

# REPORTS



OF THE

NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS

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CONTINUES NCSE REPORTS &  
CREATION/EVOLUTION

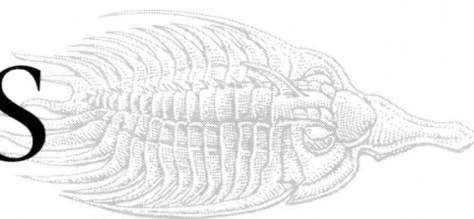


Racism and  
Evolution: Interview  
with Pat Shipman

Why We Should  
Teach our Students  
about Race

Where's the Shrimp?  
DI Out-of-Joint over  
Arthropods

# CONTENTS



## NEWS

- 4 A Walk in the Clouds  
Phillip Johnson Speaks at St Cloud State University.
- 4 Santorum Redux?  
*Glenn Branch*  
The Santorum Amendment was eliminated from the No Child Left Behind Act — or was it?
- 6 Non-Debate at American Museum of Natural History  
*Wesley R Elsberry and Andrew J Petto*  
Dembski and Behe speak at AMNH, answer questions on "intelligent design" from Miller and Pennock.
- 8 Updates  
News from Colorado, Florida, Georgia, Mississippi, Virginia, and Washington.

## NCSE NEWS

- 10 NCSE Supporter Ayala Receives National Medal of Science  
Biologist wins nation's highest award for lifetime achievement in scientific research.
- 10 National Academy of Sciences Elects NCSE Member  
Morris Goodman  
Anthropologist joins select body of prominent scientists.
- 10 NCSE's Scott Receives Public Service Award from National Science Board  
NCSE's executive director receives award for promotion of public understanding of science.
- 11 News from the Membership  
*Glenn Branch*  
What fellow NCSE members are up to.

## ARTICLES

- 13 *The Evolution of Racism:*  
An Interview with Pat Shipman  
The author discusses evolution, racism, and the misuses of contemporary science.
- 16 Racism and the Public's Perception of Evolution  
*Randy Moore*  
Opponents to evolution first worried that it denied racist ideologies, now they claim that it supports them.

## RESOURCES

- 29 Racism and Evolution Web Resources
- 37 Third Annual Darwin, Design and Democracy Conference
- 38 Web Locations Visited in This Issue

## FEATURES

- 23 Why We Should Teach Our Students About Race  
*Joseph L Graves Jr*  
Trying to avoid controversy in the classroom may handicap students' abilities to understand and solve real-world problems in the future.
- 27 Where's the Shrimp?  
*Alan Gisllick*  
The Discovery Institute responds to recent research suggesting mechanism for macroevolutionary changes in body plans.
- 28 Genetic Evidence of Body-Plan Macromutation  
*Andrew J Petto*  
How a 10-legged marine arthropod can become a 6-legged terrestrial one.
- 30 Tracking Those Incredible Creationists  
*William Thwaites*  
With recent Gallup polls showing scant progress in accepting evolution, why is ICR's John Morris so worried?
- 31 Ask About Evolution Before Election Day  
*Stan Braude*  
Even in local elections, it is important to get candidates to take a stand on creationism in the curriculum.

## MEMBERS' PAGES

- 19 American Association of Physical Anthropologists  
Statement on Biological Aspects of Race  
*AAPA revises and updates the 1964 UNESCO statement on race.*
- 20 Evolution and Science Fiction  
Recent books and favorite classics for sale.
- 22 NCSE *On the Road*

## BOOK REVIEWS

- 33 Bernard d'Abrera Responds to Shapiro's Review
- 34 *Race, Evolution, and Behavior: A Life History Perspective* by J Phillippe Rushton  
*Reviewed by Andrew J Petto*
- 35 *What it Means to be 98% Chimpanzee: Apes, People and their Genes* by Jonathan Marks  
*Reviewed by Andrew J Petto*

## LETTERS

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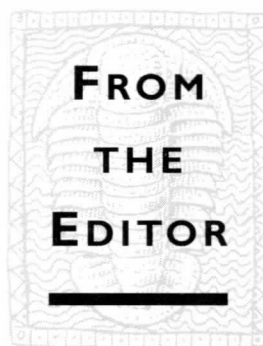
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Artwork © Ray Troll, 1997

For more information on Ray's work explore his website at <www.trollart.com>.



This issue of *RNCSE* explores a contentious issue in science and society — the meaning of human geographic variation and culturally constructed categories of race. As our readers know, anti-evolutionists have actively tried to link evolution and racism over the past few years, and in 2001 an anti-evolution resolution introduced in the Louisiana legislature was based on this misunderstanding.

Today, of course, most recognize that evolutionary theory rejects the strict typologic view of human populations that is at the basis of racial studies. The fact that some genetic traits appear in higher frequencies in some populations than in others does not indicate that these populations are genetically distinct in all ways — or even in *any* way.

This issue explores the connection between racism and evolutionary theory in several ways. First, we present an extended interview with Pat Shipman, whose *The Evolution of Racism* explores how evolutionary biology was misappropriated to serve racist and nationalist agendas in the first half of the 20th century — and why evolutionary biologists *reject* racism today. Originally published in 1994, *The Evolution of Racism* was recently re-issued by Harvard University Press.

This issue also presents an article by Randy Moore on the history of the association between racism and anti-evolutionism in the US. In contrast to recent anti-evolutionist claims that evolution supports racism, Moore illustrates how anti-evolutionists perceived evolution

as a threat to segregationist policies and ideas. Although these groups have opposed evolution consistently, Moore suggests that it is only recently that they have tried to link evolution to racism, as racist policies have lost legitimacy over the past several decades.

Finally, we reprint a short feature by Joseph Graves Jr, the author of *The Emperor's New Clothes*. Graves suggests that the best way to eliminate inappropriate ideas about racial categories is to teach more about human genetic and geographic variation.

**YOU MAY HAVE NOTICED ...**

There are a few changes in the layout and design of this issue. We have expanded the Table of Contents to make the page easier to read and more informative. The new format will allow us to include the titles and authors of *all* the items that we carry in each issue.

To accommodate this expansion, we will shorten the editor's column and the page of instructions to authors will be printed only twice a year. The instructions will be available on the NCSE website at all times.

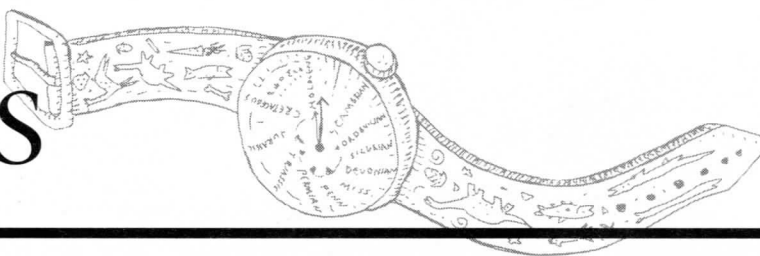
We also have a newly reorganized editorial board. Over the past few years, the materials submitted to *RNCSE* have come from many disciplines, so we have asked a few people with specific areas of expertise to act as associate editors in those fields. Please welcome these associate editors who have agreed to evaluate submissions to *RNCSE* in their various fields for the next two years.

*RNCSE* 22 (3) was printed in August 2002.

**CORRECTION**

Martin Nickels wrote to inform us of an error in the members' pages of *RNCSE* 2001 Sep-Dec; 21 (5-6): 27. In his "Top 10 Lines of Evidence", number 10 should read "archaeological record" rather than "hierarchical record". We regret the error.





## A Walk in the Clouds

Phillip Johnson spoke at Saint Cloud State University in St Cloud, Minnesota, on January 21, 2002. The talk was sponsored by the Campus Crusade for Christ, which publicized it primarily through local evangelical and fundamentalist churches. There was at least one notice in the St Cloud paper — an ad that appeared on the comics page on January 17. The event was free for students; others paid \$5.00.

About 1300 people attended, with nearly all coming from sympathetic churches. There were also some students and faculty, as well as a few interested folks from the community. Due to the short notice, only two members of the local skeptics group were able to attend. Apparently no reporters from the secular news media, with the possible exception of the SCSU student newspaper, attended. No report on the event has appeared in the local paper.

Although he accepted some help in walking and supported himself throughout the program by leaning against a high stool, Johnson's performance was not significantly affected by the stroke he suffered in the summer of 2001. His mind was sharp, and his speech was clear. He held forth for almost two hours, lecturing for the first hour and answering questions for the remainder.

Given an uninterrupted hour with a gullible, sympathetic audience, a good lawyer whose argument is uncontested can appear to build an air-tight case for just about any idea. Johnson accomplished this so well for "intelligent design" (ID) that he probably succeeded in inoculating most in the audience against any opposing arguments raised during the question-and-answer period.

Johnson took credit for writing the "Santorum Amendment" and claimed that the favorable Senate vote and the president's signature on the education bill were major victories. Of course, he failed to note that "his" amendment had been stripped from the final bill (*see below*). He also mentioned that the Ohio "revolt" is better organized than the one that failed in Kansas. These seemed to be the only points in his lecture that were new.

With the audience properly prepared, Johnson was able to keep his sheep in the fold during the Q&A session by simply staying on message regardless of the question. Of the 20 or so people who asked questions, all but two challenged his positions, but none actually pierced his armor. A question regarding theistic evolution was probably the most effective one, because it forced him to state, after considerable obfuscation, that there is no way to reconcile belief in (his version of) God with acceptance of (his version of) evolution. It also caused him to misrepresent the Pope's position on evolution while he was speaking in this predominantly Roman Catholic community.

Noting that he opposed natural selection as an explanation, one questioner asked for ID's explanation for the close relationship among primates, including humans, if one rejects common ancestry. Johnson did not miss a beat in responding to the question. Of course, he did not actually *answer* the question but simply reiterated his earlier criticisms of natural selection. A few in the audience may have picked up on this as an admission that ID has no explanatory power, but even fewer would have recognized it as a fatal flaw for a scientific theory. There was no opportunity for questioners to pursue the issue further with follow-up comments.

With hindsight, it seems clear that the best approach in such a situation is to ask questions that challenge the speaker's "facts" in ways that resonate with the audience, which is the hard part. This involves both listening to the speaker *and* to the audience.

[Thanks to Larry Lafler and PZ Myers for materials used to compile this report.]

## Santorum Redux?

Glenn Branch  
NCSE Deputy Director

The Santorum Amendment, as previously reported in *RNCSE* (2002 Jan-Apr; 22 [1-2]: 12-4), was clearly intended to single out evolution as uniquely "controversial" and thus to discourage its teaching. Introduced by Senator Rick Santorum (R-PA), the amendment (to S 1) was passed by the Senate, but removed from the bill by the conference committee. The conference committee weakened the amendment and relegated it deep within the Joint Explanatory Statement of the Committee of Conference (in Title I, Part A, as item 78), which explains how the conference committee reconciled the House and Senate versions of the bill. The bill, renamed the No Child Left Behind Act, was passed by Congress in late 2001 and signed into law by President Bush in early 2002.

Item 78, the conference committee's revision of the Santorum Amendment, states, "The conferees recognize that a quality science education should prepare students to distinguish the data and testable theories of science from religious or philosophical claims that are made in the name of science. Where topics are taught that may





generate controversy (such as biological evolution), the curriculum should help students to understand the full range of scientific views that exist, why such topics may generate controversy, and how scientific discoveries can profoundly affect society." As such, it appeals to perennially, and deservedly, popular values of fairness, equality of opportunity, and openness. But, as its ancestry in the Santorum Amendment suggests, item 78 is proving to be inspirational to the anti-evolution movement.

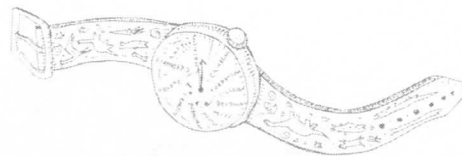
In Minnesota, a creationist group is attempting to convince Independent School District 196 in Rosemount that the No Child Left Behind Act requires the teaching of "intelligent design"; in Washington, a creationist group is making the same claim to the school board of the Burlington-Edison School District. In Carson City, Nevada, it is a member of the school board who is citing item 78 in the service of promoting young-earth creationism. Similarly, in Nebraska, several members of the state board of education unsuccessfully attempted to ensure that the newly drafted state science standards reflected the provisions of item 78. In the Georgia state legislature, House Bill 1563, introduced on February 26, 2002, was closely modeled on item 78; the legislative session ended without the bill's leaving the Education Committee. And item 78 is prominent in the ongoing controversy about Ohio state science education standards (see below).

Instrumental in the popularization of item 78 among anti-evolutionists is the Seattle-based Discovery Institute and its Center for the Renewal of Science and Culture, whose advisor Phillip Johnson "helped frame the language of the [Santorum] amendment", as he told the *Washington Times* (2001 June 18). It is not just the Discovery Institute that is publicizing item 78, to be sure: Henry M Morris, the grand old man of the Institute for Creation Research, wrote, "the bill clearly encourages teachers to include the scientific evidence *against* evolution in classes where evolution is being assumed" (*Back to Genesis* newsletter, May 2002, emphasis in

original). (In contrast, the anti-evolutionist ministry Answers in Genesis construed the fact that neither the Santorum Amendment nor item 78 was present in the No Child Left Behind Act as a defeat for the anti-evolution movement.) But clearly it is the Discovery Institute that is the prime mover.

Item 78 appeared in the state of Ohio, which is currently considering a set of proposed statewide science education standards. The coverage of evolution in the proposed standards was praised by Lawrence S Lerner, a nationally recognized expert on state science standards, who wrote, "The new draft treats evolution in exemplary fashion ... I would give the new standards, if enacted, an A" (see *RNCSE* 2002 Jan-Apr; 22 [1-2]: 9-10). With the assistance of local creationist organizations, however, the Discovery Institute has been lobbying hard either to include "intelligent design" in the standards or to weaken their treatment of evolution by requiring the teaching of both evolution and "evidence against evolution". Part of its campaign includes citation of item 78 as if it were evidence that the federal government supports either of these two approaches — for example, a Discovery Institute document referring to teaching "evidence against evolution" challenges, "If any state or local boards doubt that it is now federal policy, they should inquire about the subject to the US Department of Education" (<<http://www.discovery.org/articleFiles/PDFs/santorumLanguageShouldGuide.pdf>>).

Faced with objections to its interpretation of item 78, the Discovery Institute was able to enlist support from Senator Santorum himself, who claimed that its language was included in the bill signed into law (*Washington Times*, 2002 Mar 14). He also implied that Senator Edward Kennedy (D-MA) supported the teaching of "intelligent design", prompting Kennedy tersely to reply, "Unlike biological evolution, 'intelligent design' is not a genuine scientific theory and, therefore, has no place in the curriculum of our nation's public school science classes"



(*Washington Times*, 2002 Mar 18). Joining the fray were Representatives John A Boehner (R-OH) and Steve Chabot (R-OH), who signed a letter to the Ohio Board of Education asserting that "[t]he Santorum language clarifies that public school students are entitled to learn that there are differing scientific views on issues such as biological evolution" (<<http://www.discovery.org/articleFiles/PDFs/Boehner-OhioLetter.PDF>>). In a letter to NCSE, however, Representative George Miller (D-CA), who was on the Joint Committee of Conference, stated that "Congress recognizes that the teaching of the 'full range of scientific views' should be encouraged, and such decisions are best left to the scientific community, rather than legislators."

The DI's recent statements on the legal status of item 78 are carefully, even legalistically, worded. Like Representatives Boehner and Chabot's letter, and unlike several of the statements of local creationist organizations, they do not claim that federal law requires the teaching of "intelligent design" or even of "evidence against evolution": for instance, Bruce Chapman and David DeWolf write, "while the Santorum statement does not legally *mandate* an even-handed approach to the teaching of evolution, or penalize a failure to do so, it does provide a clear call to states to follow its policy direction in adopting science standards" (<<http://www.discovery.org/articleFiles/PDFs/santorumLanguageShouldGuide.pdf>>, emphasis in original). However, Miller demurs even to the claim about "a clear call," explaining that "the report language should not be construed to promote specific topics within subject areas."

Expect the controversy to continue.

[Forthcoming in *Research News and Opportunities in Science and Theology* and reprinted by permission.]



# Non-Debate at American Museum of Natural History

Wesley R Elsberry and  
Andrew J Petto

The American Museum of Natural History (AMNH) took a bold step on April 23, 2002 — it provided a forum for two leading proponents of “intelligent design” (ID), William A Dembski and Michael J Behe, to make the case for their claim that ID has scientific merit. Unlike a debate format, in which opponents aim to count rhetorical coups, the format of the AMNH event allowed (and required) the two ID proponents to present an affirmative case for their positions; they were subsequently questioned by two leading critics of ID, cell biologist Kenneth R Miller and philosopher of science Robert T Pennock. NCSE’s Executive Director Eugenie C Scott was the moderator.

The event — somewhat misleadingly entitled “Blind Evolution or Intelligent Design? A Debate on Evolution” — began with a long introduction by AMNH’s Richard Milner, who also co-edited the special section on ID in the April 2002 issue of *Natural History* (see Milner and Maestro 2002; Behe 2002; Miller 2002; Dembski 2002a; Pennock 2002; Wells 2002; Scott 2002; Forrest 2002). Milner explained why the museum was affording this opportunity for proponents to make a case for ID in a scientific setting:

Whether or not “intelligent design” poses a serious threat or challenge to Darwinian biology, it cannot be ignored as a sociopolitical phenomenon at least, and I know this from firsthand experience in my travels

around the country giving my own Darwin program, I’ve often been asked about “intelligent design”. So, *Natural History* has decided not to ignore the dissidents, but instead to turn a spotlight upon the controversy. ... [W]e’ll try tonight to keep the focus on scholarly issue ... and attempt to proceed in an atmosphere of mutual respect and truth-seeking.

As appropriate for such a setting, scholars with appropriate credentials in relevant fields of science could ask specific questions of the proponents of ID, and, it was hoped, receive specific answers.

Eugenie Scott gave a brief introduction to the background and the format of the event. She told the audience:

The ID — “intelligent design” — movement developed two major components. One was cultural renewal, the goals of which were social and religious. As described by Bruce Chapman, the Center for Renewal of Science and Culture quote “seeks nothing less than the overthrow of materialism and its damning cultural legacies. New developments in biology, physics, and cognitive science raise serious doubts about scientific materialism and have reopened the case for the supernatural.”

The second component of “intelligent design” claims to be a religiously neutral attempt to identify a particular kind of design, that produced by an intelligence. Let me define “design” in this context. In reference to living things, design expresses the idea that many structures are composed of parts that work together and function to get something done.

