column. In 1840 the publication of the book that would rock the belief systems of the Western world was nineteen years away from publication. Nevertheless, Genesis was no longer accepted as a scientific treatise, even by devout Christian scientists. The concept of fixed, specially-created species was laid to rest with the work of Linnaeus. Buffon and others estimated the age of the earth to be greatly in excess of 6000 years. Scientists like Cuvier and Buckland, who opposed the theory of evolution, saw the Genesis Flood as, at most, a regional

event. The geologic column was in wide use, not because it supported evolution, but because it was useful in industry. A literal reading of Genesis was, to paraphrase Daniel 5:27, "weighed and found wanting," and like any scientific theory, it was modified to accommodate new evidence.

The contributions of these real scientific creationists were pivotal to Darwin as he considered the evidence for evolution. Perhaps if the general public learns more of the history of evolution—that the theory of evolution has Christian underpinnings as well as secular and that it is not tied to a particular philosophy—they will be able to appreciate the science of evolution on a less emotional level.

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Bird Evolution

John Cole
Contributing Editor

Are birds dinosaurs? Or are they at least direct descendants, as most paleontologists since Thomas Huxley have maintained? NCSE president Kevin Padian is co-author (with Luis M. Chiappe) of the February 1998 *Scientific American* cover article, "The Origin of Birds and Their Flight," which discusses the evolution of flight in feathered ground-running carnivores and argues that birds are theropod dinosaurs. New photos show feather features better than ever. Padian is co-editor (with Philip J Currie) of *The Encyclopedia of Dinosaurs* (NY: Academic Press, 1997).

Several new books also explore the issue and come to similar conclusions. Sankar Chatterjee, long a critic of *Archaeopteryx*'s status as a direct ancestor, proposes that *Protoavis* may be an earlier and better candidate for direct ancestor. But, contrary to some who have cited him as debunking *Archaeopteryx*, he acknowledges its importance and transitional nature while pushing his *Protoavis* position. In *The Rise of Birds: 225 Million Years of Evolution* (Baltimore: Johns Hopkins University Press, 1997) he explains his argument in detail. He is rather dismissive of paleontologists such as Padian, who he says cling to a romantic notion that dinosaurs are alive and well on the backyard bird feeder, but he offers no comfort to anti-evolutionists claiming there are no transitional fossils.

The Mistaken Extinction: Dinosaur Evolution and the Origin of Birds by Lowell Dingus and Timothy Rowe (NY: WH Freeman, 1997) argues that birds are dinosaurs and that the separate classification is a mistake caused by the rigidity of

the Linnaean classification system. *Taking Wing: Archaeopteryx and the Origin of Bird Flight* by Pat Shipman (NY: Simon and Shuster, 1997) takes the reader through the author's search for answers (yes, she decides, they could fly!). Shipman, a paleontologist and experienced science writer, professes to have started with an open mind, trying to figure out where *Archaeopteryx* "fits". Her approach does not push one viewpoint or another.

From three different viewpoints, then, these books explore the vast array of what we know 130 years after the first raven-sized *Archaeopteryx* fossil was found in Germany (seven examples are now known). Contrary to creationist claims, the only serious debate is about just where specific fossils fit into family trees, not whether or not there are transitional fossils!

[All three books were reviewed by John Noble Wilford in the Sunday NY Times Book Review on January 25, 1998.]

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NCSE past president Jack Friedman recently suggested a great way to give your community access to the National Academy of Sciences recent publication, *Teaching About Evolution and the Nature of Science*. Instead of having individual teachers, parents, or school board members buy the book, Jack encourages teachers to have the school or public library purchase it. This strategy will preserve budgets and may give more people a chance to see the arguments for teaching evolution.

Edward Larson, author of *Trial and Error: a legal history of the evolution/creation controversy*, has received a Pulitzer prize in history for his book, *Summer for the Gods: The Scopes Trial and America's Continuing Debate Over Science and Religion*. He lives in Stanwood, Washington—a creationist hotbed in the early 1990s where a spectacular school-board battle led to a front page feature article for *Mother Jones*. The *Mother Jones* article also describes NCSE's involvement in Stanwood, which was reported in "Creationist cases blooming," *NCSE Reports* 12(2):1,3,5.



When Creationists Visit Your School

Molleen Matsumura
Network Project Director

RNCSE frequently reports on local controversies over whether to include evolution in science curricula, give "equal time" for "creation science", or discipline teachers who do—or don't!—teach evolution. Another recurring problem is school-sponsored assemblies featuring guest speakers who present "creation science" outside of the classroom, but on school premises.

According to federal law, *student-sponsored* religious activities occurring on public school premises during non-instructional time and without faculty participation are legal, while *school-sponsored* religious activities are not. Also, while schools may teach about religion, they may not advocate religious views, whether such views are presented by a guest or a school employee. Teachers or administrators sometimes believe they are complying with the law if they request parents' written permission. In fact, just as a permission slip wouldn't make it legal to teach a child in an unsafe classroom, parents can't give permission for public schools to violate the First Amendment.

In some districts, the result of a school's sending home a permission slip has been that parents had time to react. In Albuquerque, New Mexico a parent whose child came home with such a permission slip consulted NCSE member Mark Boslough. Boslough obtained legal information from NCSE and explained the issues to the school's principal. As a result the assembly was canceled (*NCSE Reports* 1995 Winter; 15[4]:16-7). There have also been cases in which a "creation assembly" couldn't be prevented and cases in which parents heard about it only afterward, as happened in the Moon Area School District

near Pittsburgh, Pennsylvania. At the Moon-Area assemblies, a district employee made unarguably religious statements—for example, that rainbows represent God's promise not to cause another Great Flood. A lawsuit resulted and eventually the district agreed in an out-of-court settlement to stop holding such assemblies (*NCSE Reports* 1994 Winter; 14[4]: 9).

A different course of events unfolded in Elma, Washington in May 1998, when the well-known "creation scientist" Walter Brown was scheduled to present "evidence against evolution" at a high school assembly. Though they received letters from both NCSE and the American Civil Liberties Union explaining why the assembly was neither educational nor constitutional, the superintendent and school board decided to go ahead with the assembly on May 8, on the grounds that only "scientific" arguments would be presented.

Since the assembly couldn't be prevented, and any lawsuit that might follow wouldn't correct the misinformation students received, biologist David Milne, who teaches at nearby Evergreen State College, offered to speak at a follow-up assembly. Milne's presentation had two goals—to present authoritative information about evolution, and to help students evaluate Brown's "arguments against evolution". The information below is adapted from a letter Milne wrote to NCSE about his experience.

