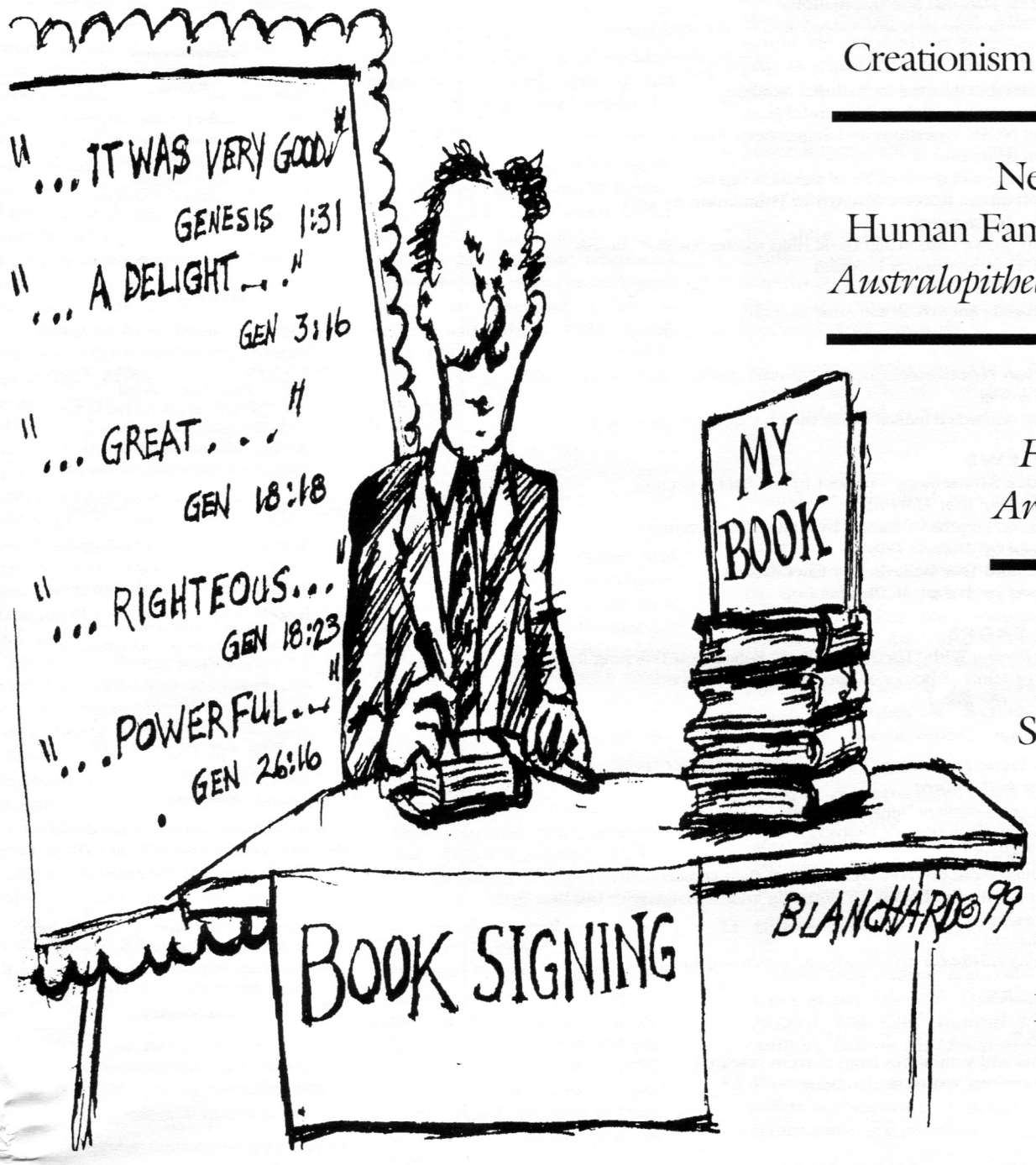
REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

Volume 19, Number 3 MAY/JUNE, 1999

CONTINUES
NCSE REPORTS &
CREATION/EVOLUTION



CONTENTS

REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION
CONTINUES *NCSE REPORTS* & *CREATION/EVOLUTION*

VOLUME 19, NR 3, MAY/JUNE 1999
ISSN 1064-2358

Eugenie C Scott, *Publisher*
National Center for Science Education
PO BOX 9477
Berkeley CA 94709-0477
(510) 526-1674
FAX: (510) 526-1675
Email: ncse@natcenscied.org
http://www.natcenscied.org

RNCSE is published 6 times a year.

Address editorial correspondence to the editor. Style guidelines can be found on the inside back cover of this issue. Write to the publisher regarding address changes, missing issues, purchases of back issue, reprint rights, and related issues.

Cover:
Book promotion cartoon drawn by John Blanchard.

FROM THE EDITOR

No, We Weren't Serious

Some of you have called and emailed about the two tongue-in-cheek articles we published in the March/April issue of *RNCSE*. We tried to warn you, so here it is on the record again: Both the "Onyate Man" article and the "news" report on Families for Learning Accurate Theories (FLAT) were just for fun. The details are in the first paragraph of "From the Editor" on page 3, and our production editor, Debra Turner concocted a set of fanciful graphics to accompany the "Special Features" header on those two pages. So, we hope we didn't cause too much distress by trying to have a little fun.

"... It Was Very Good."

Two of our features in this issue explore the question of the validity of the comments from reviewers which publishers use to promote their books. Wade Tarzia follows up on his review of *Forbidden Archaeology* (printed in *Creation/Evolution* Summer 1994 nr 34; 14[1]:13-25). Excerpts from Wade's review (and from several others, as well) appear on the *FA* web site to promote the book. Trouble is, says Wade, that his review and many others were overwhelmingly negative, but the web site makes it seem as though the reviewers thought that this was a valuable book.

Not only undeterred by the overwhelmingly negative reviews of the original book, co-author Michael Cremo published a second book in 1998 called *Forbidden Archaeology's Impact*. The main thesis of this book is that Cremo must be on to something if all the scientists hated the original book so much. Tom Morrow reviews this new offering and suggests that Cremo is perhaps a little too optimistic in his interpretation.

And just for fun we accompany these pieces with a cartoon by John Blanchard which pokes fun at the whole process of putting out "reviewers' comments" as promotional "blurbs".

Checking the Fine Print

We all notice the so-called "scientific" materials produced to promote anti-evolutionary positions, but how many of us read as widely in primarily *religious* sources? Consulting Editor Brian Alters has contributed a note on the use of annotated Bibles — known as *Interpreter's Bibles* — to counter evolution. The commentaries in these *Interpreter's Bibles* promote a particular rendering of the meaning of the biblical text. In the examples that Brian discusses, that rendering is meant to show that evolution is anti-biblical — a position which *Voices for Evolution* shows is neither universal nor mainstream among Christian denominations.

Evolution Notebook

In this issue we begin another new feature — Evolution Notebook. Thanks to a suggestion from a number of readers, we will provide periodic updates from the various fields which contribute to our knowledge of evolutionary biology. These readers reminded us that, though we are all interested in evolution, none of us can keep up with all the new information in all these fields. We hope this new feature will help to keep our readers informed, and we are pleased that Colin Groves agreed to inaugurate this series with an update on human ancestry.

Summer Reading

In our book bag we have a number of reviews. In addition to Tom Morrow's review of *Forbidden Archaeology's Impact*, we review 2 books that take aim at issues in science and religion. Arthur Shapiro reviews Chet Raymo's *Skeptics and True Believers*, and Andrew Petto reviews Ursula Goodenough's *The Sacred Depths of Nature*.

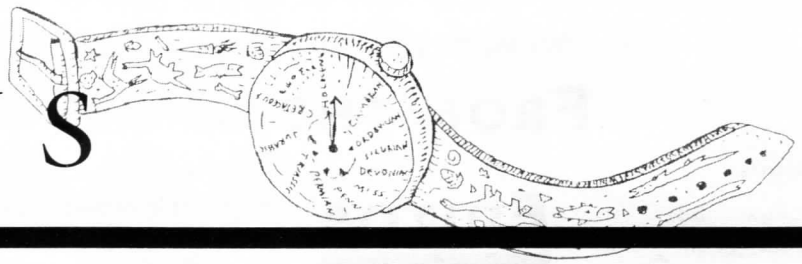
In the News

Finally, read about a strategy to claim that teachers have a "right" to present anti-evolutionary materials in the classroom. Molleen Matsumura reports that this strategy forms the current incarnation of clearly creationist incursions into the curriculum in several states. We also report on anti-evolution "goings-on" in the Congress and in the growing presence of creationist materials in Russia. Wesley Elsberry reports on the annual meeting of the Skeptics Society in which our own Genie Scott was awarded the "Skeptic of the Year" award.

Anj Petto

RNCSE 19(3) was printed in September 1999.

NEWS

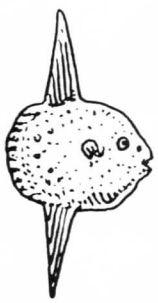


Anti-evolution in Congress — Again!

Members of the US Congress are at it again. Long-time members of NCSE may recall California Congressman Dannemeyer's proposal for a constitutional amendment instituting prayer and creationism in the schools (*see* NCSE Reports *1989; 9[3]: 1-2*). More recently a representative listening to NASA scientists' report on possible fossil life on Mars worried aloud that they were mentioning dates far older than the biblical age of the earth (*see* RNCSE *1997; 17[3]:36).* Now a member of Congress has not only read anti-evolution remarks into the *Congressional Record*, but also sent out a press release which was approvingly quoted by syndicated columnist Cal Thomas and radio commentator Paul Harvey.

On June 16, 1999, during a debate on the "Consequences for Juvenile Offenders Act of 1999", Majority Whip Tom Delay (R - Texas) remarked approvingly "The truth shall make us free...[here's] something that blows away all the smoke." He then read aloud a letter from one Addison Dawkins to the editor of the *San Angelo Standard-Times* in which incidents like the shootings at Columbine High School are blamed on various social "ills" including evolution education. On the same day, Delay's office sent out a press release containing the substance of the letter; the reference to evolution in this excerpt is italicized:

> For the life of me, I can't understand what could have gone wrong in Littleton, Colorado. If only the parents had kept their children away from the guns, we wouldn't have had such a tragedy.
>
> Yeah, it must have been the guns.
>
> It couldn't have been because half our children are being raised in. broken homes....
>
> It couldn't have been because we give 2-year prison sentences to teenagers who kill their newborns.
>
> *It couldn't have been because our school systems teach the children that they are nothing but glorified apes who have evolutionized out of some primordial soup of mud.*
>
> It couldn't have been because we teach our children that there are no laws of morality that transcend us...
>
> Nah, it must have been the guns.



Another June 16 press release by Delay, titled "God not Guns", complained about our "secularized culture" but made no mention of evolution.

Delay's reading of the letter was followed by a speech by Rep Barney Frank (D - Massachusetts). Frank commented that the bill in question had been subjected to so many changes and amendments that it was difficult to follow and added:

> But after listening to the majority whip, I have to read it more closely, because I may have missed the part in which we ban the teaching of evolution. I know we have had a lot of discussion of what was causing the problems here, but I just heard the majority whip say it was Charles Darwin's fault. It is apparently evolution. It is teaching children that they are the products of evolution that is the cause of this.
>
> So I will have to watch more carefully for the amendments when we get the amendment of the gentleman from Texas (DeLay), the majority whip, correcting the teaching of evolution.

It is difficult to say whether Delay's remarks reflect a serious intention to introduce anti-evolution legislation. Other representatives and a sitting President (Ronald Reagan) who have expressed doubts about evolution haven't made such attempts. Still, we can "watch carefully", as Rep Frank suggested, not only bills proposed in state and national legislatures, but whether candidates for office are scientifically literate. NCSE members can also challenge anti-evolution statements in opinions expressed in local media. After all, if all of society's sins and ills are the result of evolution education, what caused sin before Darwin published *Origin of Species* in 1859?