We cannot, of course, examine all aspects of the ID movement in one evening, so we will focus on the second, scholarly component of ID rather than the cultural renewal aspect. We are not here to evaluate either natural selection or evolution as scientific ideas. This is not an

evening of “evolution on trial”. Evolution is considered mainstream science and this fine museum is a virtual monument to the evolutionary sciences. Instead, we will hear the two most prominent ID theorists explain their positions and two of the most prominent critics of ID question them. And in fact, both proponents of ID have held repeatedly that ID is not merely a form of anti-evolutionism, but has an independent positive research agenda of its own. It is “intelligent design”’s distinctive positive claims that we are assembled here to consider.

The format and speakers for the evening were as follows:

- Dembski spoke for 20 minutes.
- Pennock questioned Dembski for 15 minutes.
- Miller questioned Dembski for 5 minutes.
- Questions from the audience.
- Behe spoke for 20 minutes.
- Miller questioned Behe for 15 minutes.
- Pennock questioned Behe for 5 minutes.
- Questions from the audience.

## WILLIAM A DEMBSKI

William A Dembski began the program by presenting a capsule discussion of specified complexity. He argued that specification — which he defines elsewhere as a type of pattern that, if sufficiently complex, indicates design (Dembski 2002b: 12) — is used in a variety of scientific disciplines to infer design of a complex object. His examples included archeological and forensic studies. Of course, the obvious difference between agents detected in these disciplines and the “intelligent agent” whose activity ID is supposed to detect is that we can observe or replicate the cause and effect in the former case, but not in the latter. In most supposed cases of ID, the offered account of the cause-and-effect chain is lacking key details — for example, what sort of “intelligence” could have designed living organisms? Dembski did not say, but he did tell the audience

Wesley Elsberry is finishing his PhD work in Wildlife and Fisheries at Texas A&M University. His current area of research is dolphin biosonar sound production and bioenergetics. He is also a long-time critic of anti-evolutionists; see his web site at <<http://www.antievolution.org>>. Andrew J Petto is the editor of RNCSE.



that intelligence is not reducible to natural mechanisms.

Dembski reiterated his claim that design is a notion belonging to statistics and complexity theory. He used the analogy of a long message sent from one person to another, but intercepted by a third. How does the third person know that there is a meaningful message being transmitted? The signal, said Dembski, must be both complex and exhibit a "pattern characteristic of intelligence" — the cryptographic "key" that allows the recipient to decode the message. All of his examples, however, were drawn from human technology and engineering. The unstated assumption in his presentation is that those principles are useful to understand the causes of complexity in nature. Thus he seemed to assume the validity of the argument from analogy, which numerous scholars have contested (see Wilkins and Elsberry 2001).

Dembski invoked the bacterial flagellum as an example of specified complexity in biology. He touted section 5.10 of his book *No Free Lunch* (Dembski 2002b) as giving the probability calculations needed to ascertain the "horrendous" probabilities of assembling existing materials into a novel structure with a novel function — a bacterial flagellum. He repeated that the only confirmed examples of such modification come from intelligent engineering — thus implying that unguided natural processes are incapable of producing such an outcome.

Foreshadowing Behe's presentation, Dembski argued that evolutionary biologists cannot simply claim that such a transformation through a series of "Darwinian baby steps" was possible; they must also show in detail how it could or did happen. And, Dembski added, the "baby steps" must be small enough to be reasonably probable. This was the first statement that Dembski made that could be tested directly. Presumably, if biologists could demonstrate such a transformation, then "intelligent design" would be falsified as an explanation. (Later, Kenneth Miller would demonstrate several such cases from the biochemistry and molecular biology research literature.)

According to Dembski, ID shows that the problems *claimed* to be solved by "Darwinism" have not been. Biologists are forced to assume unknown mechanisms to bridge the gaps among organisms in order to avoid the conclusion of "intelligent design". By way of analogy, Dembski said that it would be ridiculous to try to explain the Mona Lisa without recourse to some intelligent agent responsible for its production. Biologists, he said, should not posit unknown mechanisms operating in unknown ways as causes for complex structures and functions in nature.

In sum, Dembski argued that the process of inferring design has two steps: (1) the determination that the bacterial flagellum (or whatever phenomenon is under consideration) exhibits specified complexity, and (2) the conclusion that it must be the product of an intelligent agent. He argued that evolutionary theory is immune to disconfirmation and that the burden of evidence (to demonstrate natural causation for natural phenomena) is on the evolutionists. He claimed that the "full range" of biological explanations must be explored in order to show that ID is incorrect.

#### QUESTION PERIOD I

Robert Pennock was the main questioner in this first question period. His main question was, How is one supposed to use "intelligent design"? Dembski replied that one begins with the analogy to human intelligence, then looks at specific examples to extract a generalization that can be used to produce a more formal construct. Pennock protested that he had no problem with the concept that there was design in nature, only with the idea that ID is able to detect an agent capable of "transcending natural causes". In particular, Pennock challenged Dembski to show that his "explanatory filter" detects design produced by an "intelligence" as opposed to merely detecting specified complexity.

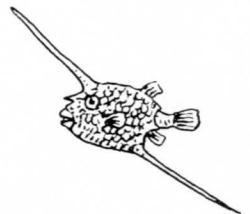
Next Pennock asked Dembski to commit to specific judgments about various scientific issues from the ID perspective. For example, is ID compatible only with an earth

about 4.5 billion years old; or is it compatible with an earth only 10 000 years old? Both claims are being made by people who promote ID. What about the varying opinions among supporters of ID regarding common descent, macroevolution, and so on? Pennock remarked that there is no consensus on these issues among ID supporters, in contrast to evolutionary studies, in which a consensus emerges from the integration of multiple lines of investigation in multiple disciplines. Dembski avoided taking any stand on these issues, saying that his stance is that "design" is detectable and that miracles have no place in his theory.

Miller tried to get Dembski to state when the "intelligent designer" infused the "specified complexity" seen in various events mentioned by Dembski and other ID advocates. Did the origin of life 3 billion years ago indicate an intervention by the intelligent designer? What about the appearance of the bacterial flagellum, the Cambrian explosion, the emergence of various animal groups? "Maybe; maybe not" was the sum of Dembski's response. The specified complexity *might* have been input as early as the origin of the universe; subsequent examples would have to be examined in detail. Miller's main contention was that if ID cannot identify *when* the "intelligent designer" inserted specified complexity into an otherwise natural process, then it is not useful as a scientific explanation for *how* this complexity came to be.

#### MICHAEL J BEHE

Michael J Behe gave his usual talk on "irreducible complexity" — a system is irreducibly complex, according to Behe, if the removal of any of its parts would cause the system to lose its function — including some discussion of his perennial example of the mousetrap. He began with a brief statement of his position on evolution. First, Behe described descent with modification "with which I agree". Then he contended that, although natural selection does explain some biological phenomena, it does not "explain everything". Then he argued that since Darwin





himself emphasized that evolutionary change must be gradual, the difficulty in building “irreducibly complex” systems step-by-step indicates that the “Darwinian” process cannot account for such systems. They must therefore be designed by an “intelligence”.

Behe went on to argue that the conclusion of design is not religious. However, he did predict that “irreducible complexity” would be found to be the rule in the biochemistry of cells, from which the conclusion follows that cells were intelligently designed. This of course invites the question of the purposes of the designer, which leads quickly into the realm of religion.

In sum, Behe argued that (1) no existing naturalistic theory explains the data of irreducibly complex biochemical systems; (2) that ID is an empirical hypothesis drawn from the pattern of data; and (3) “there is no principle that forbids our considering design.”

#### QUESTION PERIOD 2

Kenneth Miller questioned Behe’s on the main points of the irreducible complexity concept based on Behe’s prior publications. Although Behe flatly denied making some of these statements, Miller displayed the full quote and

citation for each item. Miller then proceeded to examine each of three biological systems that Behe has claimed to be irreducibly complex: the blood clotting cascade, the bacterial flagellum, and the eukaryotic cilium.

In each case, Miller demonstrated that systems identified by Behe as supposedly irreducibly complex do not become nonfunctional when some of their parts are removed. Examples include the blood-clotting cascade in dolphins and whales (which lacks one of the clotting factors found in other mammals) and the flagella of eel sperm (which lack functional complexes found in other flagella, but which function well enough to produce baby eels). In each of his examples, Miller showed that systems identified previously by Behe as irreducibly complex, and therefore condemned to become nonfunctional when any of the parts is removed, retained adequate function even when several components were removed.

Behe did not seem to accept that the examples Miller provided falsified his prior claims that these are irreducibly complex systems. In essence, his argument was that, in his examples, Miller had simply removed the *wrong* components — that only some parts of a system

qualify as “irreducibly complex,” so that it would be possible to remove some components (as in the eel sperm example) without loss of function in the *system*.

Behe did not engage Miller’s suggestions that the evolution of functions in complex, highly coordinated biological systems could be explained by exaptation — that complex structures serving one function may be modified to serve another function. Behe’s discussions appear to assume that the functions of complex structures never change.

Miller replied that Behe’s own definition of an irreducibly complex system entails that removal of *any* component would cause a loss of function; therefore either the concept of irreducible complexity is flawed or the examples that Behe (and Dembski) were using are not genuine examples of irreducible complexity. Behe complained that Miller was being unfair (by quoting Behe’s work back to him) and that he had made some more recent modifications of his ideas that were applicable here. However, Behe did not explain or present those modifications at this event.

In the final few minutes, Pennock made a telling point: neither Behe nor Dembski could pro-



## UPDATES

**Colorado, Joes:** On April 9, 2002, the board of education of the Liberty J-4 School District voted 5-0 against a proposal to include creationism in its science classes. Located in Joes, Colorado, about 150 miles east of Denver, the district serves just over 100 students. The April vote reverses a previous vote on March 12, when the board voted unanimously to include creationism. Following the March vote, local residents contacted NCSE requesting information about “creation science” and the legal consequences of the board’s proposal. In addition, letters to the board from Americans United for Separation of Church and State, the Colorado American Civil Liberties Union, and the Colorado Education Association pointed out that teaching cre-

ationism in science classes is unconstitutional and warned of a potential lawsuit.

**Florida, Niceville:** On April 21, 2002, Kent Hovind’s ministry, Creation Science Evangelism (CSE), was asked to leave the Community Earth Day 2002 celebration in Niceville, Florida (about 50 miles east of the Pensacola home of Hovind’s ministry). Its exhibit, consisting mainly of water and sand in a large metal tub, was intended to demonstrate that erosion can occur quickly, which the ministry takes to be confirmation of the young age of the earth. Although CSE reportedly had promised not to proselytize at the event, Mike Spaits, the media coordinator for the celebration, told the press that CSE staff was distributing and selling religious literature

and videotapes from its exhibit tent. Maury Adkins, public relations director for CSE, contended that the ministry was not proselytizing at the event; he also warned, “We’ll pursue it with the Federal Bureau of Investigation’s Civil Rights Division because obviously, we have a right to religious expression” (*Northwest Florida Daily News*, April 23; <<http://www.newsherald.com/articles/2002/04/23/1o042302f.htm>>).

**Georgia:** On February 26, 2002, House Bill 1563, sponsored by Representatives Snelling, Barnes, and Mills, was introduced in the Georgia House of Representatives and referred to the Education Committee. In its wording, HB 1563 closely resembles the congressional conference

vide an independent and objective criterion for "irreducible complexity" that does not require Behe to pass judgment personally and on a case-by-case basis as to whether a system is actually irreducibly complex or not. Pennock proposed that the use of knockout experiments — in which components of a system can be removed one by one — could establish what is or is not irreducibly complex. Behe agreed that this would be a good place to start, adding that he would reserve judgment. At the end of the night, however, no plans were announced to conduct this sort of definitive empirical research on irreducibly complex systems or other examples of complex specification.

### THE AFTERMATH

It is hard to judge the impact of an event like this one, of course. It was difficult to gauge the reaction of the audience — which one would expect, given the venue, to have a better-than-average understanding of evolutionary theory and research. As expected, anti-evolution organizations made a lot of hay over the appearance of two of ID's leading lights at the AMNH. Still, in the end, neither Behe nor Dembski offered any specific research to test the key elements of their proposals in support of

"design". Both Miller and Pennock cited or proposed specific research projects to test the claims made by Behe and Dembski. Both Behe and Dembski demurred. As philosopher Kelly Smith has argued, if ID is going to earn a place at the scientific table, it needs to produce its own research and to have significant "internal critique" — to resolve issues such as the age of the earth and the character and capabilities of the "designer" (Smith 2000). It shows no signs of doing so.

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Note: The articles from *Natural History* may be found on-line at <<http://www.actionbioscience.org/evolution/nbmag.html>>.

[Thanks to NCSE archival intern David S Leitner who provided us with the quotations transcribed from the audiotape of the evening's talks.]

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committee report language derived from the "Santorum Amendment" (see RNCSE 2002 Jan-Apr; 22 [1-2]: 12-4). In particular, HB 1563 contains the sentence: "In recognition of the fact that a quality science education should prepare students to distinguish the data and testable theories of science from philosophical claims that are made in the name of science, the State Board of Education is authorized to promulgate rules and regulations and develop a curriculum for topics that may generate controversy, such as biological evolution, to help students understand the full range of scientific views that exist, why such topics may generate controversy, and how scientific discoveries can profoundly affect society" (see <[http://www.legis.state.](http://www.legis.state.ga.us/Legis/2001_02/fulltext/hb1563.htm)

[ga.us/Legis/2001\\_02/fulltext/hb1563.htm](http://www.legis.state.ga.us/Legis/2001_02/fulltext/hb1563.htm)>). No action was taken on this bill before the legislative session ended.

### Georgia, Cobb County:

Presented with a petition of over 2300 signatures from people expressing dissatisfaction with the absence of alternatives to evolution in proposed science textbooks, the Cobb County board of education decided, at its March 28, 2002, meeting, to draft a "clarifying statement" describing evolution as a theory, not a fact, regarding the origin of living things. The statement is to be inserted into the science textbooks, which the board voted unanimously to adopt, despite the objections of the standing-room-only crowd. Superintendent Joe Redden was quoted by the *Atlanta Journal-Constitution*

(March 29; <<http://www.accessatlanta.com/ajc/metro/0302/0329teach.html>>) as explaining that creationism cannot be taught in public classrooms: "It's against the law", he said.

**Mississippi:** On January 21, 2002, HB 888 and HB 1101 were introduced in the Mississippi House of Representatives and referred to the Education Committee. HB 888 provided that if evolution is taught in public schools, the schools should indicate that "evolution is only a theory" (<<http://billstatus.ls.state.ms.us/documents/2002/html/HB/0800-0899/HB0888IN.htm>>). HB 1101 provided that, if theories about the origin of life are taught in public schools, "... each theory, including evolution and creation science, shall be given equal

# NCSE NEWS

## NCSE Supporter Ayala Receives National Medal of Science

On May 9, 2002, Francisco J. Ayala, Donald Bren Professor of Biological Sciences at the University of California, Irvine, was named by President Bush to receive the National Medal for Science, the nation's highest award for lifetime achievement in scientific research. Ayala received the medal at a ceremony at the White House on June 13. As the National Science Foundation's citationist wrote, "Ayala has revolutionized evolution theory by pioneering molecular biology in the investigation of evolutionary processes. His research has led to a new understanding of the origin of species, the pervasiveness of genetic diversity, the genetic structure of populations, and rates of evolution among other concepts." Ayala, who testified for the plaintiff in the important 1982 creationism trial *McLean v*

*Arkansas*, has been a Supporter of NCSE since its founding; NCSE's executive director Eugenie C. Scott commented, "Ayala's contributions to NCSE and its goal of defending the teaching of evolution in the public schools are comparable to his contributions to biology in general: immense." The National Medal for Science was established by Congress in 1959; only 401 medals have been awarded since then.

## National Academy of Sciences Elects NCSE Member Morris Goodman

The new National Academy of Sciences announced its new members recently. The NAS was established in 1863 by a congressional act of incorporation, signed by Abraham Lincoln, that calls on the Academy to act as an official adviser to the federal government, upon request, in any matter of science or technology. Now among

these prominent men and women of science is NCSE member Morris Goodman. (The complete list of new NAS members can be found at <http://www.nas.edu>.)

Goodman also recently received the 2002 Charles Darwin Lifetime Achievement Award of the American Association of Physical Anthropologists, in recognition of his pioneering "use of molecular data as a means of deciphering the tempo and mode of primate evolution"; see Mark L. Weiss's article in *Physical Anthropology* 2002 Winter; 3 (1): 1 (on the web at <http://www.physanth.org/newsletter/winter02.pdf>) for further details.

## NCSE's Scott Receives Public Service Award from National Science Board

At a black-tie dinner in Washington DC on May 7, 2002, Eugenie C. Scott, executive director of NCSE, was presented

## UPDATES

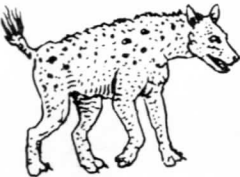
instruction time in order to provide the students with a comprehensive scientific education" (<http://billstatus.ls.state.ms.us/documents/2002/html/HB/1100-1199/HB1101N.htm>). Both bills had the same sponsor, Representative Carmel Wells-Smith, and both died in committee on February 5.

**Virginia, Purcellsville:** Patrick Henry College was denied accreditation by the American Academy for Liberal Education, a private accreditation agency, because of its requirement that faculty sign its Statement of Biblical Worldview, which provides that "Any biology, Bible or other courses at PHC dealing with creation will teach creationism from the understanding of Scripture that

God's creative work, as described in Genesis 1:2-31, was completed in six twenty-four hour days. All faculty for such courses will be chosen on the basis of their personal adherence to this view. PHC does not intend to limit biblically-based discussion of this issue; provided, however, that evolution[,] 'theistic' or otherwise[,] will not be treated as an acceptable theory" (<http://www.phc.edu/docs/StatementBiblicalWorldview.pdf>). Founded two years ago, Patrick Henry College serves primarily students who were home-schooled; the Statement of Faith that students are required to sign contains no provision about evolution. In a letter dated April 30, 2002, the president of the AALE explained that, to be accredited by the AALE,

institutions are required to support and protect "liberty of thought and freedom of speech" and have general education requirements that ensure "a basic knowledge of mathematics and the physical and biological sciences"; the AALE Board of Trustees considers the Statement of Biblical Worldview to conflict with those requirements (<http://www.phc.edu/news/docs/200205103.pdf>). Patrick Henry College is appealing the decision; notice of its intent to appeal is posted at <http://www.phc.edu/news/docs/200205102.pdf>. The controversy was covered by the *Washington Post* on May 11 (<http://www.washingtonpost.com/wp-dyn/articles/A2467-2002May10.html>).