HOW TO SET THE RECORD STRAIGHT

Preparation is all important. Milne told NCSE that he spent at least 20 hours preparing for the assembly. He explained, "I reviewed a videotape of Brown's presentation. I also ordered his book by priority mail and studied as much of it as I

could during the...[time] available.... I felt that...[I] had to address something he talked about, otherwise I would be perceived as dodging the issue." He also consulted scientists in other disciplines about some of Brown's arguments.

Suit the presentation to your audience. "I planned on talking for only an hour," Milne wrote. "Brown spoke for two; that's too much for high school students. I offered to return and spend another hour doing nothing but answering questions...." If you are making such a presentation, you should ask the advice of a teacher experienced with students in the grades you are addressing.

Stick to a few main points. "The keys were: Know what the creationist said and address that. Attack (with an example of evolution and an example of how bad creation science is). Don't let what the creationist said determine your whole agenda. Address something big claimed by the creationist speaker head on, and also give some details about the creation model the creationist will always avoid."

Choose "one really good example of how the fossil record shows evolution". Milne also told the students, "There are many more where that came from. I also told them how the creationists deal with that example." Using several slides, Milne explained fossil connections between the fish *Ichthyostega* and the amphibian *Eusthenopteron*. He pointed out that a transitional fossil exactly intermediate between two major groups—fishes and amphibians—is something that creationists say doesn't exist. This example also demonstrates macroevolution in the fossil record. He gave examples of creationist treatments of this information and "asked the students to compare mentally the detail I'd

given them to the creationist treatment and suggested that the creationists really didn't want them to know the facts of this case.... The students were fascinated by the story, even to repeating the names of the fossil critters during the ensuing question period."

Give an example of bad creationist science. Milne offered Henry Morris's calculation of the age of the earth from carefully selected human population growth data. He told NCSE, "I hit on something that really made that point. I told them that the tide was rising that morning at about 2 feet per hour. If the average ocean depth is 12 000 feet, then 6000 hours ago, there was no water in the ocean at all; therefore the ocean was created at that time. I then went through Morris's population calculation which shows that there must have only been two people in the world about 4000 years before 1800. Interesting, but the same [calculation] gives no more than 600 people in the entire world when the Great Pyramid was built."

"I mentioned that in general, creationist math showing a young earth starts with unwarranted assumptions...and that it always leads to a conclusion ridiculous when you try to square it with other things we know, like the pyramid example.... This example wasn't as powerful as the first. The main value was that it showed that I was willing to tackle creationist 'science' head on."

Take an example from the creationist speaker's presentation, and take it apart. "Repeat what he said, what he didn't say (the part that he's embarrassed to reveal), then show why he's wrong." Milne gave a detailed, profusely illustrated rebuttal of Brown's treatment of the formation of the Grand Canyon, culminating with a comparison of aerial photographs of flood formations on Earth and Mars to photographs of the Grand Canyon. He told NCSE, "The climax was truly stupendous. Everyone sat staring at the slides thinking how obvious the marks were of the passage of the Spokane Flood and of the flood on Mars—and realizing, I think, that Brown had shown them no such things near the Grand Canyon."

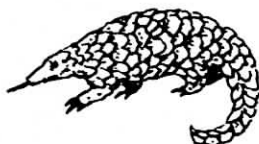
After concluding by, "Telling 'em what I told 'em"—that creationists will always tell them that mainstream science is wrong about everything,

don't believe them, check it out for yourself," Milne added a special twist. "I actually gave the students an assignment—comparing the evidence given by me and the other speaker and judging which seemed to be more credible." Milne gave the students copies of scientific articles from which Brown had taken quotes out of context. He circled the quotes, told the students to read the circled quotes and think about what they implied about the writer's views, then read the entire article and reconsider their earlier conclusions. Not only did this "evidence against misrepresentation" speak for itself, but it brought home the points of Milne's earlier presentation and gave students more time to absorb them.

"IN THE FIRST PLACE, DO NO HARM"

The students of Elma were lucky, not only because there was someone willing to "clean up" after a speaker who presented pseudoscience, but also because that someone was willing to spend hours of time preparing and to take advice from others in order to do a good job. If you hear about "creation science" being taught in your school district, NCSE may be able to help locate a good scientist who is comfortable with high school students and to help with preparation. But prevention is still the best cure, and if you hear ahead of time about a proposed "creation science" presentation, be sure to contact NCSE for information on how to keep it from happening—in the first place, or ever again.

[David Milne especially thanks NCSE member Pierre Stromberg for helping him obtain detailed information from many veteran "creationist watchers" and "especially," thanks Richard and Dorothy Norton at Science Graphics for providing a complete set of teaching slides at short notice. NCSE thanks Eric Schuster, Howard Pellett, and Patrick Pringle for sending background information used in this story.]



Historic Milestone

Robert Schadewald

April 1, 1998, is the 20th anniversary of the Schadewald Gravity Engine. On April 1, 1978, I put into the public domain the design of the simplest, most foolproof perpetual motion machine ever designed (one moving part), "that it [might] solve the energy crisis and bring peace and prosperity to the world." Well, look what has happened since! No one has heard of the energy crisis for years, the communist bloc collapsed peacefully, and (except for a few million Asians) the world is experiencing unparalleled prosperity. I am, of course, too modest to claim *all* of the credit for these developments. I ask only for what is due, just as I asked only that users put my initials (BS) on every Schadewald Gravity Engine built.

For those who have not seen my paper describing this boon, as published in the April 1978 issue of *Science Digest*, Don Simanek has the entire text posted on his web site at <http://www.lhup.edu/~dsimanek/sgc.htm>.

[Robert (Bob) Schadewald is a former editor of NCSE Reports and has served on NCSE's Board of Directors.]

Science on TV

For World Wide Web users who are also interested in science TV listings, connect to <http://www.ciconline.org/srchlist.htm>. It allows you to search by topic (biology, technology, earth sciences), a range of dates, and so on. The search will bring up the date(s) and time(s) of airing, and a short summary; sometimes they have support materials for use in the classroom!