[*The full entry in the Congressional Record can be found by searching the* Legislative Information on the Internet *website. Go to <http://thomas.loc.gov/home/r106query.html> and entering "evolution" in search window #1 (Word/phrase) and entering "06/16/1999" in date window under category #3 (Limit by:). This will return the pages containing the debate on the CONSEQUENCES FOR JUVENILE OFFENDERS ACT OF 1999 (House of Representatives - June 16, 1999). These comments by DeLay and Frank are found on page H4366 by clicking on links to the representatives' names. NCSE thanks Dan Phelps for information in this article.*]

Help Counter Creationism in Russia

Molleen Matsumura
Network Project Director

NCSE member Barbara Forrest, who recently attended a conference in St Petersburg, Russia, reports that Russian scientists desperately need resources to stem the rising tide of creationism in their country. In Russia, as in many American communities, there are 2 important dimensions of the situation, religious and educational. But in Russia, both problems are more severe.

In the US the voices of biblical-literalist religious denominations against evolution are balanced by those of denominations that accept evolution. In Russia, great numbers of American conservative Christian missionaries are fueling a new fundamentalism at the same time that official church/state separation in education has come to an end. To make matters worse, science education is limited: "Only one new biology textbook has appeared in the last 10 years," Forrest reports, "and most Russians don't have to study biology in high school anyway."

Forrest's host, Dr Sergei Orlov, is urging colleagues to develop answers to unscientific claims (sound familiar?) and collecting as much creationist literature as he can — a task made all too easy because St Petersburg is flooded with Russian translations of books and pamphlets about "creation science". "He once had a copy of *Science and Creationism: A View from the National Academy*," Forrest told us, "but it was so popular with his students that he couldn't get it back. He was delighted when I gave him my own copy."

NCSE is sending more copies, and several back issues of *Creation/Evolution*, but there is more to do. Will you help?

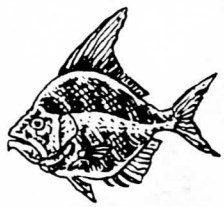
- If you or a friend is fluent in Russian, you could translate some NCSE literature for Russian scientists to use as a resource, or possibly distribute.
- When NCSE first reported on Institute for Creation Research efforts to export creationism to Eastern Europe *(NCSE Reports* 14[2]:8), we offered to help members send gifts of literature rebutting "creation science", or explaining science as a way of knowing. You can order any such book that we have in stock and we will send it, charging you our discount price plus cost of shipping. The same offer applies to back issues of *Creation/Evolution* (a complete listing of contents is at <http://www.natcenscied.org/cecont.htm>).

If some among our fellow citizens are exporting a problem, the rest of us can help with the solution. Like the idea and practice of democracy, the understanding of scientific method and critical thinking is important everywhere. Let's spread the word!

Skeptics Society Conference: "Reinventing Evolution"

Wesley R Elsberry

Mark Todd and I attended the 1999 Skeptics Society conference in Pasadena, CA this year attracted by a can't-miss line-up of speakers. The title of the conference, "Reinventing Evolution", is an apparent take-off on a hot title, "Reinventing Darwin", by the conference headliner, Dr Niles Eldredge, curator of invertebrates at the American Museum of Natural History and co-author of the famous 1972 paper which introduced the concept of "punctuated equilibria". The conference was an upscale event, hosted at the Pasadena Hilton and the nearby Caltech campus with a total attendance of over 400. It was a one-day event, with all the invited talks occurring on Saturday.



Frank Miele, associate editor of *Skeptic* magazine kicked off the conference with general comments. He was followed by NCSE Director Dr Eugenie Scott, whose presentation distinctly impressed — and dismayed — the attendees, as she outlined the extent of belief in creationism among the general populace and especially high school biology teachers in the USA. A particularly chilling statistic was that about a quarter of US high school biology teachers are already teaching some form of anti-evolutionary creationism — either "scientific creationism", "evidence against evolution", or "intelligent design". Wherever Scott went during the rest of the day, crowds of people would gather around to discuss her presentation.

Michael Shermer, president of the Skeptics Society, discussed the role of contingency in evolutionary history, comparing and contrasting Gould and Dennett. Shermer used his experience as a bicycle racer to illustrate the concept of contingency. The talk by James "The Amazing" Randi documented his struggle against pseudoscience, but the personal details took the talk rather far afield from the stated topic of "A Century of Pseudoscience".

Dr Jack Horner discussed — of course — dinosaurs and evolutionary theory, especially as it related to ecologically based predictions of the persistence or extinction of taxa when the climate changed at various points in the earth's history.

Unfortunately, Eldredge was unable to attend the meeting due to a family emergency. In his place, Dr Don Prothero, one of Eldredge's former students and now a professor at Occidental College, gave a talk discussing paleontology and evolutionary theory. Prothero pretty much gave a punctuationist presentation, including bows in the direction of the late Richard

Goldschmidt and also to neo-Lamarckian Ted Steele, and random potshots at any biologists not already on the bandwagon.

Dr Michael Ruse gave a precis of his new book, *Mystery of Mysteries: Is Evolution a Social Construction?* Ruse is a dynamic and interesting speaker, and in this talk he outlined his reasons for considering there to be 2 separable versions of evolution. One of these hews closely to the epistemic values that distinguish science as it is practiced in disciplines like physics and chemistry (seen in the peer-reviewed journals and the "professional" literature). The other is suffused with non-epistemic values introduced by various researchers and which forms the basis of a secular religion. Anti-evolutionists have already picked up on Ruse's "secular religion" comments without noting the restrictions with which Ruse conditions its deployment, and especially ignoring Ruse's conclusion that the science of evolutionary biology stands independent of its philosophical implications.

Other highlights included a program on the life of Charles Darwin provided by Richard Milner. But for the many NCSE members in attendance the pinnacle was seeing NCSE Director Eugenie Scott receive the coveted "Skeptic of the Year" award.

All in all, it was a worthwhile meeting with interesting and sometimes provocative speakers. The meeting evoked 2 different themes. One basic message of the meeting was that we are no longer just dealing with the old-style biblical literalist young-earth creationism. The second was that the modern picture of evolution (at least through the eyes of our two paleontologists) is not the neat cut-and-dried portrait with which the general public may feel most familiar. Effectively meeting the challenges ahead will critically depend upon education, both to expand the treatment of evolutionary ideas and to promote a skeptical attitude in future students. The Skeptics Society represents a body of people who may reasonably be counted as predisposed to taking the threat of anti-evolutionary creationism seriously and to rise to the challenge.

UPDATES

Florida, Bay County: On June 5, 1999, the *News Herald* reported that Leah Allen had been trying for 2 months to arrange a conference with a teacher who had confiscated and defaced her son's copy of *National Geographic*. The rare copy of a 1985 issue features a hologram of a hominid skull on the cover. During a reading period, Sebastian Allen was reading captions under illustrations of hominid fossils; the reverse side of the illustration "had an updated version of the familiar painting showing the profile of naked human males at various stages of evolution". The teacher, who tore out and ripped up the offending pages before throwing out the entire issue, reportedly lectured Allen about reading "pornography". While the principal, Maudry Cox, admitted the teacher was wrong to confiscate a student's property, she also commented, "She took a couple of pages that were not appropriate." The *News Herald* reported that Leah Allen said teachers should be happy to have students who are interested in learning about science, and that the teacher's actions were "outrageous."

Kansas: As we went to press, the Kansas State Board of Education voted on science standards, an event that made national headlines. NCSE will carry the full story in the next issue of *RNCSE*. Earlier, NCSE members reported that at a July 13 Board meeting, speakers supporting evolution education outnumbered opponents by 2 to one. The President of the University of Kansas and the governor supported the standards developed by a science writing committee. However, conservative board members continue to insist that, at most, evolution should be taught at the discretion of local districts, and one member (Steve Abrams) presented "alternate" standards drafted with the assistance of a creationist group.

Kentucky, Boone County: According to the Lexington *Herald-Leader*, a citizens' group called "Ethics in Government" is planning a court appeal of the Fiscal Court's decision to grant Answers in Genesis a rezoning permit for their proposed "creation science" museum (June 4, 1999). Even if the lawsuit fails, it will be at least 2 years before the museum could open, according to officials of the ministry who say that they have only raised $300 000 of the $5 million needed for construction (May 30, 1999).

Washington, Burlington-Edison: Science teacher Roger DeHart was told in August, 1998 by his school district's superintendent that he must stop teaching "intelligent design theory" using materials from the textbook *Of Pandas and People* (RNCSE *1999; 19[1]:7)*. Subsequently, DeHart's attorneys contacted the school district, and DeHart himself submitted materials for consideration by a curriculum review committee (Burlington *Argus*, March 3, 1999). Although the committee denied his request, the principal granted him permission to use a few pages from the book anyway. Superintendent Rick Jones has defended the decision, insisting that DeHart is only being allowed to teach about a scientific debate and commenting "People believe we are deviating from the teaching of science, and that is not so" (*Skagit Valley Herald*, July 13, 1999, p A1). A citizens' group formed by local residents including NCSE members plans to appeal the decision, and the American Civil Liberties Union has requested copies of lesson plans and other materials approved by the principal.

International — Turkey: In a previous issue of *RNCSE*, we reported that the Institute for Creation Research has been hold-

ing "creation seminars" in Turkey, and that widespread distribution of anti-evolution materials — both translations of ICR materials and books by Turkish authors — had spurred the Turkish Academy of Science (TUBA) to publish a position paper supporting evolution in September, 1998 (RNCSE *1998; 18[3]29*). Since then, the presidents of TUBA and of TUBITAK — Scientific and Technical Research Organization of Turkey — have issued a second statement, and an Evolution Commission has been formed to answer pseudo-scientific "criticisms" of evolution. In retaliation, the Science Research Foundation (Bilim Arastirma Vakfi , or BAV) has denounced members of the Evolution Commission as both "Maoists" and supporters of Kurdish separatism (an unrelated but equally damning charge). Some BAV publications, and the Islamic fundamentalist newspaper *Akit* (December 2, 1998, p 1) seriously endangered scientists' lives by publishing their addresses together with these denunciations. On May 26, the newspaper *Cumhuriyet* reported that the 3rd Civil Court in Ankara found BAV liable for damages, declaring that "a severe and unjust attack was perpetrated on the plaintiffs' personal rights, by listing the names of the scientists defending the theory of evolution and describing them as communists and separatists on the flyers distributed by the foundation." NCSE is working to help provide Turkish scientists with materials rebutting specific "creation science" claims, and will publish articles describing Turkish creationism in greater depth in a future issue. [*Ed. We are preparing a special perspective on anti-evolutionism in Turkey and in other Islamic societies for publication in the fall, 1999.*]

[*NCSE thanks Ken Atkins, Taner Edis, Adrian Melott, Mike Mitchell, Howard Pellett, Dan Phelps, Umit Sayin, and John van Keppel for material used in this story.*]

NCSE NEWS

NCSE Member Elected to National Academy

Dr. Robert Carneiro, professor of anthropology at the American Museum of Natural History, was elected to the prestigious National Academy of Sciences' class of 1999. Carneiro, a cultural anthropologist, is the author of one of NCSE's most popular brochures, "Origin Myths" (available at <http://www. natcenscied.org/broclist.htm>). We congratulate Bob for his many scholarly achievements and this most recent recognition.