**Washington, Marysville:**





## News from the Membership

Glenn Branch  
Deputy Director

From time to time we like to report on what our members are doing. As the following list shows, they have a lot to be proud about!

Responding to a two-part article on the creation/evolution controversy in *Newsday*, **J. Bret Bennington**, Assistant Professor of Geology at Hofstra University, wrote to explain that "When Charles Darwin sailed around the world ... he was a creationist. His text on 'intelligent design' was the Rev William Paley's *Natural Theology*, which argued that animals and plants were so well adapted to their world that they could only have been designed by God. ... Scrape the thin veneer of science off of 'intelligent design' and you find *Natural Theology*. By any other name it's still old-time religion and it has no business in any high school science classroom" (2002 Mar 18; Long Island edition).

**C Mackenzie Brown**, Professor and Chair of Religion at Trinity University in San Antonio, Texas, published "Hindu and Christian creationism: 'Transposed passages' in the geological book of life" in *Zygon* (2002 Mar; 37 [1]: 95-114). Brown considers similarities in the methods, rhetoric, and motives of "Bible-based young-earth creationists" and "Vedic-based ancient-hominid creationists" (such as Michael Cremo and Richard Thompson, authors of *Forbidden Archaeology*), speculating that a "broadening of Vedic creationism beyond the small confines of its ISKCON [International Society of Krishna Consciousness] origins to the conservative elements of the growing American Hindu community at large" may be in the offing. Also of interest in the same issue of *Zygon* is Gregory R Peterson's "The intelligent-design movement: Science or ideology?" (7-23), which concludes that "intelligent design" "seems to be exactly what it accuses its opponents of being: an ideological agenda masquerading as science".

**George Erickson's** *True North: Exploring the Great Canadian*

*Wilderness by Bush Plane* — "an adventure-filled, pro-environment, pro-science tour of northern Canada and Alaska" — was reissued by The Lyons Press in April 2002. Reviewing *True North* for Amazon.com, **Wolf Roder** described it as "exciting and informative", adding that "there is a strong quality of everyman in this book, a feeling that I could do this journey given the time, money, and strong enough desire." *True North* was chosen by the *Toronto Globe and Mail* as one of its top 100 books for 2001.

Several letters against creationism by **Martin Lewison**, Associate Professor of Business at the University of Arkansas, Monticello, have been published in the *Arkansas Democrat-Gazette* lately. In his most recent letter (2002 May 13), Lewison responded acidly to a local creationist, writing, "Those ... who fail to accept current scientific explanations of human evolution prefer to ignore the evidence altogether and no amount of substantiation will tear them from their precious myths, superstitions and religious dogmas."

On May 13, **Kenneth R Miller**, Professor of Biology at Brown University, participated in an on-line chat about the *Evolution* series, sponsored by *USA Today* and archived at <<http://cgi1.usatoday.com/mchat/20020513001/tscript.htm>>. Faced with questions both silly ("which sex evolved first, male or female?") and profound ("where is the intersection between faith and science?"), Miller answered with accuracy, aplomb, and a frequent dollop of wit — asked "If there is no scientific support for intelligent design, why is it that several US senators support it?", Miller replied, "Imagine that! Members of Congress who are misinformed about a scientific issue!" On May 21, Miller participated in another on-line chat, sponsored by MSNBC and archived at <<http://www.msnbc.com/news/756350.asp>>. Beginning elegiacally — Stephen Jay Gould had died the previous day — Miller proceeded to answer questions about the efficacy of natural selection, extinction and biodiversity, and reconciling evolution and religious belief. Asked whether there really is a bias against publishing evidence against evolution, Miller replied, "If there was genuine evi-

with the 2002 National Science Board Public Service Award. The National Science Board is the governing board of the National Science Foundation. The annual award recognizes outstanding contributions to communicating, promoting, or helping to develop broad public policy in science and engineering; the citation for Scott's award read, "For her promotion of public understanding of the importance of science, the scientific method, and science education and the role of evolution in science education." Paula Apsell, the chair of the NSB Public Service Award advisory committee, said, "In an appropriate manner, Eugenie Scott struck a chord for the nation in the teaching of evolution. She communicated her message in a positive way among other competing, sometimes opposite, and often emotional points of view." Scott commented, "I am pleased that the NSB, in presenting this award, is publicly reaffirming its view of the importance of evolution in science, and of evolution education in science education." Scott joins the ranks of Jane Goodall, Stephen Jay Gould, and Philip and Phyllis Morrison, all previous individual recipients of the NSB Public Service Award.

According to an article in the *Skagit Valley Herald* (May 8, 2002; <<http://www.heraldnet.com/Stories/02/5/8/15465963.cfm>>), Roger DeHart, the science teacher who was at the center of controversy at Burlington-Edison High School district for several years due to his attempts to teach "intelligent design" as an alternative to evolution (see *RNCSE 2000 Sep-Oct; 20 (5): 15*) and then accepted a teaching position at nearby Marysville-Pilchuck High School (see *RNCSE 2000 Nov-Dec; 20 (6): 7-8*), is resigning from the latter school at the end of the year to take a position at a Christian high school in Thousand Oaks, California. There were no reports of his teaching "intelligent design" in Marysville.



dence against evolution, although some might resist its publication, the scientific community is so large and diverse that that evidence would surely find the light of day."

*Intelligent Design Creationism and its Critics* (Cambridge [MA]: MIT Press, 2002), edited by **Robert T Pennock**, received very favorable reviews from **Kevin Padian**, writing in *Science* (2002 Mar 29; 295: 2373), and from Jim Holt, writing in *The New York Times* (2002 Apr 14). Padian described Pennock's anthology as "an invaluable compilation for anyone who wants to learn about the scientific and philosophical failures of 'intelligent design' and the long-term political and social strategies of its advocates", singling out **Barbara Forrest's** contribution for especial praise: "Forrest's exposé of the wedge strategy should be required reading for all scientists as well as for government officials and bureaucrats, who seem particularly gullible when terms like 'viewpoint discrimination' and the 'parental right' not to educate children are introduced." After describing the central claims of Behe, Dembski, and Plantinga, Holt wrote, "[s]eeing how the Darwinians go about rebutting these arguments makes for high intellectual entertainment", adding, "[d]espite the ingenuity of the neo-creos, the Not Darwinism part of their strategy is pretty clearly a failure." Pennock's anthology was also the subject of David Lore's column in the May 5, 2002, *Columbus Dispatch*: according to Lore, *Intelligent Design Creationism and its Critics* "should be the beach book of choice this summer for the Ohio Board of Education and members of the writing committees working on state science standards. Board members at least should read the opening chapter, 'Intelligent Design Creationism's "Wedge Strategy,"' by philosopher and ID-watcher Barbara Forrest, and the final section, 'Creationism and Education'", which contains essays by Alvin Plantinga and Pennock.

A recent article in *The Scientist* (2002 May 13; 16 [10]: 68) reported that NCSE member **Rudolf (Rudy) Raff** was honored by the Council of the St Petersburg Society of Naturalists in Russia in February 2002. Raff was one of eight recipients of the Medal of Alexander Kowalevsky; Scott Gilbert was quot-

ed as explaining that Raff received the award in honor of his efforts "to create a new synthesis of the entire field of biology, nothing less, by reuniting evolutionary biology with developmental biology." Read the complete report at <[http://www.the-scientist.com/yr2002/may/features\\_020513.html](http://www.the-scientist.com/yr2002/may/features_020513.html)>.

*Darwin and Design: Science, Philosophy, Religion* (Cambridge [MA]: Harvard University Press, forthcoming), the latest book by NCSE Supporter **Michael Ruse**, was the topic of a symposium in *Zygon* 2002 Jun; 37 (2). William S Stone Jr contributed a summary (443-6); Ward H Goodenough offered his comments on natural selection and design as they figure in the book (447-50); Michael Cavanaugh discussed Ruse's treatment of teleology, suggesting that it fails to go far enough (451-5); and Ruse replied (457-60), saying "My critics make serious and sensible points, all of which are undoubtedly true but not all of which I feel that I can accept."

Responding to the furor in the United Kingdom about state-funded Emmanuel College's teaching of creationism, **Niall Shanks** wrote to the *Guardian* to express his dismay. "If the experience in the US is anything to go by", Shanks acidly warned, "this attempt by assorted Christian fundamentalist Taliban-wannabees to turn the clock of science back to the Middle Ages will not stop with biology. In the US we are used to undergraduates believing that Noah's Ark was the source of post-flood biodiversity, that the earth is less than 10 000 years old, that humans and dinosaurs lived together (creationism's Fred Flintstone hypothesis) and that the Grand Canyon was scooped out by a tidal wave during the flood" (<<http://www.guardian.co.uk/Archive/Article/0,4273,4371719,00.html>>). Subsequently, Ken Ham of Answers in Genesis saw fit to quote from Shanks's letter in a fundraising letter dated May 2002. Shanks is Professor of Philosophy at East Tennessee State University and a coauthor of "Of mousetraps and men: Behe on biochemistry" (*RNCSE* 2000 Jan-Apr; 20 [1-2]: 25-30).

After Senator Rick Santorum's op-ed "Illiberal education in Ohio schools" appeared in the March 14, 2002, *Washington Times*, **Fred**

**Spilhaus Jr**, executive director of the American Geophysical Union, wrote to the editor to reply. Spilhaus noted that "Intelligent design" doesn't pass muster scientifically, so, instead, its supporters are seeking to use the iron fist of the law to push it in through the back door. 'Intelligent design' advocates want the Ohio legislature and the Ohio Board of Education to create by government fiat the stamp of scientific respectability where none exists." His letter was published on March 17.

In his latest "Reality Check" column for the quarterly newsletter of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP), entitled "Who let the dogmatism out?" (*Skeptical Briefs* 2002 Mar; 12 [1]: 14), **Victor J Stenger** argued that, in order to resist attempts to introduce "intelligent design" in science curricula, it is best neither to cite the religious motivations of its proponents nor to dismiss it dogmatically as unscientific. Instead, he suggested, "the best way to respond to 'intelligent design' theory is to examine its claims critically", adding that "[w]hether or not the current form of 'intelligent design' is science, it should not be taught as science in school. The evidence its supporters cite is sparse and controversial. Some of the arguments made for it are provably wrong."

Responding to Neil Greenspan's opinion piece "Not-so-intelligent design" in *The Scientist* (2002 Mar 4; 16 (5): 12), **Howard Winet** wrote to emphasize the need to "separate the *event* we call evolution, a history of life that shows patterns that are causally connected, from the mechanism(s) responsible for these patterns" in communicating with the public about evolution. He added, "As long as we maintain a reasoned scientific attitude toward the subject of organic evolution and stress that religious explanations, true or not, are simply outside the realm of science and, consequently[,] can play no role in scientific models, we remain true to our profession." His letter appeared on April 1.

[Publications, achievements, honors? Tell RNCSE so we can pass on the good news to all of our members. Call, write, or e-mail.]



# The Evolution of Racism: An Interview with Pat Shipman



*Medallion produced by Darwin's grandfather Josiah Wedgwood in 1787. By courtesy of the Wedgwood Museum Trust, Barlaston, Staffordshire, England.*

*Earlier this year, Harvard University Press re-issued Pat Shipman's 1994 book *The Evolution of Racism*. In recent years, anti-evolutionists have promoted the idea that evolution is a racist theory — even to the extent of introducing legislation that calls for eliminating evolution from public education on the basis of its supposed racist implications (see, for example, the Louisiana paragraph in *Updates*, RNCSE 2000 Nov/Dec; 20 [6]: 6). We are pleased to present an interview with Pat Shipman about her important book and its account of how evolutionary theory was misappropriated in support of racist political and social policies. The interview questions were furnished by Andrew J. Petto and Alex Wellerstein.*

**RNCSE:** *How would you describe the main theme of *The Evolution of Racism*?*

**PAT SHIPMAN (PS):** I wrote the book trying to explore the ways in which racism and evolution are intertwined and have been closely interconnected since the theory of evolution was first put forward.

**RNCSE:** *Why did you choose to call the book *The Evolution of Racism*?*

**PS:** The title has two meanings. First, the book speaks of the way racism and eugenics developed as evolutionary theory and its new view of biology became more widely accepted. Second, the book shows evolution as racists have painted it, as they have used and abused it for their own ends. So it is also a story about the special view of evolution created by racism.

**RNCSE:** *What do you think is the relationship between evolution and racism?*

**PS:** Racism, or tribalism, or “us versus them” is an old and ugly frame of mind. As the notion of a rational world — one that works according to discernable laws and rules rather than divine decree — has gained acceptance, many groups have seized upon evolutionary theory as a justification for their underlying beliefs and worldview. If the differences among living races can be explained as the working of a biological rule, then no one has to take the blame for the miserable consequences of treating others according to shorthand stereotypes rather than evaluating them according to their individual qualities. The other side

of the coin is that it has been almost impossible to study objective and quantifiable differences and variability among living human groups because racists have so misused incomplete or inexact information to justify their views.

**RNCSE:** *Racists, and more recently anti-evolutionists, have claimed that evolutionary theory has racist implications. How do the examples you use in your book show us how “scientific racism” relates to broader issues of scientific literacy and science education?*

**PS:** Without an adequate understanding of science and the basic principles of gathering and evaluating evidence, you are extremely vulnerable to believing the poorly supported convictions of those with loud or persuasive voices.

**RNCSE:** *To what extent do you think that racists sought evolutionary justifications for their already-held beliefs? Or did they develop these beliefs after looking at the results of scientific study?*

**PS:** Scientists, like everyone else, are irrevocably influenced by their personal backgrounds, social status, family experiences, and cultural beliefs. This is normal and human, and not a bad thing. I hope to give people a greater awareness of their own prejudices and how they influence seemingly objective judgments like “this is a plausible theory” and “this is too outrageous a hypothesis, just impossible to believe.” I believe that it is possible to become aware of the way our background influences our judgments and to practice becoming more open-minded. The truth is, in my experience, often surprising and frequently uncomfortable. Neither of those is sufficient reason to deny its existence.

**RNCSE:** *What do these examples of the extremes of science tell us about how it does or should function as a whole within our culture as both an intellectual and a social pursuit?*

**PS:** Science has become an ultimate authority, almost on a par with religious writings. There is a tendency to say “it is true because *they* say so”, and “*they*” can be scientists, religious figures, or any other sort of authority. I would like to replace that blind certainty in authority figures with what I think of as the basic scientific question: how would I know whether that is true?



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**Racism, like science (which it is not), has evolved more sophisticated techniques of gathering and presenting evidence.**

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**RNCSE:** *Let me ask about some specific scientists (or pseudoscientists) you discuss. Madison Grant's book *The Passing of the Great Race*, which you discuss in chapter 7, seems to presage the "culture wars" of the 1990s. Is Grant's worry about genetic mixing a worry about reversing the evolutionary progress of "higher" races or rather one about who gets to control the social agenda (and politics and economics)?*

**PS:** I can't tell you what motivated Grant because I didn't know him and I didn't live in his time. However, I believe that his concern was primarily about social agendas, politics, and control over groups. Nonetheless he had a genuine underlying question about how people differ and what that means.

**RNCSE:** *In the 1960s, Carleton Coon became a controversial figure after the publication of his book *The Origin of Races*, in which he argued that certain races reached the status of *Homo sapiens* before others, and that explains why different races reached different levels of civilization. Your treatment of Coon was a good deal more sympathetic than is typical in histories of 20th-century physical anthropology. How much of Coon's misfortune do you think had to do with his typological bent and barking back to an era in which the sociopolitical environment was different, and how much to changes in the field of physical anthropology itself — perhaps in reaction to the ways in which its methods and data had been used for evil?*

**PS:** I think Coon was unfairly castigat-ed both because he represented an older way of thinking and because, at the time he was writing and being damned by some of his colleagues, many anthropologists were trying to "clear the name" of the field as a whole by denying any racial variability existed at all. To deny variability among races (by which I mean populations that were once regionally- or geographically-based) is absurd. Anybody watching

the Olympics or any other truly international event can see that there are physical resemblances (presumably based in genetic differences) among people of the same geographical race; combination of those traits can be used fairly easily to divide people into broad racial categories. There is no point in denying these commonplace observations, and to do so for political purposes strikes me as foolish. *Of course* there are differences among people, and it should be possible to study them intelligently and scientifically so that we all know what we are dealing with. It is much too easy to attempt to discredit an academic enemy by accusing him or her of racism; it is a charge that stains indelibly whether or not it is true. It is a cheap way of ducking a greater and more complicated responsibility.

**RNCSE:** *At the end of chapter 9, you introduce the essential theme of 1990s work by J. Phillippe Rushton, and Murray and Herrnstein — that since other biological traits vary according to the geo-*

*graphic origin of human subpopulations, we ought to accept that intelligence does too. Are the real scientific issues about the heritability of "intelligence" and its distribution among human geographic variations too complicated to explain to the general public, or too poorly understood, or just really unsettled among scientists?*

**PS:** Biological traits *do* vary among geographical populations; I think that biological variability is a fact established without a doubt in humans as well as it is in, for example, ferns, seagulls, spiders, or frogs. Intelligence is a far more complex trait or set of traits than eye color or length of forearm, however, and our understanding of the genetics of even purportedly "simple traits" (such as the appearance of a particular bump on a particular tooth, for example) is very primitive. We need to stop ignoring or glossing over genuine genetically-influenced variability for fear of uncovering knowledge of those deadly and violence-inspiring differences in traits such as intelligence, morality, impulsiveness, or sexuality. We need to know what we are dealing with genetically so that we can then address the environmental influences on genetic traits with intelligence, wisdom, and kindness. For example, the main concept I took away from *The Bell Curve* is how pervasively harmful sheer stupidity is. If you look at an undesirable tendency — say, inability to hold a job, unusual likelihood of injuries, likelihood of having children at a very early age, likelihood of living in dire poverty — just about every one of them is closely correlated with low IQ or low performance on some other measure of intelligence. Never mind *who* performs badly on intelligence tests, which as we know are neither infallible nor perfect instruments for measuring intelligence. Let us talk about the fact that a small but tragic percentage of people *do* perform badly on those tests because their intelligence is low and it affects their entire lives and our whole society negatively. What are we going to do about it?

**RNCSE:** *A repeated theme in the book — in fact all the most compelling examples of the rise and fall of prominent scientists — seems to be that, especially with the issue of race and in the context of evolutionary biology, someone was trying "to subvert science to their convictions". In what ways do you think that racism has evolved?*

**PS:** Racism, like science (which it is not), has evolved more sophisticated techniques of gathering and presenting evidence. Other than that, the basic urge to protect yourself by gathering a cohesive group of "people like me" around yourself seems unchanged. What we need to think about, though, is that there is no end of misery and wickedness that can be caused by such exclusivity. We are all here, every race or sub-race or population, on one world. It is far more useful to try to figure out how we can function as a complex and constantly changing admixture of genetic and social traits than to try to rid the world of whatever group you personally find most obnoxious.