Outdated Advice Still Going the Rounds

Molleen Matsumura
Netork Project Director

In 1979 attorney Wendell Byrd, a long-time "creation science" advocate and associate of the Institute for Creation Research (ICR), wrote a "Resolution for Balanced Presentation of Evolution and Scientific Creationism" that was published as Issue 71 of the ICR's *Impact* series. The full text of this resolution is still available, either by requesting this *Impact* issue from ICR, or by viewing this page of the ICR's website at <http://www.icr.org/pubs/imp/imp-071.htm>

The resolution reads in part:

Public school presentation of only the theory of evolution without any alternative theory of origins abridges the Constitution's protection of freedom of religious exercise for students and parents, because it undermines their religious convictions, violates their separatist practices, compels their unconscionable statements, and hinders religious training by parents....

Public school presentation of only the theory of evolution without any alternative theory also violates the Constitution's protection of freedom of belief for students and parents and in doing so hinders the purpose of education by impeding their search for truth, denying them academic freedom, and restricting scientific objectivity.

The resolution was offered "as a prepared resolution for local citizens' groups seeking to obtain a fair presentation of the creation/evolution question." The accompanying text also states, "Please note that this is a suggested **resolution**, to be adopted by boards of education, not **legislation** proposed for enactment as law. ICR has always taken the position that the route of education and persuasion on this issue is more fruitful in the long run than that of coercion" [emphasis in original].

These and other points of the res-

olution are contradicted by six federal and Supreme Court rulings made since 1979. Perhaps the best known is the Supreme Court's 1987 *Edwards v. Aguillard* decision which struck down a "balanced treatment" law passed by the Louisiana legislature.

"Clarifications" of the resolution include the statement, "This Resolution does not require or permit instruction in any religious doctrine or materials" (such a requirement would violate many state constitutions as well as the federal constitution). However, such a "clarification" amounts to mere hand-waving, since courts have already determined that "creation science" is "religious doctrine" *by definition*. Moreover, districts that have attempted to provide "balanced treatment" have discovered that there simply are no instructional materials for teaching "creation science" that are free of religious overtones.

Even the footnotes present misinformation. For example, footnote 14 lists several "boards of education [that] officially require balanced treatment of evolution and scientific creationism." If they once did, they no longer do so. A school district in Texas is given as one example, but in 1984 the state of Texas and its districts abandoned "equal time" and disclaimer practices after the state's attorney general published an opinion that they were unconstitutional. Texas later went on to adopt its current curriculum standards which require teaching evolution.

This resolution may be of some historical interest, but it is truly unfortunate that it is still sometimes presented as a *current* alternative. Recently, parents from school districts in the northwest, worried about active discussion of the resolution in their districts, contacted NCSE. The greatest problem, though, is that the resolution, which was at best controversial when it was written in 1979, is now outdated.

While the ICR's stated preference for "persuasion" over "coercion" is laudable, the unfortunate reality is that when such proposals are presented in school districts, the resulting controversy can create a

climate of intimidation for teachers. Parents and school board members who oppose evolution need not even be in the majority—just very vocal—to convince some teachers that the best way to avoid trouble is to avoid teaching evolution. If you hear that this policy is being offered to state or local school boards, don't hesitate to ask NCSE to help you look inside the "new bottle" to find out whether the contents are "old wine" that has turned to vinegar.

EARTH COMING TO AN END

Earth magazine announced in the spring that it will cease publication in the summer of 1998. The magazine lured Joshua Fischman from *Science* to be its editor in 1996 in order to change from a "rockhound" newsletter into a general-interest science magazine. Fischman and the magazine's owner, Kalmbach Publishing, gave different explanations about the cause of the magazine's demise. However, it is clear that the new strategy never really paid off. While certainly pro-evolutionist, the magazine offended some professional scholars because of its continued dependence on and promotion of its first clientele—amateur fossil collectors.

[Contributed by John R Cole.]

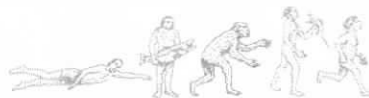
THE EVOLUTION MESS

According to an Associated Press story, "Children Won't Get Bibles," after the Gideons International had withdrawn its request to distribute Bibles in a public school, the Terrebonne Parish, Louisiana School Board discussed it anyway (and voted "No," 11-4). "We allow so many things to go on in schools," said board member Rev Arthur Verrett. "Evolution, pornography, all kinds of mess is being taught in the schools."

[Printed in *The Advocate*, Baton Rouge LA, April 9, 1998; p. 6B. Contributed by Barbara Forrest.]

Who is Fooling Pope John Paul II?

Andrew Petto
NCSE Editor



FEATURE

Pope John Paul II's October 1996 address to the Pontifical Academy of Sciences continues to have repercussions among those opposed to evolution on religious grounds. The problem is, of course, that the Roman Catholic Church (and the other faiths that have provided statements in support of evolution for NCSE's *Voices for Evolution*) also accept the Bible as "true". This acceptance, however, is not of the Bible as a scientific or historical document, but as a spiritual one ("Roman Catholic Church accepts biological evolution—Again!" *NCSE Reports* 1996 Fall; 16[3]: 7-8).

On February 4, 1997, ChristianAnswers.Net home page added a link to a page produced by Answers in Genesis (AIG; <<http://www.christiananswers.net/q-aig/aig-c017.html>>) explaining how we are being misled by a poor translation of the original document, composed in French.

Did the Pope really say that evolution was 'more than a hypothesis'? It's probable that the secular media misinterpreted the Pope's address.

The original French address says:

Aujourd'hui, près d'un demi-siècle après la parution de l'Encyclique, de nouvelles connaissances conduisent à reconnaître dans la théorie de l'évolution plus qu'une hypothèse.

In English:

Today, almost half a century after the publication of the Encyclical [*Humani generis*, 1950], new knowledge has led to the recognition of more than *one* hypothesis in the theory of evolution.

The trouble is, the French word 'une' can mean 'a' or

'one'. The secular media translated it 'a' hypothesis, while the official Roman Catholic newspaper *L'Osservatore Romano* translated it as 'one'.

According to the posting on ChristianAnswers.net, this "analysis" of the Pope's address was prepared by "the Polish RC [Roman Catholic] creationist and eminent scientist Maciej Giertych who has published over 90 scientific papers". Giertych appears to be a well-respected population geneticist specializing in trees.

The AIG commentary later accuses the Pope (and the Magisterium) of wanting to appear modern and "up-to-date" scientifically and more than a little "wary of disputing new scientific ideas" after having to reverse the Church's condemnation of Galileo for proposing a heliocentric solar system. However, rather than seeing the Church as relying on scientific experts for scientific advice, the AIG analysis says, "The church in those days made the mistake of trying to fit the Bible into Ptolemaic and Aristotelian theories; now it is making the same mistake of trying to fit the Bible into Darwinism."