Helping NCSE: Questions and Suggestions from Our Members

Molleen Matsumura
Network Project Director

In every issue of *RNCSE*, you'll find contributions by fellow members and news of ways that NCSE members are helping defend evolution education. Sometimes there's a simple "thank you" for a newspaper clipping we used in our Updates Department; sometimes there's an article detailing the work of a member involved in a local evolution/creation controversy; and sometimes, we hear a question or suggestion that doesn't quite fit into the "news" category, but certainly deserves to be passed on!

Ken Atkins has found a conversation starter that helps him tell people about NCSE. Ken organized community support for the decision by the Burlington-Edison (WA) district's Superintendent of Schools to end one teacher's use of the creationist text *Of Pandas and People* (RNCSE *17[4]:8, 18[1]:9, 18:3[6]*). Ken wrote to tell us he joined NCSE because, "The NCSE's advice, information, support and encouragement was essential to me in order to fully understand the issues involved. Without it, I couldn't have gathered troops for a letter-writing campaign and to attend school board meetings. I just didn't know enough of the facts. Count on me to continue supporting the NCSE through the coming years."

When Ken joined NCSE, he received a complimentary calendar with images of "The Birth and Death of Stars." He told us, "I'm working in a big boat shop, and the Hubble calendar I got from you folks is above my work bench. Numerous people have asked me about it. I tell them where I got it." (We're out of calendars but you might enjoy the bumper stickers offered as resources in this issue.)

Jim Murray and David E Thomas are among the members who have helped us track news about NCSE by letting us know when they encountered news stories about NCSE's statement on evolution by textbook authors. The great news is that the Associated Press wire service responded to NCSE's press release; the problem is that while we were able to find the story on the websites of many news dailies and weeklies, it's harder to find out how often the story was picked up by radio stations or printed media. If you saw or heard this story (or any other news report that mentions NCSE), please send us a clipping or the call letters of the station that broadcast the news, with the date of the broadcast.

Robert Pennock suggests sharing publicity with NCSE. Pennock has been giving several lectures in connection with his recently published book *Tower of Babel: The Evidence Against the New Creationism* and told us, "I always give folks a plug to become NCSE members whenever I give a talk about the new creationists."

Robert Raikow and David E Thomas donated creationist books to NCSE's collection. Having such

books is especially helpful when NCSE is called upon to advise school districts who have been asked to use them to "present arguments against evolution."

Ron Tolle recently asked, "I want to donate books about evolution to the local library. What books do you recommend?" Donating books to your library is an excellent idea! We suggest that you begin by talking to your librarian because libraries have different policies for donations and differing needs. For example, some libraries need more than one copy of a given book. Your library might have plenty of children's books about dinosaurs, but a short supply of books for adults, or *vice versa*. They might need books whose connection to evolution is real but not obvious, such as a biography of Charles Darwin or a *Roadside Geology* book that gives geological information about your region. Showing your librarian book reviews and sales information in *RNCSE* can help you select the best among many possibilities.

[*For more ways to help NCSE, send us an SASE with a note requesting "25 Ways to Support Evolution Education", or visit <http://www.natcenscied.org/wb atcando.htm>.*]

NCSE Members Receive MacArthur Foundation Awards

Molleen Matsumura
Network Project Director

On June 22, 1999, the John D and Catherine T MacArthur Foundation announced this year's recipients of the prestigious MacArthur Foundation Fellowship, commonly known as the "Genius Award." According to the Foundation's literature:

> [The]... criteria of selection for a Fellowship [are]: (1) the Fellow must be an individual of exceptional creativity whose work shows quality and promise; (2) the Fellow's work will likely, sooner or later, make a significant difference in human thought and action; and (3) a Fellowship must be enabling, that is, it must help an exceptionally creative individual to break away, work freely, do what could not otherwise be done....
>
> The Fellowship is designed to enhance future work, not to reward past work, hence the focus is on promise. In order to gauge promise, which can exist at any age, the Committee must balance a person's age and education or work experience with accomplishments thus far (<http://www.macfdn.org/programs/fel/faq.htm#6>).

At NCSE we were delighted to recognize the names of 2 members on the list of distinguished recipients, and couldn't resist quipping, "Looks like it DOES take a genius to know you should support NCSE." And why did the MacArthur Foundation reward this particular pair of NCSE geniuses?

Shawn Carlson is a physicist who writes the "Amateur Science" column in *Scientific American*. He received the fellowship because of his work with the Society for Amateur Scientists (SAS), the organization he founded to give amateur scientists an opportunity to contribute to serious scientific research. By providing information about research techniques and bringing together amateurs and professionals, SAS has made it possible for members to participate in archeological and seismological research, help measure solar emissions during an eclipse, and participate in a wide range of other activities. Carlson is tireless in his eagerness to share the joys of "doing science". He loves to describe the reactions of elementary school students to his "World's Most Interesting Dirt Collection" which includes moon dust and volcanic ash from Mt St Helens. Carlson told reporters for the *San Diego Union Tribune* that he plans to use his award "to advance the cause of science literacy. 'Most people think science is just facts. But it's also a process by which these facts are discovered, and we're educating people to make discoveries.'"

David Hillis is Alfred W Roark Centennial Professor in Natural Sciences at the University of Texas, Austin. An evolutionary biologist, his research is in systematics, the study of the relationships among living things. He writes, "Most of my research concerns the use of the techniques of molecular genetics to study relationships among populations, species, and higher taxa." He is currently researching phylogenetic relationships, speciation patterns and mechanisms, and evolutionary modeling. Most of his research has been done with amphibians, reptiles, and fish. Although a very well-known researcher, he is less well known as a member of GODDS (Group of Davids Doing Systematics) which allegedly was formed at a bar in Austin in 1996 and which consists of Davids Cannatella, Maddison, and Swofford (and a list of wannabes who either are Davids or systematists, but not both.) The confused reader of this essay may consult <http://ag.arizona.edu/tree/godds/godds.html>.

NCSE congratulates Carlson and Hillis.

[*More information about activities of the Society for Amateur Scientists is at <http://www.thesphere.com/SAS>.*]

NCSE Members Enjoy "Missing Links — Alive!" Gala

Molleen Matsumura
Network Project Director

"Missing Links — Alive!" is a travelling exhibit that uses thousands of square feet of dioramas, animatronics, artifacts, and fossils, complemented by taped interviews with some of the scientists who have worked to shed light on human evolution, to present 4 million years of human prehistory.

NCSE Expanding Book Program

Molleen Matsumura, Network Project Director

For many years, NCSE has offered discounts on books about evolution and related topics as a benefit of membership. Descriptions and ordering information for these books are a regular feature of *RNCSE*. However, our members are voracious readers with a variety of tastes, and it has been difficult to offer all the books you would like to buy. To expand and improve our service to you, we decided to make it possible for you to order recommended books on the World Wide Web. Here's how it will work:

- In September, we added a new book catalog to our web site at **<http:// www.natcenscied.org/ bookcat.htm>**. We will begin with a listing of excellent books that NCSE has sold in the past, but can no longer carry. We will also make available most of the books listed in our bibliographies of books for teaching about evolution, with an emphasis on human evolution. (Preview these titles at <http://www.natcen scied.org/heenbib.htm>.)
- When you want a book from our catalog, click on the title and your browser will take you to the book's listing at *amazon.com*, a well-established web-based bookseller. Just use their order form, and the book will be shipped directly to you (you can even order gift-wrapping). Amazon.com will give NCSE a percentage of each sale that was made through a link on our site.
- Any questions? Is that a hand raised in the back row? Yes, you can order other books while you are on the amazon.com site, even books we don't list. However, NCSE receives a smaller commission on such sales. To maximize your "gift" to NCSE, you would return to our site for each book you want. And yes, you can recommend to *anyone* that they use this page. They can make a purchase that will benefit NCSE even if they are not yet members.

But that's not all. We know from experience that many of our members who are trying to choose from the wealth of evolutionary literature want help in deciding what to buy.

So:

- On September 15, we will add the "Karaoke Corner". How can you "sing along with NCSE"? By emailing us your requests for evolution and science books you'd like to order through NCSE! Send your request by October 15, by postal mail *or* email to <molleen @natcenscied.org>to have your request among the first we list; once the Corner is inaugurated, you can send a request at any time. After you've read the book, feel free to send brief, signed descriptions up to 100 words long to be added to the listing. This way, NCSE members can tell each other what they're reading, and why.
- Next, we will add "Natural Selections", where we will list books (especially new books) recommended by NCSE's Executive Director and members of our Board of Directors. Watch future issues of *RNCSE* for an announcement that this feature is ready to go online.

And last but not least — you will still be able to order bumper stickers, some particularly popular books, and other special items directly from NCSE. We are very pleased to be able to expand this service to our members, and we hope you'll enjoy taking advantage of it.

When the exhibit arrived at the California Academy of Science in late May 1999, NCSE invited San Francisco Bay area members to a special tour hosted by NCSE Executive Director Eugenie Scott and President Kevin Padian. The chance to meet fellow evolution enthusiasts and support NCSE added to the excitement. The delicious hors d'oeuvres added to the pleasure of the occasion, and Lee Vineyards of Napa, California generously donated fine Saintsbury and Acacia wines for this event.

The exhibit first appeared in Europe, drawing record crowds at a number of museums, including the Edinburgh City Art Center where it was a part of the International Science Festival's 10th anniversary. The exhibit's US debut was at the Oregon Museum of Science and Industry (OMSI) in Portland. Museum officials were excited to learn just a few weeks before the opening that they would receive on loan from Danish museums some stone tools that were approximately 1 million years old.

NCSE member Lyle Hubbard, who consulted with OMSI about the exhibit and related educational programs, wrote us his impressions of the exhibit:

> The kids will eat it up. To me the most stunning portion was fired ceramics at about 28 000 BP — incredible art ... [from] Dolni Vestonice that has never been out of the country....
>
> No matter how many times I saw it, how much I worked on it, or the final opportunity to handle some of the pieces, I was, as an anthropologist, awed and humbled by the incredibly clear message that these beings were us and that we are them. How can our heritage be denied in the face of such a plethora of wonders created by human hands?

Next stop? Asia! NCSE will be on watch for news of when and if the exhibit returns to the US, since we know our members would want to be the first to know.

EVOLUTION NOTEBOOK

Australopithecus garhi: A New-Found Link?

Colin Groves
Australian National University, Canberra

INTRODUCTION

The human line separated from the chimpanzee line some 5 million years ago or a little more, according to dates derived from molecular "clocks". The earlier members of the human lineage, all of them entirely African, are lumped together as "australopithecines", named for the genus *Australopithecus* but including other genera too. Later members are placed together in the genus *Homo*.

Australopithecines have small cranial capacities (about 350 to 550 cc), large faces, jaws and cheek teeth, and the arrangement of the teeth in the jaws (dental arcade) tends to be rectangular. Where the postcranial skeleton is known, the ribcage is funnel-shaped (narrow at the top, expanding downwards), the hipbones are very wide and flaring, and the legs are short (leg:arm ratio intermediate between chimpanzee and human).The feet are basically bipedal and resemble humans, but the phalanges (toe-bones) are more curved. Fossils of the genus *Homo* have larger cranial capacities (510 cc upward), usually smaller faces, jaws and cheek teeth, and the dental arcades are parabolic. Except in the most primitive members the ribcage, where known, is barrel-shaped, the hipbones do not flare as much and are more curved, the legs are long, and the feet are fully modern.

***Table 1: Brief Comparison of* Australopithecus *with early* Homo *fossils*[1]**

	A afarensis	*A africanus*	*A garhi*	Early *Homo*
Molar & premolar size	moderate	moderate to large	huge	moderate
Anterior upper premolar	asymmetrical	more oval	more oval	more oval
Tooth enamel thickness	fairly thick	thick	thick	thick
Dental arcade shape	rectangular converges backward	rectangular diverges posteriorly	rectangular diverges	parabolic diverges
Anterior depth of palate	shallow	varies	shallow	deep
Diastema in upper jaw	common	absent	present	rare
Anterior pillars on face	no	yes	no	no
Prognathism	strong	usually strong	strong	reduced
Supraorbital structure	thin bar	thin bar	thin bar	torus
Cranial capacity	343-500	428-ca 515	450	510-752

[1]Table based on Asfaw and others, 1999.