**RNCSE:** *At the end of chapter 14, you write, "The trajectory begun with Darwin has run its course." But later, you call for us to "prepare ourselves for this new level of debate...". Where is the debate going and what is the legitimate contribution of scientists who study human variation to the debate?*

**PS:** I believe that we need to determine the truth of human variability as best we can and decide how to go on from there. But this must be done in full awareness that the truth about genetic distinctions among races is an ever-shifting entity. Every day, with every birth, the old geographically-based races are being transformed into some new admixture or melange. In this specific sense only, I would say that human races do not exist: today's "Caucasoid race" is and will be different from tomorrow's and yesterday's.

**RNCSE:** *What is the proper message for these researchers to carry to the general public about human variation?*

**PS:** I would say (1) that human variability exists; (2) that this variability reflects both genetic inheritance and environmental influences; and (3) that we have as yet *no* good evidence that the hot-button traits (such as intelligence, morality, impulsivity, sexuality, or predisposition to vote for one or the other political party) are genetically controlled or genetically predetermined. *If* they are, then I think that it is time for us to find out what the reality is, without fussing and accusing one another of dire agendas so as to block the research. Once we know what is true, then we can start to discuss what we want to do about that truth for the good of all. I would emphasize the last phrase, for I think we must move forward to considering the good of the species and of the world of other species with which we interact and not simply the good of each particular little group.

**RNCSE:** *Of course, the message of the researchers is usually filtered through the press. Every time a new hominin fossil or a new DNA sequence is announced, the public is greeted with headlines that tell us that the entire family tree is being uprooted or that the new theory turns existing ideas on their heads. What do you think about the media's coverage of issues in physical anthropology in general?*

**PS:** Reporters really like those headlines, even if they are inaccurate. Shame on them! It is possible to make people see the importance of a discovery without gross hyperbole. A recent example is the report in *Nature* that indicates that one Neanderthal specimen may be a "love child" — a hybrid of humans and Neanderthals — thus indicating that the two are not different at the species level. How does this reflect on (a) the antiquity of "races"; (b) our understanding of the potential for genetic admixture in evolving humans; and (c) the meaning of geographical variation among human populations in the modern world? There is contradictory evidence about the role of Neanderthals in our own genetic heritage. One of the problems is that we usually have to work with incomplete and broken fossils, which show physical traits that may or may not reflect genetic differences. Some do, some do not, probably. As long as we cannot tell one (a genetically-controlled trait) from the other (a trait strongly or entirely influenced by environment), there is an element of uncertainty. Another problem is that, even when we have fossil DNA — as we do now for a number of Neanderthal specimens — we don't know how much genetic variability is enough to declare that two specimens are drawn from two different species. Neanderthal DNA, based on available samples, differs from that of any known human

group. Then there is the partial skeleton that seems to have skeletal features usually identified as being human and those identified as being Neanderthal. Reconciling these two lines of evidence is hard. Neanderthals may simply represent an extinct race of humans, which would imply a great antiquity for human races, or Neanderthals may be a different species of hominid altogether. I am still of the opinion that Neanderthals are too different from modern humans to be part of our direct lineage, but that assessment is subject to change as new fossils are discovered. Another way of putting my view is that Neanderthals are a biologically distinctive group and that I *think* (based on my personal prejudices and knowledge of biological variation) that they are too different to be the same species as me. What a species is and how it is to be recognized is a deep and difficult problem.

**RNCSE:** *At the end of the book, you conclude, "As a species, it is time for us to grow up." What would a "grown-up" species have to say about its evolutionary and genetic heritage that is different from what we know now?*

**PS:** Growing up, as an individual, is a process of becoming more aware of your strengths and weaknesses and more accepting of those areas in which you are realistically limited and those in which you can excel. Let me give a personal example. I am passionately involved in dressage, an equestrian sport somewhat akin to ballet with horses. I have had to accept that I am not going to the Olympics nor am I likely to win even a regional championship. Other people are more gifted riders than I, more athletic, better coordinated, stronger, with better reflexes and a better sense of where their body parts are and what they are doing. I wish that this were not true. I wish that I could ride like other people who leave me gasping with their ability; heck, I wish that I could shimmy like my sister Kate. I cannot. I have to live with that, accept the fact, and decide how I am going to go on in the world with my limitations and strengths. That, I think, is an essential part of growing up.

**RNCSE:** *In the epilog, you write, "Ignorance is never a solution." However, in many of the instances that you explored in the book, researchers were earnestly convinced that they were beating back the frontiers of ignorance. What is the proper role for academics and researchers in helping cultural and governmental institutions to interpret and act upon scientific discoveries?*

**PS:** We have to struggle and strive to do better, to consider all the alternative interpretations of the data more rigorously, to dismantle or disable our own prejudices. Ignorance is never a solution. Glossing over or distorting the facts is not a solution either. Deciding that we do not like a particular sort of person and seeking scientific backup for our prejudices is not only "not a solution", it is at the heart of the problem. We must do better than that.

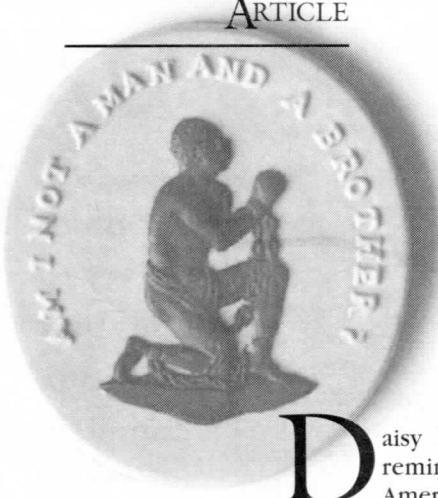
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**It is far more  
useful to try to  
figure out how  
we can function  
as a complex,  
constantly  
changing  
admixture of  
genetic and  
social traits  
than to try to  
rid the world of  
whatever group  
you personally  
find most  
obnoxious.**

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# Racism and the Public's

Randy Moore, *University of Minnesota*



**D**aisy Bates's death in November 1999 reminded many people of one of America's most bitter civil-rights struggles: the struggle to integrate public schools. In 1957, Bates helped 9 black students to enter Little Rock's all-white Central High School. Although a federal court had ordered the integration of the school, Arkansas governor Orval Faubus became a white-supremacist folk-hero when he ordered 1200 armed troops to block the black students from entering the school. In response, President Dwight Eisenhower reluctantly sent in the 101st Airborne to escort the students to class and protect them from the mobs of angry, spitting, rock-throwing whites that had surrounded the school. The students, who became known as "The Little Rock Nine", received Congressional Gold Medals in 1999 in recognition of their courage (Lawrence 2000).

Although the story underlying the integration of Central High School has been told many times, another pivotal struggle that occurred just 7 years later at Central High is often overlooked. That struggle, led by biology teacher Susan Epperson, was to overturn Arkansas's 1928 ban on teaching evolution in public schools (the only such ban passed by popular vote; see Moore 2002a). During the struggle, Governor Faubus was a vocal critic of Epperson, basing his opposition on the same reasoning that he had used to oppose integration: "It's the will of the people." Although Epperson's legal struggle was not explicitly about race, the many links between the anti-evolution crusade and its underlying racial sentiments later became explicit. Indeed, racism has long been an issue in the creationism/evolution debate.

## EVOLUTION, CREATIONISM, AND RACISM

How could evolution be used to support racism? We know that human geographic variants are recently derived and that genetic differences between them are superficial and trivial; there are, to echo the subtitle of Darwin's *On the Origin of Species* (Darwin 1859), no biologically "favoured races" of humans. Even biological distinctions of races are outmoded, for such distinctions are based not on biology, but on our cultural interpretations of nature (for example, see Gould 1977, 1993). Nevertheless, scientists and others

have often used — or, more accurately, misused — evolution to support their racist ideas.

In human phylogeny, for example, some biologists, such as Alexander Winchell (1870, 1880), claimed that whites descended from non-whites, but that whites continued to progress while non-whites did not. As a result of this continued progress, whites became superior to non-whites. Other biologists argued, on the contrary, that non-whites degenerated from whites, and therefore are inferior to whites (see McIver 1994). The constant, of course, was the assumption of white supremacy, which various biologists argued for by considerations of neoteny (see Gould 1977, 1993), cranial capacity (see Stanton 1960), and intelligence (see Gould 1977). None of this supposed evidence for white supremacy has stood up to scientific scrutiny; the state of the art in the evolutionary sciences clearly and overwhelmingly indicates that racism is not scientifically justifiable.

Racist arguments have also been based on creationist beliefs, both scientific (or pseudoscientific) and religious. Before the Civil War, apologists for slavery claimed that the South's "peculiar institution" was sanctioned by the Bible, some adding that the Bible proclaims that blacks and whites do not have a common ancestry. Such claims continued to appear well after Emancipation and into the 20th century (Dickey 1958; Odeneal 1958), bolstered by the flourishing of various individuals and groups that promoted a mix of fundamentalist religious beliefs and racism.

The Ku Klux Klan, perhaps the most influential group to promote racism in the US, also opposes evolution (as the recent movie *O Brother, Where Art Thou?* depicted). Ironically, although the Klan wants to ban the teaching of evolution, it embraces the crudest form of Social Darwinism to explain and justify its racist ideology. Specifically, the Klan endorses the ideas of many "scientific" racists who claim that genetic differences between races are biological determinants of human actions and human destiny. Anyone who intervenes to remedy these inequalities is condemned as interfering with natural laws (for example, see Lewis 1962).

The Klan gave powerful support to the anti-evolution movement (de Camp 1968). William Jennings Bryan is a case in point. Although he was not a member of the Klan and disliked some of its views (for example, its anti-Catholic and anti-Semitic bigotry), he was "soft on the Klan" because he was "mindful that a host of his followers were just the sort of people who

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# Perception of Evolution

made up the Klan" (de Camp 1968). Bryan endorsed Klansmen in elections (Feldman 1999) and spoke passionately at the 1924 Democratic National Convention against an amendment denouncing the Klan (Alexander 1965; Ashby 1987; Chalmers 1965; Rice 1962). In turn, he received political support from the Klan (Anonymous 1924; de Camp 1968; Mecklin 1926).

In 1925, the Klan became the first national organization to urge that creationism and evolution be given equal time in public schools (see Wade 1987). In the same year, Bryan's participation in the Scopes trial turned it into a major event of international interest. When Bryan died five days after the Scopes trial, the Klan burned crosses in Bryan's memory, eulogizing him as "the greatest Klansman of our time" (Werner 1929). The Klan vowed to take up Bryan's anti-evolution cause, and a defrocked Klan official formed a short-lived rival group called the Supreme Kingdom, "whose primary purpose was carrying on Bryan's crusade against teaching evolution" (Larson 1997).

Although there was no formal connection between fundamentalism and the Klan, both movements appealed to similar people. According to McIver (1994), perhaps as many as 40 000 fundamentalist preachers joined and were active in the Klan. As Mecklin observed, "a fundamentalist would have found himself thoroughly at home in the atmosphere of Klan ceremonies" (1924: 100). Moreover, many of the leading evangelists of the early 20th century were fervent creationists who supported, and were supported by, the Klan (Moore 2001; Wade 1987). William Bell Riley — who founded the World Christian Fundamentals Association and sent Bryan to Dayton to prosecute Scopes — advocated white supremacy as well as a ban on the teaching of evolution. Similarly, evangelist Billy Sunday endorsed the Klan Creed of white supremacy and bitterly attacked evolution. Bob Jones Sr's revivals were supported financially by the Klan (de Camp 1968). And J Frank Norris linked his attacks on evolution with assertions of the importance of white supremacy, warning his followers that white children would have to attend schools with and be taught by blacks.

Later in the 20th century, as most religious denominations in the US denounced the Klan, Southern Baptists — whose denomination was organized in 1845 as a haven for pro-slavery Baptists — were "unanimously silent on the question of the Klan" (Moore 2002a; Rosenberg 1989). "[A] silent but pow-

erful accessory to the segregation pattern in the South" (Anonymous 1958: 1128; see also Rosenberg 1989), the Southern Baptists opposed not only integration and other antiracist efforts, but also the teaching of evolution (Ammerman 1990), denouncing Darwinism as "a soul-destroying, Bible-destroying, and God-dishonoring theory".

Other relatively mainstream institutions in which creationism and racism are intertwined include Bob Jones University, founded by Bob Jones Sr in 1927, two years after the Scopes trial, as "a college with high academic standards; an emphasis on culture; and a down-to-earth, practical Christian philosophy of self-control that was both orthodox and fervent in its evangelistic spirit" (Anonymous 2002a). Until a massive public-relations problem forced the university to reconsider its policy in 2000, it prohibited interracial dating, which was viewed as "playing into the hand of the Antichrist" by defying God's will regarding God-made differences among the races (Hebel and Schmidt 2000). Today, Bob Jones University — the largest fundamentalist university in America — sells satellite-delivered anti-evolution academic courses (Carr 2000). And its creed contains the phrase "I believe in the creation of man by the direct act of God", which is glossed in such a way to preclude any evolutionary interpretation (Anonymous 2002b).

Such disturbing hate groups as the Aryan Nations and Christian Identity have inherited the mantle of the Klan. Writing in the revealingly titled *Christian Patriot Crusader*, one Christian Identity writer asserts that Jews are satanic, that blacks are not human, and that evolution is a "satanically inspired Jewish fable" (Dowsett 1991). Although these are fringe groups, the results of a survey in which a significant percentage of students agreed that "[t]he color of a person's skin depends on whether God favored or punished their ancestors" (Lawson and Worsnop 1992) suggests that their influence may be felt in society at large.

A more thorough analysis of the many historical links between creationism and racism is provided elsewhere (Moore 2001; Shipman 2002).

## THE VILIFICATION OF EVOLUTION

A favorite strategy of creationists has been to vilify

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**[E]volutionary  
science clearly ...  
indicates that  
racism is not  
scientifically  
justifiable.**

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evolution. At the Scopes trial, prosecutor William Jennings Bryan warned that "All the ills from which America suffers can be traced back to the teaching of evolution." More recently, Judge Braswell Dean of the Georgia State Court of Appeals stated in 1981 that "This monkey mythology of Darwin is the cause of permissiveness, promiscuity, pills, prophylactics, perversions, pregnancies, abortions, pornotherapy, pollution, poisoning, and the proliferation of crimes of all types" (quoted in Toumey 1994: 94) and in 1999, US House of Representatives Republican Whip Tom DeLay claimed that the teaching of evolution is linked to school violence, birth control, and abortion (Anonymous 1999). As part of this vilification, many creationists blame evolution for racism. For example,

**[C]reationists  
blame evolution  
for racism. ...  
Today, creationist  
organizations ...  
sell posters  
claiming that  
evolution leads  
to racism,  
Nazism, adultery,  
infanticide,  
stealing, murder,  
drunkenness, and  
homosexuality.**

Henry Morris — the most influential creationist of the late 20th century — claims that "evolutionism" is satanic and responsible for racism, abortion, and a decline in morality (Morris 1989). Today, creationist organizations such as the Creation Research Science Education Foundation sell posters claiming that evolution leads to racism, Nazism, adultery, infanticide, stealing, murder, drunkenness, and homosexuality. Despite this late-20th-century spin associating evolution with racism, the links between creationism and racism have often been explicit in the fight to integrate public schools. Not all anti-evolutionists in the South opposed integration, but many did; for these people, banning the teaching of evolution was part of a heroic campaign to save "The Southern Way of Life" from race-mixers and atheists, who were equally evil in Dixie demonology (Irons 1988). These links were obvious when Susan Epperson challenged the Arkansas anti-evolution statute in the 1960s (*Epperson v Arkansas*; see Moore 2002a).

#### THE LESSONS OF EPPERSON V ARKANSAS

In 1965, Susan Epperson was a young biology teacher at Central High School in Little Rock, Arkansas. She was deeply troubled by the fact that it was against the law for her to teach evolution, despite the fact that evolution is biology's unifying principle. Much of the mail that she received regarding her case was supportive; for example, John Roberts wrote to her on December 9, 1965: "I hope you win your case because students should know the truth." Yet despite issuing a statement affirming her Christianity, Epperson was attacked by many people as antireligious. Central High School, the site of racial turmoil in the late 1950s, was still seething with racism when she announced that she would test the state's anti-evolution law (Moore 2002a).

Many of her correspondents misunderstood evolution, as evidenced by a letter, dated January 20, 1966, which argued "Now, if man came from monkey, it

seems the monkey would be no more. Or, else monkeys would still be having men and men giving birth to monkeys." Similarly, in a letter dated March 15, 1966, a correspondent claimed:

There is absolutely no foundation whatsoever for the belief in evolution ... People still produce people, cats produce a cat, dogs a dog, birds a bird, monkeys a monkey, etc. ... I beg of you to get down on your knees and cry out to God to give you wisdom and understanding.

Others used personal attacks to express their concerns about what evolution meant for their attractiveness and ego:

... if you want to claim relation to the ugly apes go right ahead ... (undated letter)

Having seen your picture it is easy to understand why you would want to argue and teach that you evolved from this lineage. (undated letter)

You go right ahead Mrs Epperson and teach the ugly theory of evolution — because from the way you *looked* on TV, it *could* be true that man and woman did evolve from apes. (letter dated April 2, 1966, emphasis in original)

No wonder you want Arkansas to let you teach evolution in school; to look at you and your old Dad anyone would think you and he both started from a big old baboon. He looks like one and you look like a tailless monkey. ... America needs Bible teachers, not things like you. I pity your Mother for giving birth to such a girl. (anonymous and undated letter)

Others, though, apparently fearing that Epperson was an intellectual carpetbagger intent on forcing a new type of academic reconstruction on Arkansas's public schools, connected evolution with antiracism. The link was pointed out explicitly in an editorial entitled "Arkansas begins fight for freedom to teach" that appeared in *The Ohio State Lantern* on January 21, 1966:

And as for [Governor] Faubus — who used National Guard troops to prevent integration of Little Rock Central High School in 1958 — he probably finds the theory [of evolution] distasteful because, among other reasons, it implies that Negroes and Caucasians came from the same ancestor.

The antiracist implications of evolution upset many people. Here's a portion of an anonymous letter to Epperson dated December 9, 1966:

If ... them cocoanut-heads [*sic*] up there want to believe there [*sic*] foreFathers [*sic*] are monkeys, apes, or gorillas, its [*sic*] OK, but don't let them shove it down our throat like Johnson did the Civil Rights law ... If I was a teacher, the first nigger that walked in my classroom I would walk out ... and don't think I wouldn't.