Of course, the Pope's October 1996 address did nothing of the kind. It accepts the biological evolution of humans and their continuity with nature. These are "true" as historical and biological phenomena. The Pope also declared that the spiritual nature of humans is unexplained by science and "falls within the competence" of philosophers and theologians. The Pope's address did challenge these theologians and philosophers to understand how scientists think that evolution works so that they can better understand the spiritual nature of humans. In his address Pope John Paul II said

[O]n 31 October 1992, I had the opportunity, with regard to Galileo, to draw attention to the need of a rigorous hermeneutic for the correct interpretation of the inspired word. It is necessary to determine the proper sense of

Scripture, while avoiding any unwarranted interpretations that make it say what it does not intend to say. In order to delineate the field of their own study, the exegete and the theologian must keep informed about the results achieved by the natural sciences.

Furthermore, whether there is one hypothesis within the theory of evolution or many, the Pope's statement to the Academy stressed that the convergence of many scientific disciplines toward the acceptance of evolution as the basic force in the history and diversity of life on earth is "a significant argument in favor of this theory". Thus, he accepted what evolutionary biologists have been saying for decades—evolution is a theory of organic change over life's history that most likely relies on more than one mechanism.

THE POPE AS ANTIBIBLICAL

It is not a surprise that the ChristianAnswers.net takes the Pope to task on theological grounds as well. They argue that "the Pope's announcement contradicts the teaching of Jesus, the apostles, and even church tradition—that Adam's literal Fall in a literal Garden of Eden caused death and suffering in the world. This made Christ's incarnation and death for our sins necessary." To the contrary, Roman Catholic theologians have long held that Adam (and Eve) were significant as proxies for all humanity, not as the cause of all evil and death. Therefore, they hold that Christ's incarnation and death were necessary for our sins—not only or primarily for those of Adam (and Eve). Adam stands as a theological "everyman" in the most fundamental way. Furthermore, official Roman Catholic teaching places the story of the Fall of Adam and Eve at the beginning of "history"—not at the beginning of time.

Finally, ChristianAnswers.net goes the political route. Using the unique perspective on social and moral issues represented by colum-

nist Cal Thomas, they conclude that the Pope has finally succumbed to the tyranny that he fought all his life by accepting "a philosophy that stands at the core of communism". It is true that Marx was enchanted by Darwin's work, but then so were the capitalists and the "social Darwinists". Each camp felt that the economic system that it championed found its ultimate proof and justification in theories of evolution by natural selection. So, when all the communists are finally gone, Thomas may find to his dismay that evolution hasn't gone with them.

A New Synthesis?

But in reality, the Roman Catholic Church is just stepping into line

with all the other faiths that have agreed that the scientific explanation of evolution does not conflict with their theological or philosophical positions on the spiritual explanations of the relationship between humans and their God. This is, of course, a potentially productive position for both scientists and theologians because it is larger than just the acceptance of one scientific theory. What is most important about Pope John Paul II's address to the Pontifical Academy of Sciences is the commitment to use the best explanations that science has to offer in understanding how our world (and the universe) operate on a natural level as an important element in framing the spiritual and theological

questions that the Church is called to answer. As the Pope himself told the Academy, "Truth cannot contradict truth."

[Readers can find the text of the Pope's October 22 address through the NCSE web page <www.natcensci.org> where we have used the correct translation of the offending phrase "une hypothèse".]



FEATURE



Science Education Standards and Dr Seuss

Andrew J Petto
NCSE Editor

In Wisconsin, as in many other states, the Department of Public Instruction held a series of hearings to collect citizen responses to the proposed standards for education in science, social science,

mathematics, and language arts. NCSE members were very active in support of evolution's inclusion in both the science standards and the social science standards, which include human prehistory and early humans.

In the October 1997 meetings in Madison, we listened to a lot of the standard arguments about why evolution shouldn't be taught. Many of these read as though they were taken directly out of Institute for Creation Research (ICR) materials—evolution violates the Second Law of Thermodynamics; evolution violates the laws of probability; evolution is no more

than a secular religion; and so on. There was also the now obligatory citation of evolutionary biologists who have rejected "Darwinism" such as Gould and Eldredge.

However, there was one surprise in the testimony. One of the witnesses testifying in opposition to the inclusion of evolution in the science education standards pointed to the obvious links between teaching evolution and the moral and civil degeneration in the younger generations today. As proof he offered this stunning evidence: Even the beloved children's books of Dr Seuss were tainted by evolution. Look, for example, he said, at the drawing at the climax of the book *Horton Hatches the Egg*, published in 1940.

In this illustration we see that the hatchling from the egg of the lazy bird has the physical features of both its bird mother and its elephant foster parent. This proves, according to the witness, that Dr Seuss was corrupted by evolutionary thinking and passed this corruption on to the nation's children. After all, it is no coincidence, the witness point out, that *Horton Hatches the Egg* appeared in the same year as Richard

Goldschmidt's *The Material Basis of Evolution*. This book is perhaps most widely (and incompletely) known as the source of the "hopeful monster" metaphor of a profound reorganization of organisms that produces macroevolutionary change.

Of course, *Horton...* and *The Material Basis...* both had to be in press for some time before their actual publication dates, so it is most unlikely that Theodore Geisel would have read Goldschmidt's book prior to publication of *Horton...* Goldschmidt had published a number of articles and books in both English and German which contained some of the ideas in *The Material Basis...*, so it is possible that Geisel could have read these and incorporated some concepts into his books. The irony of this claim, however, is that Goldschmidt's idea of the "hopeful monster" was anything but mainstream evolutionary thinking at the time. If the Dr Seuss books were trying to insinuate evolutionary thinking into the pages of their children's stories, *Horton...* fails to capture the essence of evolutionary science at the end of the 1930s.





K-12 Science Standards, State By State

Lawrence S Lerner

In recent years, accountability and assessment have become watchwords in public education, as they have in other areas of public concern. The result has been a flurry of standards-writing, aimed at specifying what every student in the various grades from kindergarten through high school should know in every important subject. Various attempts at establishing nationwide standards came to grief for numerous reasons, mostly political. Nevertheless, some documents have emerged, especially in the sciences, that have served as models for local efforts. Most notable among these is *Benchmarks for Science Literacy*, a detailed list produced by the American Association for the Advancement of Science (AAAS) through its sponsorship of Project 2061, which ambitiously and laudably aims for a scientifically literate American public by the time Halley's Comet returns in 2061. The other main reference is the *National Science Education Standards* (NSES).