As a typical bang-up-to-the-minute biologist, I adopt a cladistic attitude to taxonomy: a family or genus is an evolutionary lineage. I place humans, chimpanzees, gorillas and orangutans together in the family Hominidae; so "hominid", a term still all too often used to mean "in the human line", actually refers to other living Great Apes too. At most, humans can be separated from other Great Apes as a tribe, Hominini, so fossils on the human side of the divide are "hominins". Anthropologists as a crew are always about 10 years behind other biologists, so it will probably be quite a while yet before textbooks of human evolution stop using "hominids" in the old sense.

THE AUSTRALOPITHECINES

Among the australopithecines, the earliest member is *Ardipithecus ramidus*, which is about 4.4 million years (Ma) old and presents a quite distinct set of traits. The other distinctive clade represents the "robust" or "nutcracker", *Paranthropus* species, a distinct lineage which can be traced through a million and a half years from 2.5 to about 1 Ma. The others are for the moment (for want of a decent cladistic model, really) lumped into the genus *Australopithecus*, which contains — or did until early this year — at least 4 species:

1. *Australopithecus anamensis*, 3.9 to 4.1 Ma, from Kanapoi and Allia Bay, Lake Turkana district, northwestern Kenya. Though only recently described, this species is represented by quite a range of remains.
2. *Australopithecus bahrelghazali*, about the same age as *A anamensis*. This species is recovered from Koro Toro in Chad and represents the only australopithecine known from western Africa. *A bahrelghazali* is known so far only by a single jaw.
3. *Australopithecus afarensis* is well known from Fejej in Ethiopia; about 4 Ma, Laetoli in Tanzania, 3.5 to 3.75 Ma; and Hadar in Ethiopia, 3.3 to 2.9 Ma These sites cover a wide area in space and time, and not everyone is convinced that they all belong to a single species. Laetoli has over 20 fossil individuals (mainly jaws and teeth), and some important fossil footprints, while the extremely rich deposits at Hadar include a collection called "The First Family" and the very famous partial skeleton "Lucy".
4. *Australopithecus africanus*, the earliest described species, from South Africa; it has long been known from the sites of Taung, Sterkfontein and Makapansgat, and new exca-

vations have recently begun at other sites in the Sterkfontein Valley (Drimolen and Gladysvale). Until very recently no absolute ages for these South African sites seemed possible, but they were dated by comparing their mammal faunas with those from sites in East Africa that could be dated. These comparisons suggested dates of 2.5 to 3 Ma. Very recently, attempts have been made to apply Electron Spin Resonance dating to them, and the results so far seem consistent with the faunal inferences.

The indications are that the early hominins were as diverse as any other group of large mammals. Among all the diversity, however, there must have been some actual ancestors and, human nature being what it is, everyone is obsessed with trying to deduce which, if any, of the fossil species might have filled this role. About all we can say so far about the ancestral possibilities of *A anamensis* is that it is in the right place at the right time and has no specialized bits of anatomy that would *exclude* it from having been an ancestor. *A afarensis* seems pretty primitive all around, but of course is more derived in the human direction than *A anamensis*. So, a plausible sequence begins to emerge. But what of *A africanus*?

Opinions have been rather divided about *Australopithecus africanus*. It is later in time than *A afarensis* and earlier than the first *Homo*, *H habilis*, so it fills the time gap; but it has seemed to be in the wrong place. Maybe our ancestors evolved in East Africa, moved south, and then later moved back again to become *Homo* (though of course they may have existed in East Africa too but we just haven't found any yet). But the differences from *A afarensis* to *H habilis* seem mostly to be pointing in the wrong direction. On the one hand *A africanus* had a larger cranial capacity on average, the lower premolars were wider (in *A afarensis* they were often narrow and fairly apelike), and the dental arcade sometimes tended to be more parabolic. On the other hand it had larger, broader molars and premolars but somewhat smaller front teeth, and a heavily built-up facial skeleton with what one specialist, Yoel Rak, has called "anterior pillars" — prominent bony thickenings alongside the snout and nasal aperture. If *A africanus* was ancestral to *Homo*, these last features would have been developed then lost again — a transition we try to avoid in deriving ancestor-descendant lineages.

Early Homo

Well-preserved specimens of *Homo* appear at around 2 Ma in East Africa, mainly at Olduvai Gorge (Tanzania), where *Homo habilis* occurs, and at Koobi Fora (Kenya), where 2 species are present, a *habilis*-like species and the larger *Homo rudolfensis*. Both, especially *H rudolfensis*, have large molars, but the premolars are less expanded than in *A africanus*. The cranial capacity is 510-680 cc in *H habilis* and about 750 in *H rudolfensis*. The postcranial skeleton in *H habilis*, at least, is every bit as primitive as in australopithecines (it is "well known" that the legs are even relatively shorter than in "Lucy", but Asfaw and others [1999] point out that the evidence actually will not sustain this conclusion; this was shown earlier by Korey [1990]). A couple of hundred thousand years after these 2 early *Homo* species appeared, the first more modern-looking species, *Homo ergaster* with its long legs, shortened forearms, short face, prominent nose and beetle-brows, and a cranial capacity over 800 cc, appears in the record and is well on the way to becoming us.

The early *Homo*-bearing beds also have stone tools. Chimpanzees modify grass stems, branches and other perishable material, and they use stones to crack nuts but do not modify the stone. Presumably australopithecines did at least as well as chimpanzees, but not until *Homo* are there signs that stone was deliberately modified to form tools.

Where, then, did *Homo* spring from? There has been a big gap in the record before 2 Ma — back to 2.5, if we think that *A africanus* was the ancestral stock; or to 2.9 if we reject *A africanus* and take it back to *A afarensis*. (A related question, where did *Paranthropus* spring from, has now gone some way to being answered by the discovery, in the mid-80s, of "the Black Skull", from 2.5-ma deposits at Lomekwi, west of Lake Turkana. This specimen is beautifully intermediate between *A afarensis* and the later (1-2 Ma) *Paranthropus* specimens we find at Koobi Fora, Olduvai and so on.

The indications are that the early hominins were as diverse as any other group of large mammals.

Until this year, there were just a few suggestive scraps:

1. A jaw from deposits of 2.3-2.5 Ma at Uraha, in Malawi. This has extremely large teeth and a characteristic U-shape, and has been ascribed to *Homo rudolfensis*.
2. A maxilla from 2.3-ma levels at Hadar. This is very clearly *Homo*, less prognathous ("snouty") than an australopithecine, with a fairly parabolic dental arcade and no anterior pillars. Its smaller teeth resemble *Homo habilis*. From the same level come stone tools.
3. A temporal bone fragment, mainly the glenoid fossa (where the jaw fits into the skull), from 2.4 Ma deposits at Chemeron in Kenya The glenoid fossa is deep and *Homo*- (rather than *Australopithecus*-) like. It appears to be placed further under the braincase suggesting that the brain had expanded above and out over the side of the joint.
4. Finally, a basicranial specimen (Sts 19) from Sterkfontein, found in amongst the *Australopithecus africanus* remains, has quite a number of *Homo*-like details of the form of the ear region, all of which distin-

guish it from any australopithecine. In comparable parts, in fact, it is quite like the Chemeron temporal.

The Uraha mandible and Hadar maxilla are early *Homo*, there is no disagreement about this. The Chemeron temporal and Sts 19 are much more controversial. Even if we narrow it down to just the first two, we come to the interesting conclusion that by 2.3 Ma two species already seem to be in existence, the same two species that we find in the 2 Ma deposits at Koobi Fora.

Enter The Bouri Hominin — or Should That Be *Hominins*?

And now, and now... hot off the presses ... a paper by Asfaw and others (*Nature* 1999 Apr 23; 284:629-5) describes a new species which they think "is descended from *Australopithecus afarensis* and is a candidate ancestor for early *Homo.*" The new species is *Australopithecus garhi* from Bouri, on the Middle Awash River in Ethiopia. The age is 2.5 Ma, and the remains are associated with large antelope remains with cut-marks on them, apparently from stone tools. The primitive stone tools themselves were found not at Bouri itself but at the nearby, contemporaneous site of Gona.

The type specimen of *Australopithecus garhi* is a partial cranium. From nearby sites, and perhaps belonging to the same species or perhaps not, come several postcranial bones including a partial skeleton, a fragment of a second cranium, and 2 mandibles (one fairly complete). The specific name, *garhi*, means "surprise" in the Afar language, and a bit surprising it is, too. It is basically australopithecine, with a small cranial capacity (450 cc), rectangular or slightly diverging dental arcade, and very prognathous face. It lacks the anterior pillars of *Australopithecus africanus*, and it even has a gap (diastema) between the lateral incisor and the canine, a primitive feature seen in *A afarensis* but not in *A africanus*. From the photos, it looks very like *A afarensis*, but the authors point out some more "advanced" features like the premolar shape and the more anteriorly placed malar (cheekbone) root. Like many australopithecines, including some *A afarensis*, it has a sagittal crest for anchoring large temporal (chewing) muscles. But what is astounding about the specimen are the huge premolars and molars. The canine, for example, is larger than any other hominin, the anterior premolar is larger than any except for some specimens of *Paranthropus boisei* (the East African "nutcracker" species), and the second molar is larger than any *Homo*, though within the range of *A africanus.*

About the mandible, Asfaw and colleagues say little, except that its morphology would be compatible with belonging to the same species. The stone tools might have been made by *A garhi*, or they might not. As for the postcranial bones, the authors are careful to explain, they too need not belong to the same species. There could be one species that left its head in the deposits and another that left its postcranial skeleton there (and of course either or neither of them might have made the stone tools). But for what it is worth, and it is worth a good deal, Asfaw and colleagues give a brief description and an interesting diagram of the limb bone proportions. The femur-to-humerus ratio was like *Homo ergaster* and modern humans (long femur, short "Lucy"-sized humerus), but the forearm (radius and ulna)-to-humerus ratio was long like a chimpanzee or, for that matter, like "Lucy".

What are we to make of it? One, 2 or 3 species? What we have is

- a skull (to which the name *Australopithecus garhi* belongs), resembling *A afarensis* but more derived; possessing features shared by *A africanus* and *Homo*, and without the apparently unique specializations of *A africanus*;
- limb bones intermediate in proportion between *A afarensis* and *H ergaster*; and
- the earliest stone tools so far discovered.

On balance, the evidence favors the single-species interpretation, but until we find associated parts we must be cautious, especially because of those vast teeth. It has been argued by McHenry, Tobias and others that megadontia (big-toothedness) is the primitive condition so that the teeth of early *Homo* ought to get smaller. Indeed, we do observe a decrease in tooth size in the emerging homins, except for these specimens from Bouri. That the putative ancestor of *Homo* (based on derived condition of skull and limb bones) had the biggest teeth of the lot — that was entirely unexpected!

Suppose *Australopithecus garhi* made the tools and was the ancestor of *Homo*. Where do the 4 early *Homo* specimens presumed older than 2 Ma fit in? The Bouri cranium lacks a base, so that prevents direct comparisons with both Sts19 and the Chemeron temporal. Asfaw and colleagues do not describe the Bouri-region mandibles, so that (for the moment) excludes comparisons with Uraha. But the Hadar maxilla is definitely different from the one found at Bouri. In fact, it could be lost among the Olduvai maxillae, more than 300 000 years later. So, if *A garhi* is ancestral to *Homo*, either there was a rapid change in maxillary morphology in the intervening 200 000 years, or else

Table 2: Body Proportions[2] of Some Important Fossils

Compared With Modern Humans and the Most Humanlike Ape (the* Bonobo *or "Pygmy Chimpanzee").