*continued on page 23*

# Statement on Biological Aspects of Race

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**PREAMBLE:** As scientists who study human evolution and variation, we believe that we have an obligation to share with other scientists and the general public our current understanding of the structure of human variation from a biological perspective. Popular conceptualizations of race are derived from 19th- and early 20th-century scientific formulations. These old racial categories were based on externally visible traits, primarily skin color, features of the face, and the shape and size of the head and body, and the underlying skeleton. They were often imbued with nonbiological attributes, based on social constructions of race. These categories of race are rooted in the scientific traditions of the 19th century, and in even earlier philosophical traditions which presumed that immutable visible traits can predict the measure of all other traits in an individual or a population. Such notions have often been used to support racist doctrines. Yet old racial concepts persist as social conventions that foster institutional discrimination. The expression of prejudice may or may not undermine material well-being, but it does involve the mistreatment of people and thus it often is psychologically distressing and socially damaging. Scientists should try to keep the results of their research from being used in a biased way that would serve discriminatory ends.

**POSITION:** We offer the following points as revisions of the 1964 UNESCO statement on race:

1. All humans living today belong to a single species, *Homo sapiens*, and share a common descent. Although there are differences of opinion regarding how and where different human groups diverged or fused to form new ones from a common ancestral group, all living populations in each of the earth's geographic areas have evolved from that ancestral group over the same amount of time. Much of the biological variation among populations involves modest degrees of variation in the frequency of shared traits. Human populations have at times been isolated, but have never genetically diverged enough to produce any biological barriers to mating between members of different populations.
2. Biological differences between human beings reflect both hereditary factors and the influence of natural and social environments. In most cases, these differences are due to the interaction of both. The degree to which environment or heredity affects any particular trait varies greatly.
3. There is great genetic diversity within all human populations. Pure races, in the sense of genetically homogenous populations, do not exist in the human species today, nor is there any evidence that they have ever existed in the past.

4. There are obvious physical differences between populations living in different geographic areas of the world. Some of these differences are strongly inherited and others, such as body size and shape, are strongly influenced by nutrition, way of life, and other aspects of the environment. Genetic differences between populations commonly consist of differences in the frequencies of all inherited traits, including those that are environmentally malleable.

5. For centuries, scholars have sought to comprehend patterns in nature by classifying living things. The only living species in the human family, *Homo sapiens*, has become a highly diversified global array of populations. The geographic pattern of genetic variation within this array is complex, and presents no major discontinuity. Humanity cannot be classified into discrete geographic categories with absolute boundaries. Furthermore, the complexities of human history make it difficult to determine the position of certain groups in classifications. Multiplying subcategories cannot correct the inadequacies of these classifications.

Generally, the traits used to characterize a population are either independently inherited or show only varying degrees of association with one another within each population. Therefore, the combination of these traits in an individual very commonly deviates from the average combination in the population. This fact renders untenable the idea of discrete races made up chiefly of typical representatives.

6. In humankind as well as in other animals, the genetic composition of each population is subject over time to the modifying influence of diverse factors. These include natural selection, promoting adaptation of the population to the environment; mutations, involving modifications in genetic material; admixture, leading to genetic exchange between local populations, and randomly changing frequencies of genetic characteristics from one generation to another. The human features which have universal biological value for the survival of the species are not known to occur more frequently in one population than in any other. Therefore it is meaningless from the biological point of view to attribute a general inferiority or superiority to this or to that race.
7. The human species has a past rich in migration, in territorial expansions, and in contractions. As a consequence, we are adapted to many of the earth's environments in general, but to none in particular. For many millennia, human progress in any field has been based on culture and not on genetic improvement.

Mating between members of different human groups tends to diminish differ-

ences between groups, and has played a very important role in human history. Wherever different human populations have come in contact, such matings have taken place. Obstacles to such interaction have been social and cultural, not biological. The global process of urbanization, coupled with intercontinental migrations, has the potential to reduce the differences among all human populations.

8. Partly as a result of gene flow, the hereditary characteristics of human populations are in a state of perpetual flux. Distinctive local populations are continually coming into and passing out of existence. Such populations do not correspond to breeds of domestic animals, which have been produced by artificial selection over many generations for specific human purposes.
9. The biological consequences of mating depend only on the individual genetic makeup of the couple, and not on their racial classifications. Therefore, no biological justification exists for restricting intermarriage between persons of different racial classifications.
10. There is no necessary concordance between biological characteristics and culturally defined groups. On every continent, there are diverse populations that differ in language, economy, and culture. There is no national, religious, linguistic or cultural group or economic class that constitutes a race. However, human beings who speak the same language and share the same culture frequently select each other as mates, with the result that there is often some degree of correspondence between the distribution of physical traits on the one hand and that of linguistic and cultural traits on the other. But there is no causal linkage between these physical and behavioral traits, and therefore it is not justifiable to attribute cultural characteristics to genetic inheritance.
11. Physical, cultural and social environments influence the behavioral differences among individuals in society. Although heredity influences the behavioral variability of individuals within a given population, it does not affect the ability of any such population to function in a given social setting. The genetic capacity for intellectual development is one of the biological traits of our species essential for its survival. This genetic capacity is known to differ among individuals. The peoples of the world today appear to possess equal biological potential for assimilating any human culture. Racist political doctrines find no foundation in scientific knowledge concerning modern or past human populations.

# EVOLUTION AND SCIENCE FICTION

Writing about science fiction in *Answers in Genesis's TJ In-Depth Creation Journal* (formerly *Technical Journal*), David J Laughlin explains that "evolution has permeated the genre from its beginning, giving writers the basis for humanistic themes and for imagining all sorts of strange phenomena", and ominously remarks that "[s]ignificantly, Rottensteiner's chronology of historically important literary works of science fiction [*The Science Fiction Book*, New York: Seabury Press, 1975] lists only five stories written from 1817 (which includes Shell[e]y's *Frankenstein*) to 1859, the year Charles Darwin's *Origin of Species* was published. Following the publication of Darwin's book, however, the same timespan of 42 years (1859–1901) produced no less than 26 important science fiction works." He concludes, "It is because science fiction has its roots in evolution that the false belief systems mentioned have emerged and thrive in the genre" (Science fiction: A biblical perspective, *TJ* 2001; 15 [2]: 81–8; on the web at <[http://www.answersingenesis.org/home/area/magazines/tj/docs/tj\\_v15n2\\_sciencefiction.asp](http://www.answersingenesis.org/home/area/magazines/tj/docs/tj_v15n2_sciencefiction.asp)>). Those who are inclined to consider *Answers in Genesis's* views about literature as every whit as reliable as its views about geology, however, should check out the following science fiction books — necessarily selected from a host of candidates — in which evolution plays a role, now available through the NCSE web site: <[www.ncseweb.org/bookstore.asp](http://www.ncseweb.org/bookstore.asp)>. And remember, every purchase benefits NCSE!



Illustration by Dave Smith, used with permission of the University of California Museum of Paleontology.

## DEEP TIME TRAVEL

### *No Enemy But Time*

by Michael Bishop

The winner of the 1982 Nebula award for best science fiction novel of the year, *No Enemy But Time* follows a protagonist whose dreams of prehistoric Africa are so compellingly detailed that he is invited to join a most unusual time travel project. Stranded in the past, he finds love among the *Homo habilis* he was sent to research. Writes Norman Spinrad, "*No Enemy But Time* is a science fiction novel of rare maturity and perhaps even rarer wit."

### *The Dechronization of Sam Magruder*

by George Gaylord Simpson  
Paleontologist and an architect of the modern synthesis, George Gaylord Simpson also ventured into fiction with *The Dechronization of Sam Magruder*, in which a physicist working on a quantum theory

of time is catapulted back to the Cretaceous, which Simpson describes in loving detail. With a preface by Arthur C Clarke and an afterword by Stephen Jay Gould. Yves Barbero, writing in *Creation/Evolution* (1996 Summer; 16 [1], nr 38: 32), remarked, "Simpson's novel is a terrific read on many levels. ... The book is a full evening's pleasure."

### *The Time Machine*

by HG Wells

A classic of science fiction, Wells's first novel hardly needs any introduction. Wells's description of our descendants in the year 802701 — the beautiful but feeble Eloi and the fierce and carnivorous Morlocks — is unforgettable. Joseph Conrad praised Wells for "contriv[ing] to give over humanity into the clutches of the Impossible and yet manage to keep it down (or up) to its humanity, to its flesh, blood, sorrow, folly. *That* is achievement." Wells studied with Thomas Henry Huxley at the Normal School of Science in London, and traces of his biological

education are evident throughout his early novels.

## HUMAN EVOLUTION IN THE PAST

### *Orphan of Creation*

by Roger MacBride Allen

In Allen's 1988 novel, now back in print, the bones of an australopithecine are found in Mississippi and are dated to the period just before the Civil War. As the evidence mounts that australopithecines are alive in the present day, the question of what it is to be human assumes a new urgency. According to Jim Foley's paleoanthropology fiction page at <[www.talkorigins.org/faqs/hom/fiction.html](http://www.talkorigins.org/faqs/hom/fiction.html)>, *Orphans of Creation* also comments on the creation/evolution controversy. Reviewing it on Amazon.com, Robert J Sawyer (whose *Calculating God* is described below) gives it 5 stars,

<<http://www.ncseweb.org/bookstore.asp>>



adding "It impressed the heck out of me."

### ***The Clan of the Cave Bear***

by Jean M Auel

First in the Earth's Children series of novels (also containing *The Valley of Horses*, *The Mammoth Hunters*, *The Plains of Passage*, and *The Shelters of Stone*), *The Clan of the Cave Bear* tells the story of Ayla, a Cro-Magnon orphan found and raised by a clan of Neanderthals about 35 000 years ago. *The Clan of the Cave Bear* was a finalist for the National Book Award for First Novel, and the reviewer for the *San Francisco Chronicle* raved, "Jean Auel has performed a minor miracle."

### ***The Evolution Man***

by Roy Lewis

Originally published in 1960 as *What We Did to Father*, *The Evolution Man* follows the adventures of the primal horde, led by their inventive genius of a father. Familiar themes of paleoanthropological fiction are treated, although not in the sort of diction that is familiar in the genre: "Good gracious! ... While I have been talking to you, and not even thinking about it, I have made a most important invention: the heavy-duty hunting spear with the fire-hardened point!" "Artfully told and laugh-out-loud funny", writes the reviewer for the *Los Angeles Times Book Review*.

## **HUMAN EVOLUTION IN THE FUTURE**

### ***Darwin's Radio***

by Greg Bear

The winner of the 2000 Nebula Award for the best science fiction novel of the year, Greg Bear's *Darwin's Radio* is "an ingeniously plotted thriller that questions everything we believe about human origins and destiny — as civilization confronts the next terrifying step in evolution" (to quote the jacket copy). "As three scientists discover a catastrophic threat within humanity's genes, Bear, a master of hard SF, explores the nature of evolution and, through well-developed characters, the nature of the species that would control it", writes the reviewer for *Publisher's Weekly*.

### ***Last and First Men***

by Olaf Stapledon

First published in 1930, *Last and First Men* stretches over two billion years to describe the career of no fewer than 18 species of humans, beginning with the First Men, *Homo sapiens*. John Maynard Smith writes, "A book which probably had a bigger influence on me than anything I've ever read was written in 1933 [sic] by a man called Olaf Stapledon and called *Last and First Men*. It's quite an extraordinary book. ... This book completely blew my mind when I read it at the age of 15 or so. It made me fascinated in genetics, fascinated in evolution, and I suppose it's as much as anything else responsible for where I am standing today."

### ***Galápagos***

by Kurt Vonnegut

"The thing was: One million years ago, back in 1986 AD. ..." Thus begins Kurt Vonnegut's satirical look backwards at the future of human evolution, narrated by a ghost who tells the story of a group of vacationers stranded in the Galápagos when the Apocalypse arrives. Their descendants subsequently evolve into a new species: furry, finned, fish-eating, and small of brain. "Vonnegut is a postmodern Mark Twain", writes the reviewer for *The New York Times Book Review*; "*Galápagos* is a madcap genealogical adventure."

## **INTELLIGENT DESIGN IN ACTION**

### ***2001: A Space Odyssey***

by Arthur C Clarke

A classic science fiction novel that not only features a mysterious alien artifact of unknown purpose (ripe for the application of Dembski's explanatory filter?) but also posits ongoing interference by extraterrestrials in the course of human evolution. Published alongside the release of the film directed by Stanley Kubrick, *2001* was followed by *2010: Odyssey Two*, *2061: Odyssey Three*, and most recently, *3001: The Final Odyssey*. There is even a creationist web site, <<http://www.2001principle.net/>>, that takes *2001* as its theme!

### ***Strata***

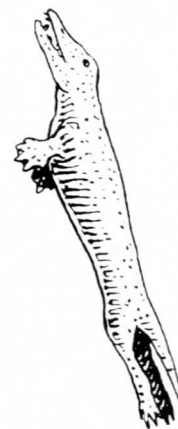
by Terry Pratchett

Before Terry Pratchett's career took off with the wildly popular Discworld series, he wrote *Strata*. "Discovering two of her employees have placed a fossilized plesiosaur in the wrong stratum, not to mention the fact it is holding a placard which reads 'End Nuclear Testing Now', doesn't dismay the woman who built a mountain range in the shape of her initials during her own high-spirited youth. But then come a discovery of something which did intrigue Kin Arad. A flat earth was something new ..."

### ***Calculating God***

by Robert J Sawyer

From the cover: "An alien shuttle lands outside Toronto's Royal Ontario Museum. A six-legged being emerges, who says, in perfect English, 'Take me to a paleontologist.' It seems that earth, and the alien's home planet, and the home planet of another alien species traveling on the alien mothership, all experienced the same five cataclysmic events at the same times in their prehistory. ... Both alien races believe this proves [that] God has obviously been playing with the evolution of life on each of these planets. From this provocative launch point, Sawyer tells a fast-paced, and morally and intellectually challenging, SF story."



## **CORRECTION**

We apologize for omitting the biographical information to accompany Reed Richter's article, "What science can and cannot say: The problems with methodological naturalism", in *RNCSE* 2002 Jan/Apr; 22 (1-2): 18-22.

Reed Richter has a PhD in philosophy from the University of California at Irvine and has lectured at several universities in the US and abroad. He has a number of publications in the fields of decision theory and bioethics. Over the past several years, he has been a frequent contributor to discussions of creationism, abortion, and euthanasia. His current interest is establishing a practical dialog between working scientists and professional philosophers on the issue of evolution.



# NCSE on the Road

## A CALENDAR OF SPECIAL EVENTS, PRESENTATIONS, AND LECTURES

**DATE** October 9, 2002  
**CITY** Lewiston ME  
**PRESENTER** Eugenie C Scott  
**TITLE** What is "Intelligent Design"?  
**EVENT** Bates College Public Lecture Series  
**TIME** 7:30 PM  
**LOCATION** TBA  
**CONTACT** James W. Carignan, jcarign@bates.edu

**DATE** October 25, 2002  
**CITY** San Francisco CA  
**PRESENTER** Eugenie C Scott  
**TITLE** The Big Ideas of Human Evolution  
**EVENT** California Science Teachers Association  
**TIME** 12:00 noon  
**LOCATION** Bill Graham Civic Auditorium  
**CONTACT** Judy Scotchmoor, jscotch@uclink4.berkeley.edu

**DATE** October 27, 2002  
**CITY** Denver CO  
**PRESENTER** Eugenie C Scott  
**TITLE** Scientists and Congressional Anti-evolutionism  
**EVENT** Geological Society of America panel discussion  
**TIME** 8:00 AM  
**LOCATION** Colorado Convention Center  
**CONTACT** Eugenie Scott, scott@ncseweb.org

**DATE** October 31, 2002  
**CITY** Austin TX  
**PRESENTER** Eugenie C Scott  
**TITLE** Why is Evolution Not Being Taught?  
**EVENT** Southwest Educational Development  
Laboratory panel discussion  
**TIME** TBA  
**LOCATION** 211 E 7th St  
**CONTACT** Eugenie Scott, scott@ncseweb.org

**DATE** November 21, 2002  
**CITY** New Orleans LA  
**PRESENTER** Eugenie C Scott  
**TITLE** An Anthropological View of the  
Creation/Evolution Controversy  
**EVENT** American Anthropological Association  
**TIME** 7:00 PM  
**LOCATION** Hyatt Regency Poydras Plaza  
**CONTACT** Eugenie Scott, scott@ncseweb.org

**DATE** April 9, 2003  
**CITY** Spokane WA  
**PRESENTER** Eugenie C Scott  
**TITLE** The Old and New Antievolutionism:  
Creationism Evolves  
**EVENT** Gonzaga University Biology Department  
Lecture Series  
**TIME** 7:30 PM  
**LOCATION** TBA  
**CONTACT** Hugh Lefcort, lefcort@gonzaga.edu

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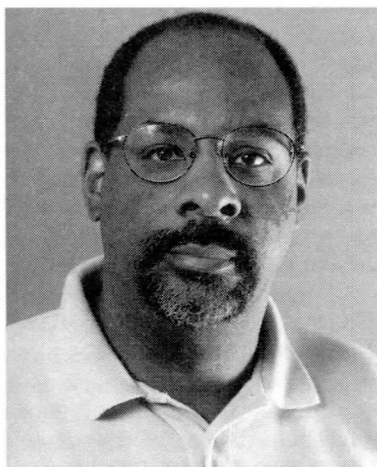
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# Why We Should Teach Our Students About Race

Joseph L Graves Jr



Joseph L. Graves Jr is Professor of Evolutionary Biology in the Department of Life Sciences at Arizona State University West and the author of *The Emperor's New Clothes: Biological Theories of Race at the Millennium* (New Brunswick [NJ]: Rutgers University Press, 2001), reviewed by C Loring Brace in *RNCSE* 2001; 21 (1-2): 50.

I began writing *The Emperor's New Clothes* in 1997. At that time, I gave a great deal of thought to which audiences would profit most by its message. Professor Michael Rose felt that it should be read by "anyone who is a registered voter in the United States". I had far more modest aspirations, but I hoped that many high school teachers would read it. My goal in *The Emperor's New Clothes* was to popularize what evolutionary geneticists have known for over 50 years — that there are no biological races in the human species. I discuss this point in the conclusion of my book:

The United States's ongoing confusion about race results not from any intrinsic difficulty explaining the topic of human genetic variation but from the deep entanglement of racial categorization in the historical and social fabric of the country. Success in clarifying this issue will result

only from intellectual courage, resolve, and resourcefulness.

An important step toward this goal will be to take this message out of the universities. Educators have not sufficiently infused the K-12 curriculum with the modern scientific understanding of human biological variation (Graves 2001: 194).