With the eclipse—at least for the time being—of the movement for nationwide standards, the burden has fallen on the states. Most states have compiled and published standards, and several more will soon complete this task. This assessment-centered focus has inevitably led to a further effort to assess the assessment documents. The Thomas B Fordham Foundation, an educational think-tank associated with the Hudson Institute, has commissioned and published a series of five studies that evaluate state standards in the five core subjects—English, history, geography, mathematics, and science. The task of evaluating the science standards fell to me, with the aid of five expert consultants. The report was published in March 1998. Needless to say, there was much tedium in the task of closely reading 36 standards documents, but I think it was worthwhile.

All standards were evaluated on

the basis of a set of 25 criteria in the general areas of clarity, organization, coverage, content, accuracy, and absence of pseudoscientific nonsense. Happily, the results of the science-standards evaluation were better than those in the four other subject areas. Nevertheless, there is much room for improvement even in the best of the state science standards. On an A-through-F grading scale, the states averaged a C-minus; six states scored A's, seven each B's through D's, and nine scored F's.

There is really no excuse for any standards that do not rank with the best. There are plenty of good models. Indeed, the scores for the best standards were closely clustered, while the poorer ones trailed off, leaving a long and depressing spoor of lower and lower scores. The clustering at the high end suggests that reasonably good quality can be attained by standards writers. Moreover, except for the issues surrounding the teaching of evolution that arise in a relatively small number of states, the sciences do not seem to be plagued with the political and ideological infighting concerning content that characterize some of the other areas, notably history and English literature.

In spite of a widespread consensus as to subject matter, however, there are areas of controversy that are shared in some degree with mathematics: How much should high-school graduates be expected to know? At what grade level should specific material be introduced and at what depth? Controversy seems to arise between two camps, each of which unwisely allows the other to characterize it: the "elitists" versus the "dumbers-down". Fortunately, experience in several states suggests that a reasonable consensus can be reached.

Ironically, in view of the vehement opposition to nationwide standards, most states cribbed more or less liberally from the *Project 2061 Benchmarks* and a few similar

model documents. Many of the highest-rated states adhered most closely to the *Benchmarks*, notably Indiana, of whose standards I wrote, "A student who fulfills the requirements set forth will have received an excellent education." But even the best of the lot could be greatly improved. Here are some of the most common shortcomings:

1. Most of the standards take the form of laundry lists (typically, "In Grade 6, the student will know that..."). This sort of list may work well in some subject areas, but science is characterized by its tight theoretical structure, which is difficult to convey in lists. Standards in New Jersey and Connecticut make up for this to some degree with their excellent organization. What is really needed, however, is a series of short explanatory paragraphs that organize list items into a theoretical framework. It is encouraging to note that California has recognized this shortcoming in its draft and plans to add the necessary explanations.
2. The word "energy" is much used but too often is poorly defined or not defined at all.
3. Astronomy tends to focus so heavily on the solar system that most of the spectacular discoveries of the past century are ignored or shortchanged. Too often, all of cosmology is boiled down to a single sentence such as, "In Grades 11-12, the student will be able to discuss the various theories of the origins of the universe."
4. The treatment of evolution varies tremendously in quality from state to state. Human evolution, unfortunately, is ignored in almost all the state standards. Students are thus deprived of important insight into our place in the scheme of things.

At one end of the spectrum of

evolution treatments, there is excellent exposition beginning with simple ideas in the primary grades and building gradually to a sophisticated discourse at the high-school level. At the other end of the spectrum, evolution is completely ignored, at least in the life sciences. It will surprise no one that seven of the eight poorest treatments (or non-treatments) come from the South. The good news is that a number of Southern states, Texas and Louisiana among them, do a fair-to-credible job of treating evolution. Though they do not make clear the central role of evolution in the life sciences, the Texas and Louisiana standards at least address the subject in a straightforward way.

In those states that do not do so, the influence of political pressure is evident, and various of the eight states have dealt with the pressure in various ways. Mississippi, whose overall score was second worst, and Tennessee, whose overall score was eighth worst, simply ignore the subject. Arizona, Florida, and South Carolina treat the subject very lightly, as though it were peripheral to science, and studiously avoid use of the "E-word." Kentucky uses the euphemistic, false synonym "change." Arkansas treats evolution gingerly, in "Who? Me?" terms, as if the writers didn't know how to cope with *Epperson v Arkansas*. Georgia, which originally tried to disguise evolution by using the term "organic variation", has had second thoughts. The final outcome is still to be seen.

DARK HUMOR

For those with a taste for irony, Alabama's response is the funniest. Into the front matter of a generally well organized document is injected the dictum: "Explanations of the origin of life and major groups of plants and animals, including humans, shall be treated as theory and not as fact" (see Scott, "State of Alabama distorts science, evolution," *NCSE Reports* 1995; 15[4]:10-1). This is, of course, the standard creationist ploy of misusing the relevant terms in such constructions as "Evolution isn't a fact, it's just a theory," as though theory were synonymous with guess. In the main text of the Alabama document, though the "E-word" is not used, the treatment of evolution is fair if not good. I was inevitably reminded of

the quantum mechanics texts written in the USSR during the Stalin era, when quantum theory was officially regarded as anti-Marxist. A text would typically begin with a disclaimer in the preface: "Rejecting all capitalist-imperialist dogma, and guided by the true principles of Marxism-Leninism, we have written this book." The main text would then treat quantum mechanics in a conventional, completely satisfactory manner. The success of this approach depended on the fact that the apparatchiks who imposed the disclaimer did not know enough physics to read the body of the text. It is shameful that science teachers in an American state should have to take a similar approach, hoodwinking the board of education so they can educate their students.

Arizona, a non-Southern state with standards that smother evolution, is a special case. The overall ranking of the Arizona standards was very high; this was not surprising because the document follows the excellent *National Science Education Standards* quite closely—in many places, word for word. However, the writing committee knuckled under to a fiat from creationist members of the Board of Education. They systematically went through the Benchmarks and expunged the dreaded "E-word." Professor Steven W. Rissing of Arizona State University has kindly provided me with a complete list of the changes.

What is more interesting is that Arizona is unique in expurgating evolution from cosmology as well as biology. Most of the other states mentioned above seem not to have a problem with discussion of cosmological and geological evolution; some even use the word evolution freely in these contexts. The Arizona expurgation has produced something of a furor, and there is considerable activity aimed at revising the standards. (see "Substandard standards in Arizona", p 7). However, there appears to be a well-organized creationist group opposing change.