	Brachial index:[3] Radius as % of humerus	Humerofemoral index:[5] Humerus as % of femur
Pan paniscus (Bonobo)	91.9	97.8 ± 2.1
A.afarensis ("Lucy" skeleton)	90.7	84.6 ± 2.8
Bouri (perhaps *A.garhi*)	97.9	ca. 70.4
H.habilis (OH 62)	[79.5-93.2]	[94.3 ± 7.7]
Homo sapiens (African)	79.6 ± 2.5	73.3 ± 1.7

[2] "±" means, for living forms, the sample standard deviation; for individual fossils, the standard deviation of the estimate. See especially Korey (1990), who shows how the *Homo habilis* data have been grossly overinterpreted.
[3] The brachial index calculates the length of the forearm as a proportion of the upper arm.
[5] The humerofemoral index calculates the relative lengths of the arms and legs by comparing the upper arm to the thigh.

the Bouri specimen is a late survivor of its species. We must not exclude a speeding-up of evolutionary rates, nor must we fall into the trap of assuming anagenesis (evolution without branching).

It's an exciting time to be alive if you're interested in human evolution. New countries are getting onto the paleoanthropological map: India, Syria, Eritrea, Chad, Malawi, and Portugal. Every new fossil fulfils certain expectations but opens up a whole barrel of new research questions. Fossil discoveries are matched by new discoveries of just how human our nearest living relatives are. And the press is avid for them all, as well it might be. Keep on your (bipedal) toes; if you miss this week's reports you might already be out-of-date.

Author's Address

Dr Colin Groves
Department of Archeology and Anthropology
Australian National University
Canberra, ACT 0200 Australia
colin.groves@anu.edu.au

Further Reading

1 ***Description of the new species and its environment:***

Asfaw B, White T, Lovejoy O, Latimer B, Simpson S, Suwa G. *Australopithecus garhi*: a new species of early hominid from Ethiopia. *Science* 1999; 284:629-5.

De Heinzelin J, Clark JD, White T, Hart W, Renne P, WoldeGabriel G, Beyene Y, Vrba E. 1999. Environment and behavior of 2.5--million-year-old Bouri hominids. *Science* 199; 284:625-9.

2 ***What is human-like about the early hominin locomotor skeleton, and what can and cannot be said about them:***

Korey KA. Deconstructing reconstruction: the OH62 humero-femoral skeleton. *American Journal of Physical Anthropology* 1990: 83:25-33.

McHenry HM. Tempo and mode in human evolution. *Proceedings of the National Academy of Sciences USA* 1994; 91:6780-6.

3 ***An alternative interpretation of*** **Australopithecus afarensis *and*** **A anamensis:**

Senut B. Pliocene hominid systematics and phylogeny. *South African Journal of Science* 1996; 92:165-6.

4 ***The candidates for earliest*** **Homo *(2.3 to 2.5 Ma):***

Uraha:
Bromage TG, Schrenk F, Zonneveld FW. Paleoanthropology of the Malawi Rift: an early hominid mandible from the Chiwondo Beds, northern Malawi. *Journal of Human Evolution* 1995; 28:71-108.

Hadar:
Kimbel WH, Walter RC, Johanson DC,Reed KE, Aronson JL, Assefa Z, Marean CW, Eck GG, Bobe R, Hovers E, Rak Y, Vondra C, Yemane T, York D, Chen Y, Eversen NM, Smith PE. Late Pliocene *Homo* and Oldowan tools from the Hadar Formation (Kada Hadar Member), Ethiopia. *Journal of Human Evolution* 1996; 31:549-61.

Chemeron:
Hill A, Ward S, Deino A, Curtis G, Drake R. Earliest *Homo*. *Nature* 1992; 355:719-22.

Sterkfontein:
Kimbel WH, Rak Y. The importance of species taxa in paleoanthropology and an argument for the phylogenetic concept of the species category. In: Kimbel WH, Martin LB, editors. *Species, Species Concepts, and Primate Evolution*. New York: Plenum Press, 1993. pp 461-84.

The De-riving Force of Cladogenesis

Andrew J Petto, University of the Arts

Cladogenesis is the term used to describe the branching off of new taxa. These branches — or *clades* —are based on several criteria which make the descendants along a particular branch different from their ancestors and from related taxa on other branches. Each new branch exhibits a combination of novel characteristics which are unique to that branch mixed with some "familial" characteristics which this branch shares with its evolutionary ancestors. Although certain novel traits may be diagnostic for members of an evolving lineage, it is often the *combination* of unique and shared characteristics which defines new branches.

The basis of constructing a good cladogram is the ability to identify the characteristics of the ancestral population and those of the descendants. Characteristics found among the ancestors and shared by most or all members of related taxa are referred to as *primitive*. In cladistic studies this word is understood as "original" or "primal" and not as "crude" or "simple". In order to avoid confusion, some writers refer to these traits as *conservative* or simply *ancestral*. Shared, conservative traits link the members of related branches to a common ancestor.

On the other hand, characteristics that are found in various evolutionary branches which differ from those of the ancestors are considered *derived*. In many cases these derived characteristics are changes to the structure or function of widely-shared ancestral characteristics. Derived traits distinguish the members of one evolutionary branch from the members of another branch.

A cladogram is based on these combinations of ancestral and derived characteristics in related species by organizing and diagramming the pattern and sequence in which they could have arisen. There are two fundamental principles that we follow in building cladograms. First, a cladogram is based on an ordered or sequenced pattern of traits. The goal is to produce the most *parsimonious* cladogram — one that proceeds from the ancestor's to the descendant's profile with the fewest backward or sideward steps. In a sense, we want a cladogram in which evolution need invent a characteristic only once in an evolving lineage

Second, we want a *monophyletic* cladogram. Each evolutionary branch must contain all descendants of a common ancestor. One of the chief criticisms against the "classical" taxonomy which places humans on one branch and the great apes (African apes and the orang utan) on another is that fails on the criterion of monophyly. Based on fossil data, comparative anatomy, and molecular biology, humans share a more recent common ancestor with African apes than either group does with orangs, and so humans should not occupy a separate branch.

Fossil data help to refine cladistic analysis by providing information about the sequence or order in which certain derived traits emerged. Cladistic analysis helps to resolve the "problem" of the so-called "missing links" or the intermediate specimens, because it does not require that fossil species *evolve into* any related species which emerge later. Instead, it represents the evolutionary history of an evolving lineage in terms of a collection of characteristics which can be passed along to descendant populations — or not!

BOOKREVIEW

Forbidden Archaeology's Impact

By Michael A Cremo. Los Angeles: Torchlight Publishing, 1998. 592 pages, bibliography and index.

Reviewed by Tom Morrow.

What if somebody published a 592-page book to answer all the critics of his previous book? That's what Michael Cremo does in *Forbidden Archaeology's Impact*. In 1993 Cremo and Richard Thompson published *Forbidden Archaeology (FA)*, a voluminous exposé of "anomalous archaeological artifacts" which suggested modern people possibly lived on earth almost as long as the world existed, starting some 4.3 billion years ago.

Like Christian creationists who accommodate science to the Bible, Cremo and Thompson are Hindu creationists who harmonize science with their sacred Vedic scriptures. The *Bhagavata Purana* says that men and women have lived on earth for a vast period of time called the Day of Brahma, which is composed of a thousand yuga cycles. Each yuga cycle lasts 12 000 "years of the gods." And since each "year" equals 360 earth years, one yuga cycle equals 4.32 million years while a *thousand* yuga cycles total 4.32 billion years, summing up the Day of Brahma.

Forbidden Archaeology's Impact describes the critical responses to Cremo's first book by including all his personal correspondence, interviews, journal articles, conference papers, and even Internet postings. But Cremo mostly confronts his critics head-on, reprinting their harsh book reviews verbatim and following them up with the lengthy rebuttals that he mailed to each reviewer in protest.

And Cremo doesn't suffer critics gladly. He mailed a copy of this book to the NCSE because it includes a voluminous rebuttal to Wade Tarzia's review published 5 years ago in *Creation/Evolution 34*. So I'll choose my words carefully.

Cremo strenuously protests the *ad hominem* attacks targeted at *Forbidden Archaeology* and its abridged edition, *Hidden History of the Human Race*. And in the reviews he cites, some critics *did* unnecessarily tease, trivialize, and spoof the authors' deadly serious presentation of their major evidence for human antiquity. And I agree that those reviewers should have analyzed *FA's* claims more seriously and professionally.

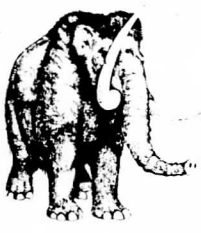
But their scorn could have been provoked by the book's blunt, in-your-face debut. As a publicity stunt, Cremo and Thompson mailed dozens of free, unsolicited copies to various paleoanthropologists to trigger a response. And when these recipients opened their packages to discover a book from the International Society for Krishna Consciousness dedicated to His Divine Grace AC Bhaktivedanta Swami Prabhupada and consisting of a thousand-page assault on their profession, accusing them of unwittingly and deliberately suppressing evidence, what were they to think? Perhaps that this book was someone's spooky, surreal prank?

Paleoanthropologists have grown to expect the taunts of Christian anti-evolutionists who appeal to biblical authority. Now they have to put up with Hindus attacking evolution by invoking cyclical *kalpas*, *manvantaras*, and *yugas* while accusing anthropologists of worshiping at the altar of Darwinian fundamentalism and metaphysical materialism. Gee, where have we heard *that* before? What kind of reception did Cremo expect?

Besides, many critics had genuine problems with *Forbidden Archaeology* that went beyond its attacks on "Darwinism". For all its densely technical discussions of archaeological "anomalies", many critics complained that Cremo and Thompson bombarded readers with abundantly *useless* data. For example, *FA* devotes 400 pages to analyzing anomalous stone tools depicted in obscure literature over the past 150 years. Worse, these specimens no longer exist. So *FA* compensated by providing page after page of drawings taken from their original sources. But in his reprinted review on page 103, Kenneth Feder frets that these illustrations are absolutely useless because it is impossible to determine whether these Paleolithic tools are drawn to scale or accurately rendered.

In *Forbidden Archaeology's Impact*, Cremo boasts that he's overthrowing the Darwinian worldview; but Darwinism is the study of *biology*, not Stone Age finds. And Cremo ignores animal evolution entirely. In 2 reprinted letters, Cremo says he's writing a book that cites land plants found in Cambrian strata (from reports published 50 years earlier) and fossils of flowering plants found in Jurassic strata (about 213-144 million years ago). Most paleobotanists agree that angiosperms didn't appear until the late Cretaceous period (about 70 million years ago). But Cremo never explains why these potential revelations threaten biological evolution.

In their separate reviews reprinted in this book, Tarzia and Bradley Lepper revealed Cremo's biological misunderstand-



ings while critiquing his "ape-man" chapter. *Forbidden Archaeology* and its abridged version, *Hidden History of the Human Race,* claimed that Bigfoot, Yeti, and other backcountry "wildmen" really exist and that their existence threatens evolution. Why? Because if someone caught a live Sasquatch, that would prove ancient hominids still coexist with modern humans.

But on page 159, Tarzia accuses Cremo and Thompson of "ignoring the possibility of shared common ancestry." Cremo's 14-page rebuttal to Tarzia ignores that criticism. On page 203, Lepper says, "Cremo and Thompson devote an entire chapter to reports of 'living ape-men' such as Bigfoot, which, even if true, contribute nothing to their thesis that anatomically modern humans lived in geologically ancient times. Chimpanzees are 'ape-men' of a sort, sharing 99% of our genetic makeup, and their coexistence with *Homo sapiens sapiens* does no violence to evolutionary theory."