I believe that there are two reasons that human genetic variation is not routinely discussed in US high schools. The first is that there is an unfortunate trend sweeping the nation's curricula to avoid controversy whenever possible. In this vein, we have seen state school boards attempt to eliminate discussion of organic evolution because some of their constituencies are ideologically opposed to it. Of course, it follows that without discussions of human evolution, no meaningful discussion of human genetic diversity can be engaged.

Racism and the Public's Perception of Evolution continued from page 18

A similar link between racism and Epperson's lawsuit was made in a letter to Epperson dated May 1, 1966:

I can imagine, you refer to the Negroes ... One of many things [that] makes me mad at the Welfare Department. Pays Negroes to increase their population by leaps and bounds... [If] this actually enters court, it will sure scramble the Civil Rights Bill, I hope.

Others made more subtle, yet equally revealing, statements about the link they assumed between racism and evolution. For example, one letter writer closed his "Easter Sunday 1966" missive attacking Epperson with a telling postscript: "P.S. I'm white, too."

## HISTORY'S LESSONS

Today, the links between evolution, creationism, and racism often remain explicit. A recent example occurred in April 2001, when Louisiana State Representative Sharon Broome introduced a resolu-

tion urging the state legislature to "reject the core concepts of Darwinist ideology" because the writings of Charles Darwin are "racist" and have been used by Hitler and others to justify mass murder and other heinous crimes (Good 2002). Although the Louisiana House Education Committee passed the resolution by a vote of 9 to 5, the Broome resolution was changed on the floor of the House. All references to Darwin and Darwinist ideology were removed, and the final version was simply a resolution to end racism and other forms of bigotry in Louisiana public schools (see the discussion in Good 2002).

There is a great irony here: creationists originally misused evolution to promote racism, but later vilified evolution as racist. The simple fact remains: there is no "inferior" race; the genetic differences between races are trivial. Neither evolution nor creationism is intrinsically racist, but both have been used to support racist ideas. Many creationists have denounced racism, but others continue to promote racism as part of their ideology.



Another unfortunate example of this trend is that of people refusing to let their children read Mark Twain's *Huckleberry Finn* because he uses the word "nigger" in the text and graphically describes the degradation that African Americans suffered in chattel slavery. Thus, we in the US still have problems discussing the scientific concepts relevant to the biology of "race" and have even greater problems recognizing the racist legacy that built our modern nation.

I suggest that these rationales for avoiding discussions of "race" in the curriculum are extremely dangerous. They must be wholeheartedly resisted with every ounce of our courage and intellectual fiber. We must do this because, when our curriculum ceases to engage controversy, it becomes neither interesting nor relevant. Our students can clearly observe biological variation in the features of their fellow students. Yet they are presented with no scientific explanations for the origin and significance of that diversity. Instead, they are engulfed in a milieu of folk ideas, stereotypes, and overtly racist explanations of that same diversity. For example, the 1998 MSNBC internet series on race, "Colorblind: Talking about Race under Internet Cover", revealed the general ignorance that we in the US still harbor concerning the concept of race. Some respondents thought that our socially constructed human races

were equivalent to dog breeds; even worse, some thought that they were equivalent to separate species incapable of producing fertile offspring!

The inability of the curriculum to address the social history of race is just as problematic. Discrimination and racism still determine many important social outcomes for individuals. Our students recognize this, even if their curricula do not, and many are victimized by that same ongoing discrimination. Our failure to address these social contradictions can only lead to a greater number of students who are alienated from our schools.

The second reason that discussions of human genetic diversity have not entered the high school curriculum has been the lack of communication between the scientists and the science teachers on this subject. This was in part due to scientists' not realizing how important this issue can be for high school audiences. It also results from the fact that scientific discussions of race necessarily impact the social legacies of racism. Few scientists have had the inclination or the understanding of this problem to help articulate these issues in ways useful to high school science teachers. I believe that *The Emperor's New Clothes* is a good start that brings together the science of race and the social historical treatment of racism. It is writ-

ten in a way that can facilitate teachers' developing exercises in biology, history, or sociology that foster critical thinking about the history of and our current understanding of human biological diversity and the outmoded use of the term "race" to apply to our species.

#### WHAT BIOLOGISTS MEAN BY "RACES" AND WHY HUMANS DO NOT HAVE ANY

Modern biology sees geographical races as equivalent to subspecies. These are defined by two criteria: overall genetic distance and whether such groups have been maintained as unique genetic lineages. Subspecies are thought to result from the processes involved in speciation, natural selection, and genetic drift, and have about 20% total genetic distance at polymorphic loci. We can see this in various *Drosophila* (fruit flies) species, but we do not see that much geographical variation in modern humans. Estimates of the amount of polymorphic variation between human populations vary between 3% and 7% (Graves 2001: 204). Neither is there any evidence of human races as distinct lineages (Templeton 2002: 37). Thus there is no biological meaning to such socially defined groups as "blacks" or "whites".

These groups are based on the history of racism and slavery in the New World. They do not conform to the underlying biological varia-



Why do the links among evolution, creationism, and racism persist? Although the blatant racism of creationists such as Billy Sunday, J. Frank Norris, and Bob Jones Sr seems a distant chapter of history, relics of these beliefs persist. Some people link racism with evolution out of ignorance; these misconceptions might be remedied with better teaching about evolution in which we explicitly address "the race question" (see "Why we should teach our students about race", p. 23). However, many others have political purposes for vilifying evolution. Indeed, there are few accusations that are as strong and potentially devastating as that of racism, and the branding of evolution (and, by implication, people who support evolution) as "racist" immediately puts advocates of evolution on the defensive. This aspect of the evolution/creationism controversy, like many others, is not about science education; it is about politics and perceptions, and we should not expect this to change. Instead, we should be prepared to address the issue with scientific and

historical facts and arguments. By exposing these misconceptions about evolution and racism in our classrooms and elsewhere, we can promote scientific literacy as well as social justice.

#### ACKNOWLEDGMENT

I thank Susan, Jon, and Elaine Epperson for discussing *Epperson v Arkansas* with me and for giving me access to their papers.

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tion within our species. This fact is now generally agreed upon among professional scientists, particularly physical anthropologists and geneticists (see, for example, AAPA 1996 and p 19; there is additional discussion in Graves 2001). These realizations, however, are just beginning to find their way into the public discourse. If this is true, what then accounts for the appearance of racial differences and the correlation of these differences with various social and cultural phenomena?

When the term "race" is used, it implies the existence of some non-trivial underlying hereditary features shared within a group of people and not present in other groups. Biological science has long been interested in the identification and quantification of variation in species. It has developed relatively precise tools to examine particular hereditary characteristics exhibited by organisms. When these tools are used to examine any of the physical features that define human biological races, we find that we cannot unambiguously retrace the racial divisions used in our society. Skin color, hair type, body stature, blood groups, disease predisposition or prevalence: none of these alone or in combination defines the "racial" groups that we have constructed.

Thus the average person distinguishes what he or she perceives to be racial categories by observ-

able physical traits. These physical traits do vary among geographical populations, although not in the ways most people believe. For example, Sri Lankans of the Indian subcontinent, Nigerians, and Australoids share dark skin, but differ in hair type and genetic predisposition for disease. Using physical characteristics such as body stature, body proportions, skull metrics, hair type, and skin color to create a tree of relatedness for human populations, the result is trees that do not match the measured genetic relatedness and known evolutionary history of our species (Cavalli-Sforza and others 1994: 71). For example, such an analysis would link Papuans and Australian Aborigines to sub-Saharan Africans, and Eskimos and North American Indians to Swedes and French. We know from genetic analyses, however, that Papuans and Australian Aborigines are most distinct from sub-Saharan Africans and that Eskimos and North American Indians are more closely related to Northeast Asians such as the Japanese.

These misclassifications result from the fact that local populations respond to climatic and other external environmental variables to produce physical characteristics adaptive to that specific environment. Thus, in general, tropical populations will have physical traits that match tropical conditions and arctic populations will

match arctic conditions. These features of a population's characteristics will be discordant with (not correlated to) other aspects of physical makeup. For example, at the same latitude, populations at high altitude might be expected to have greater lung capacity and greater red blood cell volume than a genetically related population at lower altitudes. We would expect that Kenyans, due to their evolving at high altitude, would have greater mean lung capacities and red blood cell counts than people living in the Congo basin. Yet, at the same time, Kenyan populations at high altitude have a very low frequency of the sickle cell anemia gene. This results because the sickle-cell trait is directly related to its ability to resist malaria. Malaria infection is rare at high altitudes because the humidity is too low for the survival of the mosquitoes that carry the parasite.

The failure to be able to define races by phenotypic traits is reinforced by the small differences among all modern human populations found at the genomic level. In February 2000, Craig Venter, then president of Celera Genomics, commented that it was not possible to distinguish among people who are ethnically African American, Chinese, Hispanic, and white at the genomic level. This statement vastly oversimplifies human genomic variation, since the Celera draft human genome



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map was based on DNA from only 5 volunteers. Nevertheless, we know there is very little genetic variation in modern humans.

The geographic distance between populations predicts the amount of variation we will see between populations (Templeton 2002). It is also clear that when human genetic variation is viewed by geographic distance, no discrete breakpoints appear — the distribution of traits varies along a continuum, changing gradually from one population to the next. Consequently, there is no way to claim that discrete racial categories can be created along the continuum of human genetic variation. Other studies support this general conclusion, including a recent examination of single nucleotide polymorphisms (SNP) at 313 genes from individuals in four US ethnic groups (who were described as Asians, Caucasians, African American, and Hispanics-Latinos [Stephens and others 2001].) This study confirmed the overall expectation from prior studies that the majority of SNP variation occurred as variations among individuals within populations (about 85 percent) as compared to variation between populations (about 15 percent).

#### FROM THE SCIENCE TO THE CLASSROOM

In *The Emperor's New Clothes*, I demonstrated that our social con-

struction of race was contingent upon the prior assumption of significant biological variation among human populations. Scientists now know that this was a false assumption — both at the level of the phenotype and genotype. Yet we in the US still believe in the main that race is a salient descriptor of personality, intellect, and morality. I believe that it is essential that the scientific understanding of human biological diversity be brought to the US public. Including discussions of this topic in the high school curriculum where appropriate is a step in the right direction. Science courses could develop modules that look at both human physical and genetic variation. Social sciences and history courses could include material that examines the history of the race concept and its use in the US. Exercises that include the expertise of science and social science teachers might be even more effective to this end.

Our students' misconceptions about human biological variation are severe. They exist, in part, because our curriculum does not address them. Some will argue that this effort is too risky; I say that whatever risk there is should be considered against the cost of continued ignorance.

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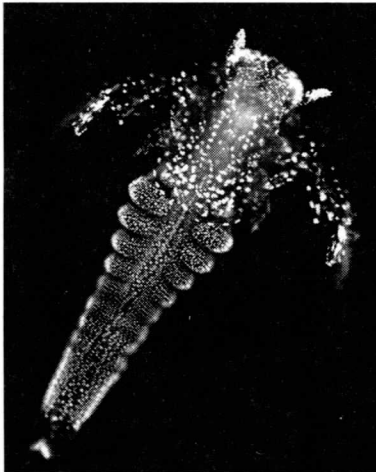
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*Artemia*  
(brine  
shrimp).  
Photograph:  
Matthew  
Ronshaugen,  
UCSD

## Where's the Shrimp?

Alan Gishlick  
NCSE Postdoctoral Scholar

In a Discovery Institute press release dated February 6, 2002 (<http://www.discovery.org/viewDB/index.php3?program=CRSC%20Responses&command=view&id=1119>), Jonathan Wells accused three developmental biologists, Matthew Ronshaugen, Nadine McGinnis, and William McGinnis, of making "exaggerated claims" in a recent paper in *Nature* (Hox protein mutation and macroevolution of the insect body plan. *Nature* 2002 Feb 21; 415: 914-7). Wells apparently made the accusation initially to a reporter seeking comments from creationists and proponents of "intelligent design" (ID) on the *Nature* paper; the reporter's article quoting Wells appeared on February 7 (<http://abcnews.go.com/sections/scitech/DailyNews/darwingene020207.html>).

The *Ubx* gene appears both in fruit flies, where it inhibits the development of limbs on abdominal segments, and in crustaceans, where it does not inhibit limb development. Researchers inserted the crustacean *Ubx* gene into a fruit fly and observed that it did not function as a limb inhibitor. Then, they experimented on the crustacean *Ubx* gene and specifically isolated the mutations that cause the *Ubx* gene to become a limb inhibitor. This is exciting research because crustaceans have many pairs of limbs, while insects have just three pairs, and it is the *Ubx* gene that controls limb devel-

opment in both. The authors conclude that this shows that specific micromutations can cause large-scale phenotypic effects, thus helping us to understand better the processes that may have been involved in the evolution of the insect body plan and, by extension, those of other animals as well (a possible pathway is shown in the figure on p 29).

Wells wrote in the DI press release: "The mutation does not transform the embryo into anything like an insect, but only into a disabled shrimp." Wells's hostility toward the biological fact that genes govern the evolution of new body plans seems to have blinded him to the obvious: There were no mutant shrimp.

"Intelligent design" proponents have been repeatedly told that if they want to be taken seriously, they must produce scientific research of their own rather than uninformed and irresponsible criticism of the work of real scientists. They claim that "intelligent design" is not just anti-evolutionism, but Wells's press release is no more than that. We keep waiting for real scientific research to emanate from proponents of "intelligent design", but if Wells's latest effort is any indication, then — to paraphrase a Russian proverb — we may be waiting until shrimp begin to whistle.

### EPILOG

A version of the foregoing state-

ment was posted on NCSE's web site on February 7, 2002, whereupon Wells posted a press release entitled "Mutant shrimp? — A correction" on the DI's web site on February 11, 2002 (<http://www.discovery.org/viewDB/index.php3?program=CRSC%20Responses&command=view&id=1118>). Wells conceded, "I was mistaken. No mutant shrimp were produced", but went on to claim that "In fact, I made the mistake because I gave the UCSD researchers more credit than they deserved. Their actual results provide even less evidence for evolution than I was initially led to believe. ... In light of the UCSD researchers' actual results, their claim to have discovered a 'general mechanism for producing major leaps in evolutionary change' is even more exaggerated than I originally thought."

Wells's evaluation of the significance of the research is sophomoric. Ronshaugen and his colleagues do not claim to have discovered *the* genetic mechanism for evolutionary change, but rather *a* mechanism by which a single simple micromutation can cause macroevolutionary changes in the body plan — something that "intelligent design" advocates say is impossible. But the *Nature* paper shows that it is indeed possible.

But what is most striking about Wells's "correction" is that there appears in it no acknowledgement of the fact that it was irresponsible

# Genetic Evidence of Body-Plan Macromutation

Andrew J Petto  
NCSE Editor

We have previously reported in *RNCSE* on current research on genetic mutations associated with major changes in anatomical features. These have included single-gene mutations responsible for limblessness in snakes (see "Developmental study explores specializations in snake skeletons", *RNCSE* 1999 May-Jun; 19 [3]: 37), for wing differentiation in birds (see "Which came first: The drumstick or the wing?" *RNCSE* 1999 Jan-Feb; 19 [1]: 25), and for the transformation of feet into jaws in crustaceans (see "How to make a foot into a mouth: Developmental genetics and evolution", *RNCSE* 1997 Nov-Dec; 17 [6]: 32). Now, biologists at the University of California, San Diego (UCSD) have performed an experiment demonstrating that a small genetic change can cause large-scale alterations to body plans of

the sort that took place during the early evolution of land animals

According to a UCSD press release:

The achievement is a landmark in evolutionary biology, not only because it shows how new animal body plans could arise from a simple genetic mutation, but because it effectively answers a major criticism creationists had long leveled against evolution — the absence of a genetic mechanism that could permit animals to introduce radical new body designs.

The key to this research are regulatory genes known as *Ubx* and *Abd-a* that are found in both insects and in branchiopod crustaceans, such as the brine shrimp, *Artemia*. The role of the *Ubx* gene, according to lead author Matthew

Ronshaugen, is to control the activation and inhibition of other genes associated with limb development by the effects of proteins that it produces. Changes in the *Ubx* gene, and therefore its protein products, affect the way that it turns other genes on and off, according to Ronshaugen. In insects, such as the laboratory fruitfly, *Drosophila melanogaster*, these genes are expressed in the abdominal segments of embryos where they suppress the development of limbs in those segments. In the branchiopods, these genes are expressed in both the abdomen and the thorax, but do not suppress limb development.

In its "wild" state, the *Ubx* gene obtained from brine shrimp only suppressed 15% of embryonic limbs in fruit flies, compared to 100% for the fruit-fly version. However, the shrimp version of the gene did produce an "abdomi-

of him to offer an evaluation of a scientific paper that he had not read. What happened to the keen moral sensibilities of the author whose *Icons of Evolution* (Washington [DC]: Regnery, 2000) fastidiously accused the "dogmatic promoters of Darwinism" of "the sort of distortion that would land a stock promoter in jail?"

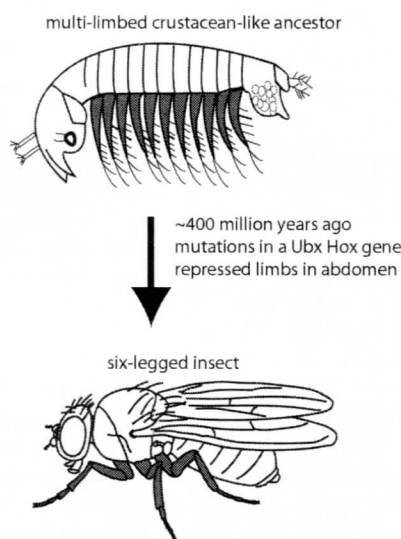
The DI continues to promote Wells's critique of the *Nature* paper. In "ABC News: *Hox* genes and natural selection" (*Newsletter*

of the American Scientific Affiliation & Canadian Scientific & Christian Affiliation 2002 May/June; 44 [3]: 4-5), Mark Edwards extols the efforts of the DI to ensure that "reporters are learning the prominent names in the ID community and ... are seeking out ID proponents for comment." (Strangely, Mark Edwards is not identified anywhere in the newsletter as the press spokesman for the DI, which might lead the unwary reader to overestimate his

objectivity on the topic.) Edwards cites in particular Wells's comment to the ABCnews.com reporter that "There's an awful lot more to a species change than eliminating some legs. In effect, all they've produced is a crippled shrimp." No mention is made of the fact that no shrimp, crippled or otherwise, was produced in the experiment or of the fact that, as a result of his comments, Wells was caught in an act of flagrant scholarly irresponsibility.