At the other end of the spectrum, Connecticut treats evolution as the organizing principle of the life sciences, and it is possible to perceive biological evolution as part of the overall history of the universe. Delaware does almost as well. Indiana is clear not only on the sub-

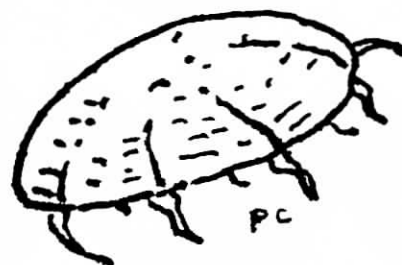
ject of biological evolution but in the touchy areas of reproductive and mental health, ethics, and environmental issues. Rhode Island, Utah, and Wisconsin go still further, stressing the criteria that distinguish science from pseudoscience.

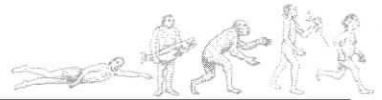
Clearly, students are injured if they are shielded from biological evolution. Their study becomes not biology but natural history ("How To Tell the Birds From the Fishes," as Will Cuppy put it). On a larger scale, the seamlessness of the sciences—the close meshing of the life sciences with the earth sciences, and of the earth sciences with astronomy—is hidden. There is, moreover, the risk that students will be encouraged in the notion that learning science amounts to memorization of a large heap of facts, many of them perhaps obscure or incomprehensible.

How useful will the current vogue for standards be? Laundry-list standards are useful for writing multiple-choice exams, and uniform, comprehensive exams have their place. But there is far more to teaching the sciences. Unless there is implementation down the line—teacher education, adequate support services and laboratories, stringent requirements for textbooks, and so on—standards writing will turn out to be a waste of time. Nevertheless, good standards are an essential first step toward improvement of science education, and of education in general.

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Scientific Expertise and the Media

Kevin Padian

President, NCSE Board of Directors

Each year NCSE officers and members are contacted by radio and television stations, newspapers and magazines to offer perspectives on science and to respond to statements made by "creation scientists". Perhaps no one is besieged by the press as much as our own Executive Director, Dr Eugenie Scott, and certainly no one that I know handles the requests so well. The challenge that she faces constantly is also one that we all must confront whenever we are called upon to "represent" evolutionary biology in a public forum.

How can one scientist deal with a well-credentialed adversary who maintains that evolution must be restricted only to small genetic changes in populations, that no major transitions between taxa are recorded in the fossil record, that a single flood can account for the world's geology, that the theory of plate tectonics is at odds with erosion rates, and that radiometric dating is flawed by the principles of physics? How do we approach these problems before the public?

The answer is that no one can deal with all of these charges, so no one of us should try to represent all scientific disciplines (see *NCSE Reports* 15[3]:23 and 14[2]:22). Your opponent is attacking science itself. The specific claims, which have no support in the scientific community, are only a vehicle to this end. Besides, it would take too long to defend all of science by trying to provide all the scientific background necessary for the average person to understand the misrepresentations in these arguments.

It is useful to clarify for an audience that, generally, claims of "creation science" are religiously based. Its proponents are grounded in religious, not scientific principles and thought—regardless of the specific "scientific" problem or issues they discuss or study. It is also useful to note for audiences that, although your opponent appears to be presenting a great deal of evidence against evolution, no valid scientific evidence has been presented in support of the alternative position, whatever it may be (and why isn't this

position clear?) Is this position in fact religious, and not scientific?

With very few exceptions, "creation scientists" have thin scientific credentials, publish little in peer-reviewed journals, and/or are generally not trained in the fields they are disparaging. When they do publish acceptable scientific or technical work, it has nothing to do with evolution or any related science. This is not apparent to the audience which sees "credentialed" adversarial scientists as opponents who cancel each other's purported expertise. The real issue is what is the *nature* of the scientific credentials and what do these credentials mean? Is it the degree that makes the scientist or the dedication to "science as a way of knowing" about the world around us?

It can be tempting to dismiss the statements on evolution by an atmospheric chemist, but it is not logical (and will not win points with an audience) to do so merely because the person is trained as an atmospheric chemist. We must show that the views of evolution's opponents are not informed, miss crucial information, or have not been tempered through scholarly review by the scientific community—an essential task in doing science.

Recently, on a radio program, I tried the tactic of asking Dr X, a mechanical engineer, why he doesn't publish his theories about mechanisms of geologic change in peer-reviewed journals if they are scientific and don't require divine intervention. He could give only a weak response that creationists can't get things published in secular journals. I replied that there seemed nothing about his theory that is supernatural. He said that his theory is too long to publish in the short space that journals provide, but I replied that I had published papers of more than 50 pages in some journals. I further noted that a study had been done some years ago by Eugenie C Scott and Henry P Cole ("The elusive basis of creation 'science'." *Quarterly Review of Biology* 1985; 60:21-30) asking journal editors about creationist submissions. Those editors that could recognize them said that they got very few, but that reviewers

rejected them not because of supernaturalism but because the papers were illogical, did not show awareness of the literature, did not perform scientific tests, and were poorly written.

The average person appears to distrust experts, but if their kids are sick they don't call a plumber, and if they have termites in the house they don't call a brain surgeon. The appropriateness of expertise and the limits of your own knowledge are important to express to an audience. (Personally, I would never feel comfortable expounding on mechanical engineering or atmospheric chemistry, but I have learned not to assume the same attitude in a "creation scientist" with whom I might be discussing paleontology.) An important question to ask is this: if your "creation-scientist" opponent has such a terrific scientific theory that will replace currently accepted ideas, why aren't *Nature* and *Science* clamoring to publish it? Why aren't the Nobel Prize people beating a path to his door? If the idea is valid and explains all the evidence better than any other, it will make his scientific career. People of all nations, creeds, races, and religions work comfortably within the scientific paradigm and include evolutionary theory as part of that. There is no division between "religious" and "scientific" scientists—only between those who proceed from religious assumptions and those who do not allow such assumptions to determine in advance the outcome of their investigations of nature.

I think that the issue of the credibility of "creation scientists" needs to be put more squarely before the public. When anyone reads an article in the newspaper about a scientific discovery, it almost always involves overturning or adding to something we thought before. You never see breaking news that says, "Theory of gravitation supported again!" Publication of results doesn't mean that they are necessarily right, or that this is the last word on the subject. It means that at least a couple of experts in the field have looked over the work and found it plausible at face value (and presumably, interesting enough to be published). Science is not afraid of challenges or of change; that's what it's all about. Dogmatism is the province of its critics. If we get this message out, we can expose pseudo-scientific charlatans for what they are.