Cremo's response to Lepper on page 213 is oddly revealing: "While evidence of the coexistence of anatomically modern humans with more apelike hominids today does not do any violence to evolutionary theory, their coexistence in the distant past would do some violence to it. And the evidence documented in *Hidden History* suggests that they did coexist in the distant past."

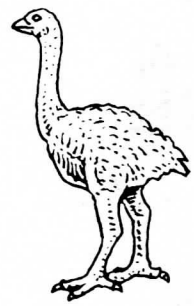
I read that passage over and over, trying to make sense of Cremo's response. If he concedes that humans and nonhuman hominids coexisting today would not undermine human evolution, then what was the purpose of his ape-man chapter to begin with? And if modern humans and apelike hominids coexisted in the distant past, paleoanthropologists will always presume that they shared an even earlier ancestry. For example, even though some paleontologists and ornithologists currently disagree over whether birds diverged from Cretaceous maniraptorans (a specific group of dinosaurs) or earlier Triassic thecodonts (tree-dwelling reptiles), neither side claims their disagreement invalidates the conclusions of common ancestry for dinosaurs and birds.

What's more, Cremo is oblivious to biological context. One of *many* reasons why scientists accept evolution is that humans share numerous anatomical traits with *all* living mammals, not just primates. But if we embrace the notion that modern people lived on earth 600 million years ago, *long* before the arrival of other mammals, reptiles, fish, vertebrates, or *any* animal with a skeleton or hard body part, then biological patterns would be rendered senseless.

Even if we overlook the implausibility of humans' thriving in an oxygen-starved world without available food sources, think about what it would mean to have people living on earth eons before the first arthropods arrived. Finding fossilized humans at every level of the geologic column would not be anomalous at all. Those finds would be the *rule*, not the exception, and a Darwinian paradigm would have never seized a foothold to begin with.

But of all the criticisms aimed at *Forbidden Archaeology*, Cremo objects *most* to those who labeled it pseudoscience, which is understandable. Cremo and Thompson toiled for 8 years on this comprehensive reference work, and calling it pseudoscience is the same thing as labeling it a fraud. But when I read correspondence reprinted in *Forbidden Archaeology's Impact* which Cremo exchanged with his sympathizers and supporters, he appears too stubborn and sanctimonious to follow scientific rules. For example, if Cremo and Thompson wanted their debut to be taken seriously, they should have first submitted their findings through an extensive peer-review process, but Cremo thinks "peer-review" simply means conspiracy and censorship. Like all creationists, Cremo is not looking for *real* answers – just believers.

Next, let's examine portions of the two following letters that Cremo wrote to his supporters. This first one on page 300, is addressed to Dr Horst Friedrich:



> In your review, you note that Richard Thompson and I did not discuss the idea of recurring catastrophes or the evidence for advanced civilization mentioned in the Vedic literatures of India. That was deliberate on our part. In *Forbidden Archaeology* we wanted first of all to demonstrate the need for an alternative view of human origins. In our next book, tentatively titled *The Descent of Man Revisited*, we shall outline the alternative, drawing extensively upon Vedic source material. This will include, of course, the recurring cataclysms of the *yuga* cycles and *manvantara* periods, as well as discussion of Vedic descriptions of advanced civilization in ancient times, and in an interplanetary context as well. I hope that will satisfy you! A new picture of human origins will have to be comprehensive, in the manner you suggest in your *NEARA Journal* article, incorporating evidence not only for archaeological and geological anomalies, but also paranormal phenomena of all types, including evidence for extraterrestrial civilization.

That's only the beginning. Cremo goes on to describe, in complete detail, 3 unique *avatarian* manifestations of the Godhead and explains how Shrila Prabhupada spread Krishna consciousness around the world through God's "confidential empowerment". The religious significance of Cremo's research is paramount.

However, *Forbidden Archaeology's* harshest critics were paleoanthropologists, and it was amusing to watch Cremo lecture professional scientists on how to do their

continued on bottom of next page

BOOKREVIEW

The Sacred Depths of Nature

By Ursula Goodenough, 1998. New York: Oxford University Press. 174 pages.

Reviewed by Andrew J Petto, Division of Liberal Arts, University of the Arts, Philadelphia PA 19102-4994; ajpetto@uarts.edu.

One of the foundational concepts in my own discipline, anthropology, is that by exploring the many ways in which people in different cultures and different times *express* their realizations of "humanness" we can uncover the underlying pattern which reveals the universal character of human nature. Underneath the varied traditions and practices of all cultures, we expect to find a common, human condition which is obscured by the particulars of time and place.

In *The Sacred Depths of Nature* Ursula Goodenough explores such a pattern — the feelings elicited by "listening to the St Matthew Passion or standing in the nave of Notre Dame Cathedral" (p x-xi). What are those feelings, Goodenough asks, and how can we use them to develop a "planetary ethic" — an integration of cosmology (How Things Are) and morality (Which Things Matter). The main thesis of this book is that the scientific account of the natural world (the Epic of Evolution) is the "How Things Are" which can be used as a foundation for "calling forth appealing and abiding religious responses" (p xvii) and can become the foundation for the planetary ethic. Finding and experiencing these religious responses in nature is what Goodenough calls "religious naturalism".

Sacred Depths is very much a personal journey into the Epic of Evolution and its implications for a planetary ethic based on religious naturalism. In the book's introduction, Goodenough explains the essential elements of a religious perspective. First is the integration of cosmology and morality so as

> to render the cosmological narrative so rich and compelling that it elicits our allegiance and our commitment to its emergent moral understandings (p xiv).

In order for the cosmology to achieve this end, it must make us *feel* religious:

> We are moved to awe and wonder at the grandeur, the poetry, the richness of natural beauty; it fills us with joy and thanksgiving (p xvi).

The journey on which *Sacred Depths* leads us is a lucid and up-to-date account of the modern scientific understanding of the cosmos and our place in it. Each chapter explores a different topic and serves both as the elaboration of those before it and the foundation for those that follow. At the end of each chapter are *Reflections* in which Goodenough shows us how that chapter's topic elicits those religious feelings in her, and her responses to those feelings.

This is a wonderful and inspiring book to read for many reasons. It tells the story of the universe in a clear, straightforward way and in language meant to make this information more accessible. But more important than the telling is how the reflections put the information in perspective. Goodenough is true to her promise in the Introduction that the story of nature — the *real* story as we understand the science of it all — is neither depressing nor nihilistic.

Contrary to one of the commentaries on the dust jacket, however, this is *not* a reductionist approach to the universe; we are reminded repeatedly that the whole is more than the sum of the parts and that the essential quality of life is its "emergent" state — the potential to adapt, re-organize, and persist. Goodenough also re-establishes the awe and reverence for the universe that we all feel when we see it in operation and which connects religious cosmologies at their foundations, from the pantheists and animists through the formal and hierarchical "churches".

In the final chapter, Emergent Religious Principles, Goodenough reflects for us on how the themes that emerged from the Epic of Evolution can be used as the foun-

Forbidden Archaeology's Impact

jobs. He even admonished Lepper for not properly understanding Thomas Kuhn's prerequisites for scientific revolutions. Yet despite all this, read the following portion of this letter addressed to Dr William Howells on page 337:

> Historically, I would say that the Judaeo-Christian tradition helped prepare the way for the mechanistic worldview by depopulating the universe of its demigods and spirits and discrediting most paranormal occurrences, with the exception of a few miracles mentioned in the Bible. Science took the further step of discrediting the few remaining kinds of acceptable miracles, especially after David Hume's attack upon them. Essentially, Hume said if it comes down to a choice between believing reports of paranormal occurrences, even by reputable witnesses, or rejecting the laws of physics, it is more reasonable to reject the testimony of the witnesses to paranormal occurrences, no matter how voluminous and well attested. Better to believe the witnesses were mistaken or lying. In my opinion, there is even today quite a lot of evidence for paranormal phe-

dation for the planetary ethic that she calls for in the Introduction. The implications of this chapter are that traditional religious narratives have obscured the story of the universe, but that we can extract them from out of the feelings that all humans have in common when we contemplate nature. In addition, Goodenough is candid about how she *feels* about science's story of the universe — particularly about the *religious* feelings of awe and reverence. The voice in the book is more that of a gentle and patient mentor or guide than of a didactic schoolmistress. We must, after all, find our own connections to the "sacred depths" of nature.

That said, there are several disappointments in the book. One is that we never read what *is* "sacred" in nature. What is it that makes the awesome, emergent qualities of "How Things Are" sacred? All we know is that they are capable of eliciting a certain emotional reaction in us which Goodenough has called religious and that one way that we define the "sacred" is by its connection with things "religious". In the final chapter we read that when we perceive the sacred, we feel reverence.

Perhaps it is because, as she states in the Introduction, Goodenough does not wish to prescribe or impose a particular point of view so as to allow a broad development of the new planetary ethic; but what makes things "sacred" is in the second part of her construct — Which Things Matter. What is held sacred by human societies are those ordinary things which are infused with meaning and significance in the context of a moral construct. Goodenough never specifically characterizes the word "sacred" inside the book, so we are left to construct that meaning ourselves out of her reflections.

The definition of what is "religious" is also less than satisfying. It seems tautological — something is a "religious" experience or has "religious" characteristics if it makes us "feel religious". Yet, awe and wonder and joy and thanksgiving *can* be reduced to sensory and neurochemical responses. It may explain the reasons why we experience similar feelings in response to both Bach's St Matthew's Passion and the annual migration of Monarch butterflies; but it doesn't tell us why these are *religious* feelings and not simply *human* feelings. The answer to that question, among people of faith, is that the meaning is conveyed by the shared ethic.

What makes Bach's Passion Chorale meaningful to the community of faith is more than the awe-inspiring, beautiful music; it is also the relationship between the believer and the life and actions of the Redeemer which are the subject of the music. That relationship is one of a spiritual emergence — much like the emergent qualities of biological organisms that are the foundation of Goodenough's "Covenant with Mystery". The believer and nonbeliever may have the same reactions to the *beauty* of the music, but the *meaning* conveyed to the believer is much more than that.

To her credit, we see in the Reflections sections how Goodenough makes these connections herself, but when they operate as the basis of morality, such connections are generally made in the context of cultural *interpretations* of those feelings. Indeed in the Reflections on page 73, Goodenough acknowledges that the etymological root of "religion" connotes a connecting or binding together. That is, the feelings are given their deeper meaning by their connections with products of human culture.

It is, ultimately, the human community which gives the meaning (and religious value) to our experiences. However, Goodenough also makes it clear that she is operating outside any of these *confessional* communities, so this is a "religion" without faith based on a "Credo of Continuation" which states:

> The continuation of life reaches around, grabs its own tail, and forms a sacred circle that requires no further justification, no Creator, no superordinate meaning of meaning, no purpose other than that the continuation continue until the sun collapses or a final meteor collides (p 171).

And there is that word "sacred" again.

continued on bottom of next page

> nomena. Unfortunately, this evidence tends to be suppressed in the intellectual centers of society by the same process of knowledge filtration that tends to suppress physical evidence that contradicts general evolutionary ideas.

In other words, Cremo not only accuses the "scientific establishment" of rejecting the paranormal; but also claims that mainstream scientists are immersed in a conspiracy to *suppress* its evidence. And he has the effrontery to wonder why scientists won't take him seriously?

Frankly, I appreciate Cremo's courage to express his paranormal leanings so candidly. "Intelligent Design" creationists, in contrast, often wriggle and squirm when confronted with theirs. Let me say that if anybody is interested in the cultural and religious groundwork, sincere personal motivations, and epistemological methods employed by Hindu "creation science", *Forbidden Archaeology's Impact* is the most comprehensive, conclusive reference work on this topic.