Diagram:  
Matthew  
Ronsbaugen,  
UCSD



nalizing" effect — changing the outward form of thoracic segments in embryonic fruit flies. So the UCSD team constructed a series of hybrid proteins — removing specific sequences of amino acids from various parts of the proteins of one species and replacing them with the corresponding sequences from other species. The goal was to identify the changes responsible for the suppression of limb development in insects.

The first result was to locate the limb suppression function in the C-terminal region of *Ubx* (proteins have a carbon [C] end and an amino [N] end; the C terminus refers to the sequence of amino acids at the carbon end). Deleting the C terminus from the shrimp *Ubx* produced strong limb repression in fruit fly embryos (80%). Further research showed that the 29 amino acids in this region serve to inhibit the limb-suppression activity of another region (called the QA motif) in that protein. The UCSD team also discovered the presence of multiple copies of the amino acids serine and threonine in crustacean, but not insect, C-terminus regions. They concluded that mutations that caused a loss of serine and threonine increased limb suppression. Finally, they discovered that the expansion of the QA motif (longer in insects than in crustaceans) would further enhance the limb-suppression functions of this protein.

Perhaps most important, the mutation involved is a genetically

dominant form, so only a single copy of the mutated allele is necessary to produce limb suppression. Most anti-evolutionist objections to this sort of macromutation assume that the mutation is in a recessive form and that two copies of the allele must be present simultaneously. However, there is no requirement that new mutations must be recessive.

This research also shows another example of the error made by anti-evolutionists when they assume that evolution requires a "Darwinian" process — the gradual accumulation of small anatomical changes that eventually produce macroevolutionary change. In this research, as in the others cited above, a small change in a regulatory protein produced major anatomical changes in body plan.

Read the original article: Ronsbaugen M, McGinnis N, McGinnis W. *Hox* protein mutation and macroevolution of the insect body plan. *Nature* 2002 Feb 21; 415: 914-7. The research abstract is available at <[http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v415/n6874/abs/nature716\\_fs.html](http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v415/n6874/abs/nature716_fs.html)>.

Also of interest: Galant R, Carroll S. Evolution of a transcriptional repression domain in an insect *Hox* protein. *Nature* 2002 Feb 21; 415: 910-3.

The UCSD press release is located at <<http://ucsdnews.ucsd.edu/newsrel/science/mchox.htm>>.

## RACISM AND EVOLUTION WEB RESOURCES

For readers interested in further explorations into the misuse of evolution to support racism, we have identified several Internet resources.

- Jonathan Marks has posted several recent publications on his web site at <<http://www.uncc.edu/jmarks/pubs/main.html>>.

- *The New York Times* interview with Joseph L. Graves Jr is available at <<http://www.nytimes.com/2002/01/01/health/genetics/01CONV.html>>.

- Joseph Conley, a graduate student in the history of science program at Princeton University delivered a paper at the 2001 Princeton conference, Darwin's Entangled Bank: The Cultural Legacy of Evolution. Conley's research is highlighted at <<http://www.princeton.edu/~jconley/DarwinRacism>>.

- Margaret Wertheim wrote this editorial after a bill equating evolution with racism was introduced to the Louisiana legislature: <<http://www.laweekly.com/ink/01/26/news-wertheim.shtml>>.

## RUSHTON ONLINE

Readers of several internet lists saw this announcement in early 2002:

The Abridged Edition of *Race, Evolution, and Behavior* by J Philippe Rushton is available for download in English, Romanian, and Dutch free of charge at <[http://www.charlesdarwinresearch.org/Race\\_Evolution\\_Behavior.pdf](http://www.charlesdarwinresearch.org/Race_Evolution_Behavior.pdf)>.


The PDF file is 50 pages long.

Rushton's book is reviewed by Andrew J Petto on p 34.



# Tracking Those Incredible Creationists

William Thwaites



I have studied creationists for a quarter of a century, but it still amazes me to read John Morris's recent claims in the newsletter of the Institute for Creation Research ("Cracks are widening in evolution's dam!" *Acts and Facts* 2002 May; 31 [5]) that evolution "has enjoyed total control" of the public schools for decades; that "students who object [to evolution] are often humiliated before their classmates and persecuted at grade time"; that evolution "gives a low view of human life"; that "naturalistic" evolution should be opposed and that evolution is (necessarily) "a religion".

Perhaps evolution has enjoyed total control in cartoons, movies, park displays, newspapers, *National Geographic* and other natural history magazines, and museums, but not in the public schools! We know that most public school teachers are very timid about teaching anything substantive about evolution. We know that about 25% of high school science teachers do not even accept the scientific validity of evolution. We know that almost all public high

school graduates do not know the first thing about the mechanisms of evolution or the evidence for it, or even that evolution has nothing to say about the existence or nonexistence of a deity.

And regarding the "humiliation" of creationist students in the public schools, the instances must be few and far between. What public school teacher would risk his or her job doing that? And what constitutes "humiliation" in Morris's eyes? Does "persecution" mean more than that students who refuse to learn evolution fail their exams in the same way they would if they refused to learn the Pythagorean Theorem?

As for evolution's giving a "low" view of human life, the opposite is generally true. When evolution is presented or implied at all, it is likely to have a distinct ladder-of-life tone — and of course humans are portrayed in that view as being at the very top of that ladder. In the relatively few classrooms in which evolution is taught the way it is understood by the scientific community, the position of humans is presented as neither low nor high, only recent. The popular media may suggest that evolution says that we cannot help being immoral and unethical, but does Morris know of any documented cases of public school teachers — except creationists, of course — who teach that evolution mandates immoral behavior?

Finally, the distinction between philosophical naturalism and methodological naturalism seems to have gone completely over Morris's head (though he is certainly not alone here). How can a discipline that confines itself to natural material things have any-

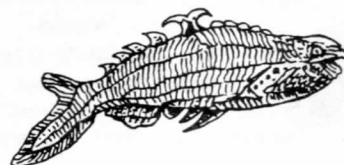
thing to say about a deity? Sadly, some of evolution's most noted promoters themselves have not quite come to this understanding yet. As Ken Miller points out in his *Finding Darwin's God* (New York: HarperCollins, 1999), these promoters contribute to keeping the creation/evolution controversy alive — at the very least by agreeing with Morris that evolution can and does disprove the existence of God. Morris should be arguing against Richard Dawkins and others who claim that evolution disproves God. Morris should support the people and organizations who, like NCSE, see that the natural sciences can never prove or disprove the existence of God.

It would be nice if Morris were only concerned about Christians' losing their faith in God as a result of overzealous claims made by some influential evolutionists. But such an enlightened quest for mutual respect between science and religion is not in the nature of the ICR. The battle that the ICR is waging is to promote a specific religious point of view that finds moderate and tolerant interpretations of Scripture as objectionable as the inappropriate religious claims made in the name of science. For the ICR, "compromise" is a dirty word.

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*William Thwaites taught biology and genetics at San Diego State University for almost 30 years. He and the late Frank Awbrey also taught a "creation vs evolution" course at SDSU in which creationists from ICR and Loma Linda's Geoscience Research Institute were invited to visit the class and present evidence for the literal truth of Genesis. Based on the information presented by their creationist guests and creationist writings, Thwaites and Awbrey were able to point out the logical flaws and inaccuracies of creation "science". Thwaites is now retired and living in Oregon.*



# Ask About Evolution Before Election Day

Stan Braude

After the election of various “stealth” candidates in a number of local elections around the country in recent years, I have made a strong effort to ask all our local candidates the following question:

Why do we teach evolution in our schools and would you support adding creationism to the curriculum?

Usually I have called the candidates on the phone, but this year I attended the candidates’ forum at our local elementary school, Jackson Park, in the University City, Missouri, school district. To my surprise, 4 of the 6 candidates for school board answered that they would support adding creationism as an alternative to evolution.

One said that more than 80% of Americans believe in teaching both evolution and creationism to our kids. He also contended that evolution is not scientific and both evolution and creationism should be taught.

The second said that evolution, creationism, and “intelligent design” should be taught, referring to “intelligent design” theory as a scientific form of creationism and to evolution as “just a theory”.

The third said that he would support teaching creationism if the board agreed. He also claimed that evolution and creationism were competing scientific theories.

The fourth remarked that she was criticized in the last election for supporting the teaching of creationism in our schools and was

happy to have other candidates on her side this time. She said that, since we have a diverse community, different theories should be taught, adding that evolution is “just a theory”, not a law like the law of gravity.

Only two of the candidates said that evolution is taught because it is a fundamental scientific theory in biology. One of these two has a PhD in physics from Caltech, and said that “if creationism were taught in comparative religion or history classes, that would be appropriate, but not in a science course.”

The candidates’ responses to my question so frustrated me that I could not fall asleep that night. Instead, I typed up the following explanations, which might make useful informational or briefing materials to give to candidates who respond to questions about teaching evolution with the mix of scientific ignorance and political opportunism that I heard in these answers.

## Law and theory

The confusion over the status of evolution as “just a theory” rather than a law (like the law of gravity) is based on a misunderstanding of these terms. Physicists today still work on and discuss gravitational theory. They do not question whether gravity exists; they investigate how and why it works the way it does. Similarly, biologists working on evolutionary theory today know that evolution is a fundamental part of the living world. Their research examines the mechanisms driving evolution and the details of evolutionary history.

## Hypothesis and experimentation

We can test the hypothesis that gravity holds the earth in orbit around the sun by making careful

astronomical observations and testing whether they fit our predictions. Even though we cannot move the earth or change its orbit, we can still test the theory. Similarly, we test hypotheses about evolutionary history by making observations and testing whether they fit our predictions. We examine evolution in current living systems on a human time scale, extrapolating processes to longer time scales. Even though we cannot go back in time, we can still test the theory.

## Evolution a theory in crisis?

Ideological opponents of evolution often seize upon disagreements among scientists about evolution as evidence that evolution is somehow a theory in crisis. But when scientists disagree about evolution, they disagree about the details of a set of evolutionary relationships or the relative influence of different mechanisms, not about whether evolution occurs in living systems and resulted in the biodiversity we see on earth today.

## Teaching good science

We teach evolution in our schools because it is a *fundamental* theory in biology. It explains the patterns that we see in all living systems. It allows us to make strong predictions about the physiology and biochemistry of organisms based on their evolutionary relationships to other organisms. It allows us to understand, and fight, disease resistance to drugs. And the list could be continued indefinitely.

Failing to teach our students the best science available would be a terrible disservice to them. Teaching evolution in a biology

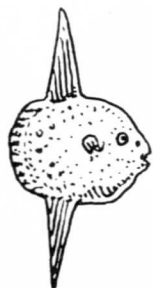
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**“Why do we teach evolution in our schools and would you support adding creationism...?”**

**Only two of the candidates said that evolution should be taught because it is a fundamental scientific theory in biology.**

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*Stan Braude is Research Assistant Professor, International Center for Tropical Ecology, at the University of Missouri, St Louis. He is a long-time supporter of evolution education.*



class is no more antireligious than teaching fundamental theories in mathematics, physics, or chemistry. We do not want to avoid teaching the principle of conservation of mass in chemistry because it contradicts the multiplication of loaves and fishes. We should not avoid teaching inertia in physics or the heliocentric model of the solar system in astronomy because they contradict the sun's standing still for Joshua in his battle with the Amorites. Our children should learn religious teachings at home and in church, not in the science classroom.

### Does everyone have a right to an opinion?

The majority of Americans could not explain how internal combustion engines work, but plenty are happy to offer advice if your car breaks down. The opinion of one trained mechanic is more valid than the opinions of 100 biologists who have never rebuilt an engine. The mechanic may be wrong some of the time, but his opinion, based on his training and experience, is worth more than the opinions of the uninformed. I do not ask my biology teacher how to fix my car and I do not ask my mechanic what to teach in a biology class.

I did not disseminate these explanations: after the first candidates' forum, I was advised not to make an issue of evolution education because it could actually motivate local creationist-friendly churches to rally voters in the election. I nevertheless attended the second candidates' forum, in which someone else asked the candidates to explain their stands on creationism, which had already become known to the community. The questioner also reminded the candidates that most of the other campaign issues centered on the tight school budget and asked them whether they were aware how expensive it would be for our community to defend a decision to teach creationism alongside evolution in court.

Most of the candidates gave essentially the same answers as they had given to my question at the earlier forum, with one adding that he would have to hold hear-

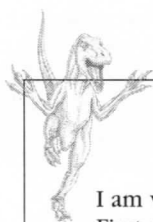
ings on the matter and hear both sides. However, one of the four who originally answered in favor of teaching creationism changed her answer, saying that while she personally believed in the biblical account of creation, evolution was the only theory appropriate for a science classroom. At least she appears to have been educated, although perhaps this was merely a politically opportunist answer to capture votes. Even so, it would mean that she was counting more on the votes of those who wanted good science education in our schools than of those motivated by sectarian dogma.

Our small local election did not attract media attention; creationism did not become an issue out-

side those public meetings with the candidates. Still, in the end, the three candidates who understood that evolution, and not creationism, belongs in our science classes were elected on April 2. I encourage all supporters of evolution to ask the "evolution question" of all local candidates — not just those for school board. I would rather educate, or if necessary "out", candidates before election day than have to fight them afterwards.

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## Letter to the Editor

I am writing in regard to articles in the last two issues of *RNCSE*.

First, the late Triassic mass extinction is claimed to have "killed the last of the mammal-like reptiles that once roamed the earth and left mainly dinosaurs" (*RNCSE* 2001 May-Aug; 21 [3-4]: 33). My research on this matter indicates that the therapsids of the Permian gave rise to a herbivorous branch including the Triassic dicynodonts that apparently did die out at the end of that period. However, the carnivorous-to-insectivorous theriodonts included the two lineages connected to mammal evolution by different researchers — the ictidosaurs and the cynodonts — and both of these groups are considered to have survived well into the Jurassic.

The other matter involves the article by Skip Evans (*RNCSE* 2001 Sep-Dec; 21 [5-6]: 22-3). I agree with his concern about equating Darwinism with evolution *per se*, but I do take issue with his statement that "a layperson reading the advertisement might well assume that the signatories objected to evolution itself, rather than to the universality of natural selection as its mechanism" (p 23). About 15 years ago PBS presented a special about Gregor Mendel in which he and associates were portrayed by actors. In the scripted dialog, a friend pointed out that he had discovered a mechanism for organic evolution other than Darwin's natural selection, whereupon Mendel responded by pointing out that natural selection is a process rather than a mechanism. I was pleased to hear this since it corresponded to the distinction I (a geologist and invertebrate paleontologist) had been pointing out to biologist colleagues for many years. Darwin (and Wallace) explained why evolution occurred rather than how. The mechanisms, which include gene mutation and symbiotic relationships, did not become clear until much later.

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[Ed. The note on the Triassic-Jurassic extinction was a summary of a research article that appeared in the journal *Science*. Readers interested in the details of the authors' arguments and their judgment on the significance of extinctions of various lineages should refer to the original report: Ward P and others. Sudden productivity collapse associated with the Triassic-Jurassic boundary mass extinction. *Science* 2001 May 11; 292: 1148-51.]

# BOOKREVIEWS

## BERNARD D'ABRERA RESPONDS TO SHAPIRO

[In RNCSE 21: 5-6, we published Art Shapiro's review of Bernard d'Abrera's *The Concise Atlas of Butterflies of the World*. As is our usual custom, we provide space for the author's reply, and d'Abrera has submitted these comments in response to Shapiro's review.]

1. Shapiro gratuitously accuses me of being "very fussy" about the spelling of my name. As my work is universally in use, convention requires correct attribution be made both to author and source. In the past, Anglo-Saxon editors unfamiliar with Spanish orthography, have endowed me with a capital D. This anomaly was finally corrected by Charles Bridges in his epic series of authoritative volumes. My reasonable request for correct spelling of my name does not need *ad hominem* comment.
2. Shapiro uses the word "rant" thrice, to describe my work. There is nothing in my entire work which can reasonably be construed as "rant". All of my arguments are clear, precise, cogent, and supported with impeccable references. He scorns my use of the word "Concise" to describe my Atlas, referring to what he calls "the main text". For your information, the "main text" is the 199 pages out of 353 which are not either pictorial or figurative. It is also "Concise" in that it compresses, in a single volume, 25 larger volumes.
3. Shapiro claims "*it appears that d'Abrera is his own editor*". He is not. The editor of his books is his wife and co-publisher, Lucilla Wyborn d'Abrera. Consequently, Shapiro has insulted her professional integrity and independence, and slandered her reputation. He libels her by implying lack of editorial objectivity in claiming that "*the usual restraint that would be applied by a professional publisher is absent*". This last comment states categorically that Hill House Publishers are not "professional" publishers. This further libel, which can only be seen in the pejorative sense that Hill House are amateurish, or dilettante, is unworthy of your journal. In addition to the 28 books on Lepidoptera, Hill House have also published 21 ornithological volumes, as well as books on land snails, history, religion, cookery, an antiquarian atlas, maps, prints, and even a children's book! Since 1988 Hill House Publishers have also been a legally contracted licensee of the British Museum (Natural History) in the matter of facsimile series (visit the Hill House Publishers' web site, <<http://www.hillhouse-publishers.com>>). Thus Shapiro's claim is both specious and temerarious. It is also palpably actionable in a Court of Law.
4. Shapiro accuses me of "*showing increasing signs of detachment from mainstream science*", without

considering whether "mainstream science" itself might possibly be in error. Numerous happy precedents (Redi, Mendel, Copernicus, Galileo, Newton) were at some stage tarred with that old brush. If the mainstream is indeed rushing towards a precipice, then I as a boatman on that stream, perceiving my danger, am entitled to leave it by the safest exit, lest I too perish in the flood. To then affix to my work the opprobrium of guilt by association with the psycho-sexual ravings of a notorious disciple of Freud, is a particularly telling example of why "mainstream science" is off course. Shapiro has here demonstrated a classic example of *ignoratio elenchi*.

5. Shapiro pretends to quote from my own work, evidence of such detachment. What he has done is unforgivably to commit the sin of ellipsis (thrice) in his selective quotations of my words. Eviscerating my text, he indulges in the old debating trick of seemingly refuting the substantive point of the argument by pretending to expose flaws in the metaphors used to advocate that point. My proposed new Theorem/Law states that **"Evolutionism unscientifically attempts to break the demonstrable and unbreakable nexus between the parallel decay of Species with Time."** Shapiro's omission of the stated Theorem is the second example of his use of ellipsis. My metaphor of the ice blocks that precedes his omission thus becomes gobbledegook.