BOOKREVIEW

Huxley: From Devil's Disciple to Evolution's High Priest

by **Adrian Desmond. Reading (MA): Addison Wesley. 1997. 832 pages, incl. 36 illus., notes and index.**

Reviewed by John R Cole, Contributing Editor.

Thomas Huxley, founder of a British dynasty of Huxleys prominent as scientists, novelists, political activists, and mystery-and-science-fiction writers, is best known as "Darwin's Bulldog". He championed Darwin's ideas and Darwin himself in public fora, while Darwin remained a semi-recluse at Down, his wife's family (Wedgewood) estate. Huxley attended scientific meetings and union-hall debates with equal enthusiasm, speaking out for evolution and public science education. Without Huxley, Darwin would have had a much smaller impact, at least initially. Huxley has been remembered too often in Darwin's shadow when he was, in fact, a major scholar in his own right. He did pioneering work in biology and paleontology, studying Coelenterata (polyp- and medusa-forming animals). He sailed as ship's doctor on a world survey as ambitious as the voyage of the Beagle. Although Darwin observed people on his voyage and described them perceptively, Huxley was clearly more interested in social issues in ports he visited and during the rest of his life. This welcome biography rediscovers this fascinating man a century after his death—the man who literally put the word "scientist" into play as a common word for people who do science. (He also coined the term "agnostic" and in the process probably helped lay the foundation for the public perception of science as an "agnostic" or atheistic activity!)

Desmond's biography reads a bit like a novel and deserves a wide audience simply as a good book, even if the writing is occasionally over-colorful. It fleshes out our knowledge of a figure—surprisingly little-known today—who played a pivotal role in pivotal times in Western intellectual and political history. Desmond makes a very good case for Huxley's having been a pioneer and embodiment of the rise of the middle class, the concept of the meritocracy, and science as a public, state and business concern in Britain (and by extension in much of Western culture). Huxley was embraced in the United States at least as enthusiastically as at home. His agenda went far beyond championing Darwin, but he did that masterfully and, along with Herbert Spencer, was responsible for much of the triumph of the Darwinian paradigm in America as well as Britain.

Huxley is actually comprised of two earlier books by the author (which I have not read and thus cannot discuss what, if any, differences exist here). The two earlier works appear to be simply joined as the two "halves" of the new volume's subtitle. Desmond's book *Darwin*, written with James Moore, may be the ultimate biography of Darwin and his place in Victorian society, and this new book aims to give the same "last word" treatment of Thomas Huxley. To that end, Desmond dug out and read Huxley's vast collection of papers at the British Museum and found many differences from the published versions of collected letters and other papers (perhaps because Huxley's handwriting was so indecipherable?) This is original research, not a rehash.

Desmond writes with a style which will appeal to

Dickens fanciers but may alienate others. This is not surprising since a huge amount of the text is taken from Dickens (in quotation marks). The reader thus rounds a corner with Huxley in London and sees buildings and scenes of poverty described by Dickens as well as Huxley in his letters and notes. To me, this became detail overkill at times, when I could not be sure whose thoughts I was reading without consulting footnotes. Huxley's brother John, also a physician, showed young Tom endless examples of poverty, opium dens, and so forth. Desmond's own voice is clearest when he is commenting on the nature of "the new contextual history of science" (p 617), and the book is a fine introduction to this newish approach to biography and history even though Desmond clearly lionizes his subjects just as much as earlier biographers' styles did.

Huxley was acutely aware of the fact he was championing a cause and leading a revolution against the power of the Anglican Church. A form of this struggle continues today in the US, Turkey, Afghanistan and other countries. It was clearly a struggle to invent and empower a powerful middle class through universal education, professionalization, and political maneuvers; biblical literalism was just a small part of the struggle for control of political and economic power. Today's American anti-evolutionism is anachronistic by comparison. Ironically the American concept of the nation's being *all* middle class has empowered a new breed of anti-evolutionist who is typically unaware of the historical origins of his and her class consciousness and lack thereof! Huxley's opponents fought a losing battle against modernization and industrialization. Even though the battle often used theological excuses, it was most successful as a triumph of technocrats over an old, fading aristocracy, so most of today's devoutly middle class populist anti-evolutionists owe a lot to Huxley and his allies!

BOOKREVIEW

Darwin's Dreampond: Drama in Lake Victoria

by **Tijs Goldschmidt**.
Cambridge (MA): The MIT
Press 1997. 274 pages, refer-
ences, glossary, index,
US\$15.00.

*Reviewed by Danny Yee,
Department of Anatomy and
Cell Biology, University of
Sydney, Australia.*

In 1981 Tijs Goldschmidt began a study of the cichlid fish ("furu") of Lake Victoria. Having diverged from a single species in what appears to have been only the last 12 500 years, these fish constitute a "species flock" with more than 200 members. They display a diverse array of feeding adaptations: among them there are fish-eaters, insect-eaters, prawn-eaters, algae-scrapers, mud-biters, leaf-choppers, snail-crushers, snail-shellcrackers, scale-scrapers, and pedophages. In *Darwin's Dreampond* Goldschmidt shows off the Lake Victoria furu as a biological case study, using them as a springboard for explaining basic taxon-

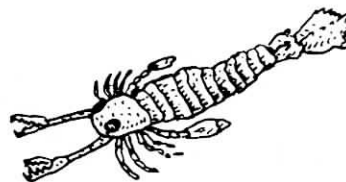
omy and systematics and concepts in evolutionary biology such as speciation, adaptive radiation, and natural selection. The final chapters describe the effects on the lake ecosystem of the introduction of the Nile Perch—notably the extinction of most of the furu species.

All this comes coated for easy digestion: Goldschmidt is a storyteller as well as a scientist, and anecdotes from his personal experiences in Tanzania are used to frame—and explain—the biology. An attack of malaria leads, naturally enough, to an explanation of sickle-cell heterozygosity—and a debate with a doctor about natural selection. An account of a local wedding leads into a description of the marriage customs of the Sukuma, and thence into a discussion of sexual selection. A visit to a missionary lepidopterist and the inspection of his butterfly collection lead into an explanation of Batesian and Mullerian mimicry. And the local economics of the study area are connected to

an explanation of furu ecological niches.

Darwin's Dreampond is never dull or dry. It provides an entertaining account of the evolutionary and ecological marvels of the Lake Victoria cichlids, along with extensive references to the scientific literature for those who want more detail. It is also an excellent introduction to the basic concepts of evolutionary biology, and one especially suitable for those more accustomed to travel writing.