Author's Address

Tom Morrow
662 Hogskin Valley Rd
Washburn TN 37888-1735

BOOKREVIEW

Skeptics and True Believers

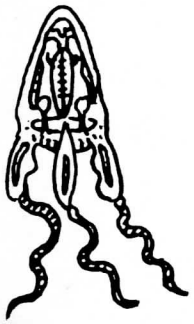
By Chet Raymo. 1998. New York: Walker and Company. 288 pages. Cloth, $23.00.

Reviewed by Arthur M Shapiro, Center for Population Biology, University of California, Davis CA 95616.

Does anyone but me remember "The Conversion of Aurelian McGoggin?" It's a short piece from Rudyard Kipling's "Plain Tales From the Hills" set in British India. McGoggin is an obnoxious autodidactical windbag. Having read some Auguste Comte and Herbert Spencer, he has concocted his own creed, a hodgepodge of materialism, positivism, humanism and Darwinism, which he insists on preaching at length to anyone unlucky enough to be within reach of his stentorian voice. His put-upon comrades lovingly refer to him as "The Blastoderm". One day the Blastoderm suffers something like heat stroke, which renders him speechless for 2 days and occasions a 3-month convalescence. That's enough to drive him to serious introspection: being struck dumb was undreamt of in his philosophy. Freed from the pressure of constant oral self-affirmation, he begins to doubt that he is the repository of ultimate wisdom. His associates revel in blessed silence. We all know a Blastoderm or two.

Addressing the zone where science and religion meet, Raymo divides people into "skeptics" and "true believers." ("A term which is charged with the sacred demonizes its antonym," said Jean Starobinski.) However, things are not all that simple. There are religious skeptics — deeply religious skeptics — and atheist — *profoundly* atheist — true believers. The Blastoderm is a specimen of the latter type. *Skeptics and True Believers* is about mind-sets. It is firmly opposed to the mind-set of anyone who claims to be in possession of absolute truth, be it theistic or atheistic. In the tradition of

continued on page 23



Another disappointment comes in the unevenness between the sections exploring the Epic of Evolution and the related Reflections. The former are well-connected to and cognizant of the scholarly traditions and intellectual history which produced them. The latter show no such connection. There is a long and noble scholarly tradition in spiritualism and mysticism, a great deal of it very accessible in public libraries and bookstores. Except for various quotations and verses in the Reflections, none of this scholarship seems to serve as a foundation for the reflections and contemplations in this book. Mystics in particular strive to get closer to the "Mystery" and connect to it through contemplation of and reflection on nature. Their efforts are aimed at knowing more about the foundation of their spirituality. The "Covenant with Mystery" in this book seems content to leave it "out there" somewhere.

Still, I would recommend this book for 3 reasons. First, it shows that a proper, scientific understanding of the cosmos does not kill spirituality. As Richard Dawkins wrote in our inaugural edition of *RNCSE* (1997; 17[1]: 8-14) the *real* story of the cosmos is powerful and awesome and wonderful. Dawkins would certainly disagree that there is anything spiritual about it all, but Goodenough is correct that the human response to the beauty and power of nature brings out the same feelings as other situations which we generally accept as "spiritual".

Second, in the current trend to increased dialog between science and religion, this dialog must be founded on an up-to-date scientific narrative, and Goodenough's "Epic of Evolution" fills the bill admirably. It clearly distills and extracts the essence from the best, current scientific research and analysis. It is, after all, as Pope John Paul II noted in his address to the Pontifical Academy of Sciences in October 1996, in the domain of the theologians and philosophers to interpret these data in the context of the spiritual narratives shared by the community of faith.

Third, Goodenough tackles a tough and persistent problem for the ages — what is this that we feel when we contemplate the universe, and why do we keep feeling it? Humans through the ages have had a sense of something more, something deeper. We can either chalk that up to the delusions and pretensions of our overactive neurochemical apparatus, or we can ask whether we sense something more because there *is* something more. *Sacred Depths* provides a fresh and valuable start for grappling with that problem — to face up to the problem and bring to bear all the information that science can muster. The next step is to engage the information, scholarship, and analysis of allies outside of science — in philosophy and religion and culture — and then to make one's own "Covenant with Mystery" an emergent relationship.

Goodenough is correct that recognizing and accepting the real story of the universe is step one. Agreeing on the facts is the necessary foundation for a shared ethic of any sort. Indeed the issues she raised in this book do matter. However, what they mean and what makes them sacred comes not from the things themselves, but from a shared interpretation of their significance and a willingness to assign priorities and values. *Sacred Depths* does not take this second step.

What's Wrong with "Theory not Fact" Policies on Teaching Evolution?

1. Legislation or regulations that single out evolution for restriction, ignoring other scientific topics, are unconstitutional *(Epperson v Arkansas).*

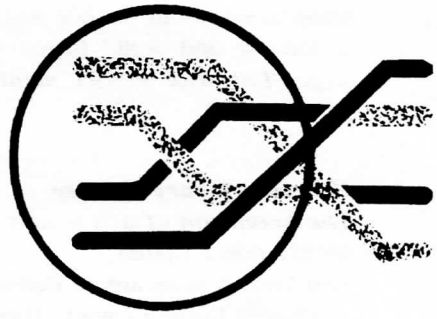
2. Legislation that requires teaching evolution as "theory" or "belief" only, or that it not be taught as "fact", without defining these terms, is too vague to give real guidance to school districts and teachers about what may be taught.

3. Such legislation intimidates teachers, who are likely to avoid teaching a subject for fear of violating the law. Legislation that explicitly bans teaching evolution has been found unconstitutional; vague legislation that has a "chilling effect" is also likely to be found unconstitutional. In First Amendment law, laws which have a "chilling" effect on behavior are often found to be as unconstitutional as laws which explicitly forbid that behavior.

4. "Theory, not fact" legislation implies that "theory" should be understood in the ordinary sense of "guess" or "hunch". Science teachers, however, use *scientific* terminology, in which "theory" means a logical, tested, well-supported explanation for a great variety of facts. In a physics class, students will learn that the *theory* of gravity explains such facts as the rate of acceleration of falling objects; in chemistry class, they learn that atomic *theory* explains the structure and behavior of elements and compounds; in biology they learn that the *theory* of evolution explains facts about genetics and other subjects. If the purpose of the legislation is to require that teachers and texts offer evolution as a theory in the *scientific* sense, it is unnecessary — they already do so.

5. "Theory, not fact" legislation, if passed, is likely to cost the taxpayers money for useless litigation. In 1968, in its *Epperson v Arkansas* decision, the Supreme Court outlawed bans on teaching evolution. In 1994, the Ninth Circuit Court of Appeals ruled in *Peloza v Capistrano* that evolution is *not* a religious belief but a scientific principle; the Supreme Court refused to hear an appeal of this ruling, allowing the decision to stand. And in 1997, in *Freiler v Tangipahoa Parish Board of Education,* the District Court for the Eastern District of Louisiana ruled unconstitutional a policy adopted partly because board members objected to teaching evolution "as fact," and requiring that a disclaimer be read aloud by teachers whenever they taught about evolution.

For more information, contact NCSE, PO Box 9477, Berkeley CA 94709-0477 or email us at <ncse@natcenscied.org>. Telephone us at (510) 526-1674 or toll free at 1-800-290-6006. Reach us by fax at (510) 526-1675 or connect to our web site <http://www.natcenscied.org>.



Habits of Mind...

How Scientists Think

The Roving Mind
by Isaac Asimov
In these 62 essays the celebrated science popularizer and science fiction writer punctures the pretensions of creationism and other pseudosciences, explains the possibilities opened by genuine scientific research, and adds a few personal recollections. First published in 1983, this book has been reissued in a special edition that adds ten memorial essays by such well-known authors and scientists as Arthur C Clarke, Stephen Jay Gould, and Carl Sagan. Paper, 378 pages. *List price $18.95, member price $15.25.*

Great Essays in Science
edited by Martin Gardner
In this reprint of the 1984 edition, Gardner assembled 34 timeless essays by eminent scientists, philosophers and science writers, including Albert Einstein, Sigmund Freud, and Rachel Carson. Each essay is preceded by an essay by Gardner, a noted science writer in his own right. He delivers on the promise in the introduction that readers will find "a sumptuous feast of ... absorbing, thought-disturbing pieces that have something to say about science and say it forcibly and well." Paper, 442 pages. *List price $19.95, member price $16.00.*

Thomas Henry Huxley: The Evolution of a Scientist
by Sherrie L Lyons
Best known as an ardent defender of Charles Darwin's work, Huxley was also a noted scientist who did research in developmental morphology well before publication of *The Origin of Species*. In the course of this investigation of Huxley's scientific interests, Lyons shows why Huxley's own research led him to disagree with some of Darwin's crucial concepts, how his views about the pace of evolution changed over time, and which issues that Huxley raised are still relevant to modern evolutionary theory. Cloth, 339 pages with illustrations. *List price $54.95, member price $44.00.*

In this issue we feature books about scientific thought. Some present the reflections of eminent scientists on a great variety of topics, and others are designed to help readers apply the scientific approach to every-day problems. And yes, one of the problems scientists think about and help us to think about is that old-time creation science.

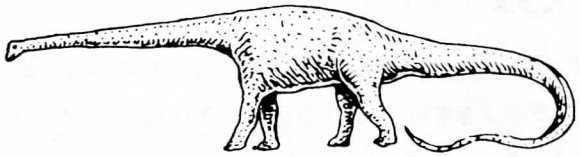
Here we offer books that are new from NCSE (marked with an asterisk), and tested favorites... *and* we are pleased to announce that we are expanding our book program by making it possible for members to order additional books on-line (see page 9).

Thinking Like a Scientist

Studies Show: A Popular Guide to Understanding Scientific Studies
by John H Fennick
By comparing good and bad methodology to explain how scientific results can differ, sometimes drastically, Fennick seeks to arm his readers with the skills to understand and evaluate almost any scientific study. Paper, 240 pages. *List price $18.95, member price $15.25.*

Science: Good, Bad, and Bogus
by Martin Gardner
In essays accompanied by letters from his readers and his own replies, Gardner explores the great variety of pseudoscientific conjectures so common in the media today. With unsparing humor, he demolishes the "evidence" for ESP, faith healing, psychokinesis and more! Paper, 429 pages with index. *List price $19.95. member price $16.00.*

Scientists Confront Creationism
edited by Laurie R Godfrey
This anthology of essays by scientists from many fields systematically answers leading anti-evolution arguments from claims that "there are no transitional fossils," to arguments that "life is too complex to have come about chance." According to Martin Gardner, "This



scholarly, richly-documented anthology is also a slashing, two-fisted attack.... [F]or anyone open to reason and overwhelming evidence, it couldn't be more effective." Paper, 324 pages. *List price $11.95, member price. $9.50.*

Taking Darwin Seriously: A Naturalistic Approach to Philosophy
by Michael Ruse

NCSE members who watched the 1998 "Firing Line" debate on evolution will recall the wit and erudition Ruse brings to his subject. In this updated edition, Ruse sets himself 2 tasks: challenging the claims of creationism, and demonstrating that problems of knowledge and ethics can only be understood in light of the awareness that humans are the end-products of the process of evolution. *Paper*, 340 pages with illustrations, references, and index. *List price $18.95, member price $15.25.*

Science and Earth History: The Evolution/Creation Controversy
by Arthur N Strahler