6. Shapiro attempts to ridicule my Theorem by claiming that "*the same discovery was in fact made by ... Vladimir Nabokov.*" The awareness of the decay of Nature-with-Time was earlier hinted at by such minor luminaries as Augustine, Aquinas, John Donne, Shakespeare, and oth-





ers, before the magisterial Vladimir Nabokov had indeed discovered himself. Further, permitting Shapiro his Nabokovian fantasy, at no time did Nabokov establish the demonstrable connection between the Parallel Decay of Species with Time. This writer appears to be the first to do so in the form of a Theorem, supported by the metaphor of the progressive melting of two ice blocks. It is very likely that awareness of Nabokov's unsurprising lack of metaphysical and philosophical insight, led Shapiro to his mischievous use of ellipsis in misquoting from my work.

7. Finally, Shapiro accuses this writer of lacking "whimsy", again comparing me with the mentally distressed Wilhelm Reich, and at the same time presenting me to his readers as a figure of fun, rather than as one who enjoys it in his work. Shapiro has failed to see the love, delight and, yes, the whimsy, in my photographs (and their captions) of living insects. In addition to whimsy, I have amplified the irony in the arguments of religious evolutionists, and their philosophical bankruptcy, and I have to say that I have never had so much fun in my life. My readers are still chuckling! It is indeed testimony to the editorial skill, objectivity, and sober propriety of my editor in her role as professional publisher of a distinguished publishing house, that she has restrained me from having even more fun.

Readers of this journal must buy a copy of my book and read it for themselves, not simply accepting Shapiro's jaundiced view of it.

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## RACE, EVOLUTION, AND BEHAVIOR: A LIFE HISTORY PERSPECTIVE, SECOND SPECIAL ABRIDGED VERSION

By J Phillippe Rushton  
Port Huron (MI):The Charles  
Darwin Research Institute, 2000.  
50 pages.

Available in PDF format at  
<[http://www.charlesdarwinresearch.org/Race\\_Evolution\\_Behavior.pdf](http://www.charlesdarwinresearch.org/Race_Evolution_Behavior.pdf)>.

**Reviewed by Andrew J Petto**  
**University of the Arts**

Here is a survey that anyone can conduct to illustrate the main error in Rushton's work on human racial variation. Ask any 100 people this question: "What 'race' is Tiger Woods?" Most North Americans will say "African-American" or "black". The students in my genetics class did, too. However, Woods does not refer to *himself* that way, and if we could partition his genes into those derived from the major geographical "races" that our society recognizes, we would learn that only about 25% of them were drawn from his African heritage. So the racial labels that our culture has taught us to apply to human variation often incorrectly or incompletely characterize the underlying genetic differences among human populations — to say nothing of the complex intergradations among neighboring populations. Although this is really old news to those who study the mechanisms of human genetic, biologic, and geographic variation, Rushton is convinced that measurable differences in IQ, job performance, personality, sexual maturation, and other traits among major geographical populations are embed-

ded in the genetic differences that necessarily arise in a species as widely distributed as humans.

Since the original publication of *Race, Evolution, and Behavior: A Life History Perspective* (Rushton 1995), the author has produced two abridged versions. Many academics received the first one mailed in mysterious plain envelopes with no return address. The second version is available free on the internet. Both abridged versions are faithful to the general arguments and conclusions of the original, although they are organized somewhat differently and lack the data tables and references of the original. They seem in particular to take notice of the objection that the triune race concept is superficial and does not represent the true state of genetic variation in a chapter entitled "More Than Skin Deep". However, the basic argument is the same in all editions: Humans are widespread geographically and show variations in certain features that correlate with geographic ancestry. Humans derived from two geographically diverse ancestral populations are likely to exhibit genetic variation over at least a portion of the genome. Variation between human populations derived from different ancestral populations is therefore likely to have a genetic basis. For readers interested in Rushton's arguments, I recommend tackling the original (Rushton 1995). Only in that version does Rushton provide documentation for his claims in the form of data tables, references, and a discussion of the scientific literature.

There are many problems with the way that Rushton uses "race" as an analytical concept — not the least of which is the discredited notion that our folk classification systems really are accurate reflections of underlying genetic variation. The scientific research literature abundantly documents problems associated with the way Rushton uses IQ, r- and K-strategies in life history adaptation, data

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aggregation, and the relationship between "intelligence" and brain-mass:body-mass ratios. Rather than repeat these criticisms, I would propose a definitive analysis that both the proponents and critics of these racist interpretations could perform, taking on the contentious claim that differences among races are genetically based. In a sense, this suggestion parallels Kelly Smith's recommendations to "intelligent design" theorists on how to make their discipline scientifically respectable (Smith 2000).

First, establish that the biological relationship in question — for example, that people with larger brains have higher IQs — really does hold among *all* humans in general, without regard to racial or geographical ancestry. Second, identify those genetic loci associated only with the feature in question. That is, ascertain which alleles those with bigger brains and higher IQ scores possess that those on the opposite end of the scale do not. Third, compare the variations among the "races" *only* at these genetic loci.

If, and only if, the major races differ in the specific genetic loci that are associated with the behavioral, reproductive, temperamental, demographic, and psychological features that Rushton presents in his writings, might we be able to infer correctly that there is a genetic basis for *these* differences in test performance, economic and educational achievement, age at first reproduction and interbirth interval, and so on. The failure to provide a real genetic basis for these comparisons is a long-standing complaint against the methodology of Rushton and others, but with recent advances in genomics, it now becomes easier to resolve the problem.

Finally, using known or plausible genetic mechanisms, Rushton needs to demonstrate that the association of certain genes only with certain groups is due to shared ancestry, and not just some accidental association within the sample. Until we can demonstrate that any genes specifically associated with these features really *do* vary according to the continent of ancestral origin, there will not be a

scientifically compelling case for Rushton's racist conclusions.

To date, none of the genetic differences documented among the human populations called "races" has been correlated with variations in the specific features — behavioral, reproductive, temperamental, demographic, and psychological (including IQ) — that Rushton concludes must be due to biological differentiation and adaptation in these populations' evolutionary history. Rushton and his fellow travelers need to stop congratulating themselves for their bravery in defying academic "political correctness" (quoted extensively before the title page) and to begin building and testing hypotheses that explore the relationship between specific genes or gene complexes and specific ecological, social, behavioral, or psychological outcomes. Until they produce research that demonstrates such a link, their work will be properly relegated to an academic backwater of outmoded and useless just-so stories that have been superseded by modern science. And only then we will be able to determine whether, as Richard Lynn was quoted in *The Hamilton Spectator* as claiming, Rushton "should, if there is any justice, receive a Nobel Prize" (Buist 2000).

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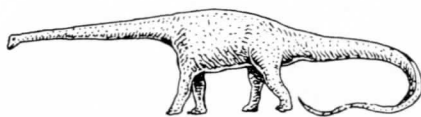
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## WHAT IT MEANS TO BE 98% CHIMPANZEE: APES, PEOPLE, AND THEIR GENES

By Jonathan Marks  
Berkeley (CA): University of California Press, 2002. 288 pages.

Reviewed by Andrew J Petto

Nothing. And *everything*. That is Jonathan Marks's conclusion in this wide-ranging book about the understanding and misunderstandings that genetics, and particularly molecular anthropology, have generated about what it means to be human. Somewhat more eloquently, Marks writes:

There is consequently no guarantee, short of detailed physiological and genetic data and analyses, that anything chimpanzees do is directly relevant to understanding anything that humans do. Since they have been different species for several million years, anything that chimpanzees do may be either (1) an element shared with human nature; or (2) an ancient element of human nature now lost by humans; or (3) an evolved elements of chimpanzee nature, never possessed by human ancestors (p 160-1).

Make no mistake: those detailed physiological and genetic analyses are barely begun. In other words, we *may* share over 98% of our DNA with chimpanzees — that oft-quoted value, Marks points out, is based on an assessment of significantly less than the complete human (or chimp) genome — but what a difference that 2% can make: not even a casual observer would mistake a chimp for a human. What this small difference *means* depends on what we wish to know.

This book is more than a long argument about the technical precision of various genetic and biochemical methods, however. It is about what we make of them.





Long before the 98% figure burst forth into the public discourse, scientists and nonscientists alike were convinced that the African apes were our closest biological relatives. Every relevant discipline — comparative anatomy, paleontology, embryology, psychology, behavioral ecology, comparative physiology, and so on — produced the same conclusion. In one sense, the molecular studies only confirmed what we already knew.

But the widespread use of this figure is misleading, Marks argues, because its *apparent* precision generates a false sense of scientific certainty — not so much in the great genetic similarity that it confirms between closely related species, but in the inference that this figure somehow “explains” things. What things could it explain? Suggestions range from promiscuity to aggression to homosexuality to any of a wide variety of interesting conditions that have so far only the most tenuous connection to specific sequences of DNA contained in the individuals who express them. There is a long, long chain of inference here, and for years Marks has consistently been calling scientists and science popularizers to task for their overgeneralizations of genetics research to address a wide variety of interesting social, legal, and technical issues: everything from racial studies to animal rights, creationism, and cultural hegemony and colonialism. And he tackles each of these issues in turn with relish in *What It Means to be 98% Chimpanzee*.

Despite the apparent precision of scientific studies and the authority with which their results are reported, most violate what Marks calls “a simple rule of molecular anthropology: *Genetic conclusions*

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*require genetic data*” (p 114, emphasis in the original). This is a theme that Marks has been pursuing since the 1980s — any genetic explanation for an observed difference between populations (or even species) “requires more than just observing the difference to be consistent. It requires presumably genetic data” (p 91). He also extends this principle to any pronouncement that a scientist makes outside his or her field of expertise. *RNCSE* readers will find that he does not let defenders of evolution off the hook when they overextend the boundaries of scientific inference in their noble quest.

But this is more than just an account of scientists’ behaving badly (or even of bureaucrats’ and ideologists’ misusing science). It is also a call for the maturation of a field that calls itself “molecular anthropology” — for the field to become as much anthropological as molecular. Or, as Marks put it, “What would constitute an ‘anthropological biochemistry’ if you didn’t need to know any biochemistry to do it?” (p 3). Genetic studies of human populations and variations within and among human populations will always find biological (and biochemical) variation. The transformation of these observations into meaningful data — what Marks calls the transformation from “information into knowledge” (p 78), which is the essence of scientific and scholarly practice — requires a *context*. In scientific studies, of course, this context is provided by the guiding theories in the discipline and the hypotheses that these theories generate. They are the questions that we are trying to answer by studying data on human variation.

One of the big problems with contemporary pronouncements about the “genetic basis for” any variety of human variations (and as “explanations” for differences among groups) is that the context used to generate those questions derives from the old, discarded typological views of human classification — views increasingly rejected by anthropologists beginning in the 1940s when anthropology began to acknowledge that human populations are not “naturally packaged into discrete

groups” (p 73). Molecular (or any) studies based on these old notions that human variation fits into several types with fixed biogeographic boundaries ignore contemporary anthropological theory — and reality. This would be comparable to initiating a new “genetics” research project based only on methods and practice from the 1940s, before the discovery of the structure of DNA.

True to Marks’s writing for general audiences, the style is frank and often blunt, but it cuts right to the point. Marks wants the reader to make no mistake about his critique of how we — even some researchers — make more of genetic differences and similarities than the data can bear. I admit to being a real admirer of Marks’s work in this regard. Overall, he makes his points cleanly and explains them well. There are only a few exceptions — the use of familial anecdotes to explain phylogenetic relations is distracting, and several early attempts to explain why paraphyly in modern *Homo sapiens* populations undermines tripartite racial analyses to utter failure are not entirely successful. Marks does ultimately succeed (p 134), but some will still disagree with his claim that *contemporary* African populations subsume the gene pools of European and Asian branches of the species, even though *ancestral* African populations certainly did. However, in the context of the whole work, these are minor quibbles.

In a sense, *What It Means to be 98% Chimpanzee* is a reality check. It asks the important questions that were obscured by the hype of the Human Genome Project and the continuing stream of new scientific “breakthroughs” reported in the media. These questions are not just the rumblings of some anthropological curmudgeon; they resonate in the minds of ordinary citizens. Early in 2002, one of the students in my Human Variation class grappled in her journal with the main theme that would later appear in Marks’s book:

[T]hey announced in late June of last year that they had completed the first draft



[of the entire human genome]. Scientists are calling this one of the biggest milestones in history. Why? How will our lives change now that we know what's in our genes?

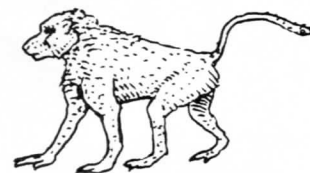
How indeed? The answer, Marks tells us, is not in our genes, but in

how we make sense of the genetic data about human variation. And to do *that*, we need contemporary anthropology to provide a context.

[An earlier version of this review appeared in Human Nature Reviews at <<http://human-nature.com/nibbs/02/petto.html>>. This version is reproduced with permission.]

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## THIRD ANNUAL DARWIN, DESIGN AND DEMOCRACY CONFERENCE

Organizers of the conference, *Darwin, Design and Democracy III: Teaching Origins Science Objectively*, recently made the preliminary program available on line. The conference was held from July 26 through July 28, 2002 in Kansas City, Missouri. The complete program and other materials can be found at <<http://www.IntelligentDesignnetwork.org/DDDIprogram.htm>>.

### FRIDAY, JULY 26, 2002

**7:30 PM** Darwin Does Hollywood: Naturalism in the American Movies. Jack Cashill, PhD  
Presenting Evolution Objectively: A "How To" for Tenth Grade Biology. Jonathan Wells, PhD

### SATURDAY, JULY 27

**8:30 AM** From Goo to You via the Zoo: Teaching About the Origin of Life in High School. William Harris, PhD  
**9:35 AM** Mouse Traps and Molecules: Teaching Evolutionary Mechanisms and the Challenge of Irreducible Complexity. Michael J Behe, PhD  
**10:45 AM** First Concurrent Sessions  
**11:45 AM** Have Lunch With the Speakers  
**12:45 PM** Second Concurrent Sessions  
**1:45 PM** The Impact of Origins Science on Religion — Straight Talk with a School Board. JP Moreland, PhD  
**3:00 PM** The Rule. (A three-act play about the trial of a biology teacher who seeks to teach origins science objectively.)  
**4:15 PM** Defending Objective Origins Science? Dialogue with a School Board about the Legal Need for Objectivity in Origins Science. John H Calvert, JD  
**7:30 PM** Panel Discussion: Should Only Naturalistic Explanations be allowed in Origins Science? Moderator: Woody Cozad, JD  
**9:15 PM** Questions from the audience  
**9:45 PM** Lobbyfest: Meet our guest speakers in the lobby

### CONCURRENT SESSIONS

Paul Ackerman, PhD. An ID-based critique of Stephen Pinker's national bestseller, *How the Mind Works*.

Kirk Durston, MA. A method to detect intelligent design: Dembski's Explanatory Filter

Mark Edwards. Communicating Effectively with the Media about Origins Science

Michael Keas, PhD. Teaching the Cambrian Explosion: Multiple Competing Hypotheses

Robert Lattimer, PhD. The Ohio Firestorm of 2002

Scott A Minnich, PhD. Teaching Irreducible Complexity at the College Level — State of the Criticism

Ralph Richardson, MD and Brian Sandefur. Teaching the Evidence with Internet Textbook and Curriculum Supplements

Frank Turek, MA. Speaking to School Boards and Legislatures about Origins Science

Jonathan Wells, PhD. A Critique of the PBS Series on Evolution

Pamela Winnick, JD and reporter for the *Pittsburgh Post-Gazette*. Writing Honestly about Origins Science

Video: *Unlocking the Mystery of Life* (First Concurrent Session)

Video: *Icons of Evolution* (Second Concurrent Session)

Video: *The Triumph of Design and the Demise of Darwin* (First Concurrent Session)

Video: *I was a Teenage Darwinist* (Second Concurrent Session)







## WEB LOCATIONS VISITED IN THIS ISSUE

### NEWS

TOPIC	Santorum Redux
OWNER	Discovery Institute
LOCATION	< <a href="http://www.discovery.org/articleFiles/PDFs/santorumLanguageShouldGuide.pdf">http://www.discovery.org/articleFiles/PDFs/santorumLanguageShouldGuide.pdf</a> >
LAST VISIT	June 30, 2002
TOPIC	Non-Debate at the American Museum of Natural History
OWNER	BioScience Productions, Inc
LOCATION	< <a href="http://www.actionbioscience.org/evolution/nhmag.html">http://www.actionbioscience.org/evolution/nhmag.html</a> >
LAST VISIT	June 30, 2002
TOPIC	Updates: Georgia Introduces "Santorum Amendment" Language
OWNER	Georgia Legislature
LOCATION	< <a href="http://www.legis.state.ga.us/Legis/2001_02/fulltext/hb1563.htm">http://www.legis.state.ga.us/Legis/2001_02/fulltext/hb1563.htm</a> >
LAST VISIT	June 30, 2002
TOPIC	Updates: Mississippi House Considers "Only-a-Theory" Bill
OWNER	Mississippi Legislature
LOCATION	< <a href="http://billstatus.ls.state.ms.us/documents/2002/html/HB/0800-0899/HB0888IN.htm">http://billstatus.ls.state.ms.us/documents/2002/html/HB/0800-0899/HB0888IN.htm</a> >
LAST VISIT	June 30, 2002

### NCSE NEWS

TOPIC	National Academy of Sciences Elects NCSE Member Morris Goodman
OWNER	National Academy of Sciences
LOCATION	< <a href="http://www.nas.edu">http://www.nas.edu</a> >
LAST VISIT	June 30, 2002

### FEATURES

TOPIC	Where's the Shrimp?
OWNER	Discovery Institute
LOCATION	< <a href="http://www.discovery.org/viewDB/index.php3?program=CRSC%20Responses&amp;command=view&amp;id=1118">http://www.discovery.org/viewDB/index.php3?program=CRSC%20Responses&amp;command=view&amp;id=1118</a> >
LAST VISIT	July 5, 2002
TOPIC	Genetic Evidence of Body-Plan Macromutation
OWNER	<i>Nature</i>
LOCATION	< <a href="http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v415/n6874/abs/nature716_fs.html">http://www.nature.com/cgi-taf/DynaPage.taf?file=/nature/journal/v415/n6874/abs/nature716_fs.html</a> >
LAST VISIT	July 5, 2002

### RESOURCES

TOPIC	Third Annual Darwin, Design and Democracy Conference
OWNER	Intelligent Design Network
LOCATION	< <a href="http://www.IntelligentDesignnetwork.org/DDDIprogram.htm">http://www.IntelligentDesignnetwork.org/DDDIprogram.htm</a> >
LAST VISIT	June 5, 2002

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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, curricula, 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 that might not be understood by a non-specialist. All article manuscripts are submitted to reviewers for comments on their technical content and 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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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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