[An HTML version of this book review can be found at http://www.anatomy.usyd.edu.au/danny/book-reviews/b/Darwins_Dreampond.html along with more than 400 other reviews.]



1998 INTERNATIONAL CONFERENCE ON CREATIONISM

*Excerpted from a description
of "Purpose and Scope" in the
printed brochure for the
1998 International
Conference on Creationism
(ICC98) scheduled for Aug. 6-
8, 1998 by the Creation
Science Fellowship, Inc of
Pittsburgh PA*

The sponsors of the ICCs maintain that the discipline of creation is a binding element unifying all areas and disciplines including science, edu-

cation, history, sociology, medicine, mathematics, etc. It is therefore, an intention of the ICCs to provide a forum for the rigorous development and systemization of the creation model of origins.

Behind the polemics of the creation/evolution controversy are questions of scientific and philosophical importance. The inherent and obvious design of the cosmos screams of a Designer, and the diversity and unity of this universe tell of the Designer's Nature. The notion of universal design does not relegate creation to religion; rather it proves the need for

open discussion in the scientific, philosophical, theological, and academic communities. The origins debate is a watershed issue that needs to be addressed as we enter the 21st century. Creation researchers need to develop their model in order to offer the only alternative to the evolutionary worldview.

[Details of the conference and text of the brochure can be found at the ICC web site. The statement of "Purpose and Scope" is on line at <http://www.icc98.org/Purpose/ICCpurp.htm>]



Letters to the Editor

Dear Dr. Scott:

On December 19, 1997, I stumbled by accident upon the broadcast of the big forum on the reality of evolution, which, as I understood it, had been organized by William Buckley. Permit me to congratulate you on the quality of your contributions to the discussion and of your presence. You brought to the debate an admirable clarity and an equally remarkable equanimity. I was astounded that you were able to maintain the equanimity part especially when faced with the utterings of one particular presumptuous and impudent "intellectual" whom I judged to be one of the most unsufferable individuals I had set my eyes on in a long time.

Unfortunately one "Big Bertha" that

is part of the evolution camp's arsenal was hardly used in this debate—the contribution of molecular evolution. By the mid-60s it was apparent that phylogenetic relationships, as deduced from comparisons among sequences of homologous informational macromolecules, coincided to a remarkable extent with phylogenies established by other, completely different means.

Is it not incredible that, at the end of the 20th century, and in this country, we are still faced with this "war" as if the century had never existed?! When I pointed to this contribution in the 60s, I apologized for beating a dead horse. Being of European origin, I could hardly imagine that the horse was not dead.

How could this broad coincidence of evidence independently adduced from the analysis of vastly different levels of biological organization be compatible with an anti-evolutionist stance? There seems to be only one good anti-evolutionist explanation compatible with the observed coincidence; namely, that the creator carefully arranged everything so as to make us falsely believe in evolution. In that case, why don't creationists at last bend to God's will?

With my great appreciation and all good wishes,

Emile Zuckerkandl
Institute of Molecular Medical Sciences
Palo Alto, CA

INTERNET LOCATIONS VISITED IN THIS ISSUE

- Topic:** Minutes from the March 17, 1998 Science Committee Meeting
Owner: California Department of Education
Location: <http://www.ca.gov/goldstandards/Meetings/Minutes/SciMinutes/Mar17.html>
Last Visit: July 1998
- Topic:** Analysis of Pope John Paul II's statement on evolution
Owner: Answers in Genesis
Location: <http://www.ChristianAnswers.net/q-aig/aig-c017.html>
Last Visit: July 1998
- Topic:** Cable TV Listings
Owner: Crosby Publications (*Cable in the Classroom Magazine*)
Location: <http://www.ciconline.org/srchlist.htm>
Last Visit: July 1998
- Topic:** Book Reviews of *Darwin's Dreampond*
Owner: Danny Yee
Location: http://www.anatomy.usyd.edu.au/danny/book-reviews/h/Darwins_Dreampond.html
Last Visit: July 1998
- Topic:** Schadewald Gravity Engine
Owner: Don Simanek
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- Topic:** "Resolution for Balanced Presentation of Evolution and Scientific Creationism"
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Reports of the National Center for Science Education (RNCSE) welcomes contributions from its readers and from anyone interested in issues related to evolution as the foundation for the biological sciences, to the place of evolution in the science curriculum, or to the public perception of scientific method and practice. These contributions may be submitted in one of two forms.

News, commentaries, and features describe events or experiences that we wish to relate to our readers and members. These may include reports of school-board elections or local organizing by parent and teacher groups, political or governmental decisions and policies, first-person accounts of experiences with anti-evolutionist speakers, curriculum, or organizations, other reports of information related to our primary concerns of promoting good science in education and public life, and, of course, humor related to creation/evolution issues.

Articles include book reviews, scholarly articles, and formal essays. These may explore specific arguments raised by anti-evolutionist scholars, relate new information that may be helpful in promoting evolution, or present original research related to the public understanding of evolution. We also welcome case reports and classroom action research that assess the outcome(s) of strategies for strengthening the understanding of evolution in educational practice.

All articles should be written for a general audience, and authors should provide definitions or descriptions for technical terms and concepts whose meanings might not be evident to the nonspecialist. Article manuscripts are submitted to reviewers for comments on the technical content and the suitability for a general audience. Acceptance for publication does not take into account the author's formal academic background or profession. We encourage query letters from any prospective author.

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Kehoe AB. Modern anti-evolutionism: The scientific creationists. In: Godfrey LR, ed. *What Darwin began*. Boston: Allyn and Bacon; 1985. pp 165-85.

Kuban GJ. Sea-monster or shark? An analysis of a supposed plesiosaur carcass netted in 1977. 1997; Available from <<http://members.aol.com/paluxy2/ple>

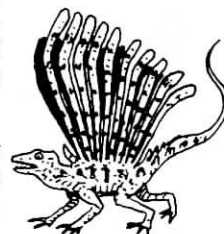
sios.htm> Accessed 1997 Mar 28.

Smith FZ. Geocentrism re-examined. *Journal of Nice Things* 1985; 21(3):19-35.

Waters IC, Rivers HI, and others. Swept away in a flood of enthusiasm [editorial]. *Reports of the National Center for Science Education* 1995 Jan-Feb; 1015(1):22-9.

Zubrow E. *Archaeoastronomy*. Orlando, FL: Academic Press, 1985.

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