This updated edition of a long-time NCSE favorite has been praised by *Science Books and Films* as "a modern scientific masterpiece". It is the definitive scientific resource, presenting both a survey of the evidence for evolution and detailed refutations of "creation science". With a new preface and responses to the most recent attacks on evolutionary theory, Strahler brings to bear knowledge from the disciplines of cosmology, astronomy, geophysics, geology, paleontology, and evolutionary biology. Cloth, large format, 575 pages, illustrated. *List price $55.95, member price $44.75.*

Understanding Science: An Introduction to Concepts and Issues
by Arthur N Strahler

This book presents a significant effort to help the public understand the methods and use of science and its relationship to other ways of thinking. Strahler begins with 8 chapters exploring a number of crucial scientific concepts and contrasting science with pseudoscience. The second half, "Science and Other Knowledge Fields", begins by discussing "The Major Classes of Knowledge" and continues with a careful examination of such topics as "Logic and Mathematics" and "How Science Impacts Ethics and Religion". A final chapter asks, "Creationism — Is It Religion or Pseudoscience?" and carefully distinguishes questions we may ask about creationism from those we may ask about religion in general. Cloth, 423 pages with references and index. *List price $31.95, member price $25.50.*

Science, Nonscience, and Nonsense: Approaching Environmental Literacy
by Michael Zimmerman

Biologist and columnist Zimmerman's collection of columns covers a range of subjects including creationism, pseudoscience, and ecology. Beginning with an introduction to the nature of science and scientific thinking, and ending with a warning against "The Myth of the Technological Fix", Zimmerman's effort to help us make educated decisions about policy issues is always readable and thought-provoking. Cloth, 220 pages with index. *List price $25.95, member price 20.75.*

ORDER FORM NCSE PO Box 9477, Berkeley, CA 94709-0477

Name

Address

City State Zip

Home Phone Work Phone

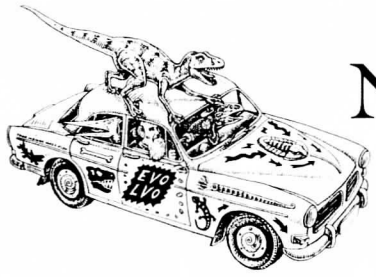
METHOD OF PAYMENT

☐ Check (U.S. Dollars) Made payable to NCSE Charge to ☐ VISA ☐ Mastercard

Name as it appears on card

Credit Card Number Exp Date Signature

QTY	DESCRIPTION			PRICE
			SUBTOTAL	
	SHIPPING			
	Books	each	$2.00	
	Cassettes, transcripts, diskettes	1-3	$1.25	
		4-5	$1.75	
		6+	$2.00	
	CA residents add 8.25% tax			
	Foreign Orders: We will invoice shipping costs		SUBTOTAL	
			TOTAL	



NCSE on the Road

A Calendar of Special Events, Presentations, and Lectures

DATE Oct. 6, 1999
CITY Montreal (Canada)
PRESENTER Eugenie C Scott
TITLE Creationism, Evolution, and Public Education
HOST McGill University School of Education
LOCATION McGill University, Montreal, Canada
TIME TBA
CONTACT Brian J Alters, alters@education.mcgill.ca

DATE October 23, 1999
CITY Denver CO
PRESENTER Eugenie C Scott
TITLE Science, Religion, and Evolution
HOST The Paleontological Society
EVENT Evolution: Investigating the Evidence; a workshop for teachers; held in conjunction with the Geological Society of America Annual Meeting
LOCATION Denver Convention Center
TIME TBA
CONTACT Judy Scotchmoor, judys@ucmp1.berkeley.edu

DATE October 24, 1999
CITY Denver CO
PRESENTER Eugenie C Scott
TITLE Problem Concepts in Evolution
HOST Geological Society of America Annual Meeting
EVENT Paleontological Society Short Course: The Evolution-Creation Controversy II: Perspectives on Science, Religion, and Geological Education
LOCATION Denver Convention Center
TIME 8:00 AM - 5:00 PM (Scott presentation at 3:30 PM)
CONTACT Dr Patricia Kelley, (910) 962-3490

DATE October 24, 1999
CITY Denver CO
PRESENTER Kevin Padian
TITLE Transitional Fossils
HOST Geological Society of America Annual Meeting
EVENT Paleontological Society Short Course: The Evolution-Creation Controversy II: Perspectives on Science, Religion, and Geological Education
LOCATION Denver Convention Center
TIME (Padian presentation at 9:15 AM)
CONTACT Dr Patricia Kelley, (910) 962-3490

DATE October 26, 1999
PRESENTER Eugenie C Scott
CITY Denver CO
HOST Geological Society of America Annual Meeting
EVENT Symposium sponsored by the National Association of Geology Teachers:
TITLE Teaching Geologic Time
LOCATION Denver Convention Center
TIME TBA
CONTACT Dr. Martin Miller, miller@darkwing.uoregon.edu

DATE October 28, 1999
CITY Ft Worth TX
PRESENTER Eugenie C Scott
TITLE Ancestors, Transitional Fossils, and Evolution
HOST National Association of Biology Teachers
EVENT NABT Annual Meeting
TIME 8:30 - 9:45 AM
LOCATION Tarrant County Convention Center, Theater
CONTACT Alton Biggs, altonb@ix.netcom.com

DATE November 19, 1999
CITY Tulsa OK
PRESENTER Eugenie C Scott
TITLE Cans, Can'ts, Shoulds and Shouldn'ts: Teaching Evolution
HOST National Science Teachers Area
EVENT Convention Featured Presentation
TIME 1:00 - 2:00 PM
LOCATION Tulsa Convention Center
CONTACT David J Berenhaus, berenhaus@nsta.org

[Check for updates and details on the NCSE web site: <http://www.natcenscied.org>.]

Join us at the National Center for Science Education

Membership in NCSE brings you:

- 6 issues of *Reports of the National Center for Science Education*
- Up to 20% discount on selected books
- Participation in NCSE's efforts to promote and defend integrity in science education

Membership Information

Name

Address

City State Zip

( ) ( )

email Telephone Fax

Occupation (Optional)

☐ Check here if you do not want NCSE to share your name and address with other organizations

☐ Check (US dollars) ☐ Charge to: ☐ VISA ☐ Master Card

Credit card number Exp. Date

Name as it appears on card Signature

NCSE Membership

☐ One Year US: $30 Foreign: $37 Foreign Air: $39 _____

☐ Lifetime $600 _____

Tax deductible contribution to NCSE _____

TOTAL _____

Skeptics and True Believers

Eric Hoffer, the longshoreman-philosopher who popularized the term "true believer" about 4 decades ago, it is a manifesto against all varieties of Blastoderms.

Chet Raymo is Professor of Physics and Astronomy at Stonehill College in North Easton MA and writes a weekly column, Science Musings, for the *Boston Globe*. He was raised Catholic — he tells of being indoctrinated from Frank Sheed's *Theology and Sanity*, a book arguing that a truly sane person by definition must be Roman Catholic. Although he has by his own account outgrown all the mumbo-jumbo of his youth, he has never stopped being troubled by the question of how faith and science fit together.

Skeptics and True Believers is a book for other reflective adults. It begins somewhere beyond where certainty has been lost. Call it an affirmation for those looking for hope. But it has little patience for New-Age gurus trying to build cults on foundations of quantum physics or chaos theory and even less for the current "angel" fad. Raymo sees such stuff as foredoomed and contemptible for its shallowness. He is looking for something deeper, something closer to ultimate meaning. For those who reject any prospect of ultimate meaning, his quest is at best quixotic. Raymo's basic argument is not new, but it is lyrically, indeed poetically, put forward here. Scientific method is the pinnacle of human civilization; with all due acknowledgement of its intrinsic falsifiability, scientific knowledge cannot be rejected or ignored. Science neither desacralizes nor demystifies the universe.

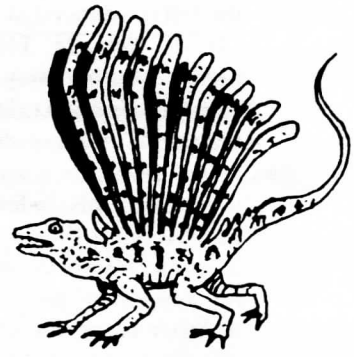
Raymo quotes EO Wilson: "Our sense of wonder grows exponentially: the greater the knowledge, the deeper the mystery." Only a soul that is deadened, or dead, can resist the majesty of the universe as revealed to us by science. Speaking of "knowing and being", Raymo says (p 232-4):

> Cosmology, spirituality, celebration — these are the attributes of religion. ...Cosmology reveals the creation. It answers the big questions. ...For better or worse, this is the task of science... now embraced globally as the one truly human instrument of cosmic revelation.
>
> For the method to work, we pretend for the moment that it is possible to step out of ourselves into the world *as it is*. To this end we invent names — *Cercyonis pegol*, *Cercyonis meadi* — that match the patterns we think we see in nature. Of course, *perfect objectivity is impossible*. ...Science works...in that wall of liquid between mind and world.... With science, the arrow of transference is inward, from world to mind, a soul-making vector, incandescent with facts, sparks of the white fire kindled in our hearts.... Only when we are emotionally at home in the universe of the galaxies and the DNA will the new story invigorate our spiritual lives and be cause for authentic celebration. Knowing and believing will come together again at last. Cautious and skeptical as knowers, we can then give ourselves unreservedly to spiritual union with creation and communal celebration of its mysteries.

Once again, for the true believer materialist-positivist this is all literal nonsense. But most people are not Blastoderms. The physicist-priest John Polkinghorne says that there is "a God-shaped hole in many people's lives." The Czech president and intellectual Václav Havel has been saying something similar for years (Raymo chides him on p 165-6 for going too far with this). Some sociobiologists argue that religious belief has an evolutionary function, and most social scientists ascribe important social functions to religious belief. The recent history of state-mandated atheism belies the canard that, given a choice, people will gladly throw off the oppressive burden of belief. False consciousness and opiates of the people notwithstanding, most people seem to find it very hard — at least very depressing — to believe in nothing larger than themselves.

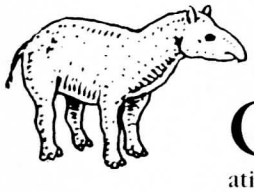
Raymo wants to believe that a new spirituality grounded in science will emerge. He fears that if it does not, that God-shaped hole will be filled by oppressive old orthodoxies and superstitions. He has no clear vision of what this new spirituality might be like — only that it has to be cleaner and purer and more uplifting than the incantations of one or another kind of Blastoderm.

[*Technical note from the author: The* Cercyonis *are butterflies and bark back to an earlier discussion of how taxonomy allows us to order nature. Unfortunately, Raymo got one of the names wrong. It's* Cercyonis pegala, *not* pegol. *But pegol is intrinsically a pretty word, and I hope someone names a butterfly* Cercyonis pegol *some day.*]



A New Tactic for Getting "Creation Science" Into Classrooms?

Molleen Matsumura
Network Project Director



One of the enduring characteristics of evolution/creation controversies in this country is that anti-evolution tactics change over time, although the underlying message does not. One reason these changes occur is that anti-evolutionists respond to court rulings by looking for specific language in these decisions which may seem to provide a "loophole" that can be used as another route for bringing "creation science" into the schools. For example, Eugenie Scott has described the "mutation" of proposals for "balanced treatment" of evolution and "creation science" into proposals for teaching "evidence against evolution" (*NCSE Reports* 1996; 16[2]:5). The name may change, but the content stays the same; the "evidence" offered "against evolution" consists of the same "unsolved problems" decried by "creation science".

The most publicized efforts to have "evidence against evolution" taught are legislative proposals like the bill introduced in Ohio in 1995 (*NCSE Reports* 16[3]:18). But there's another way of bringing anti-evolution into classrooms that may be more successful because it is less publicized, and often goes unnoticed; this is for teachers to present it on their own initiative. In some instances, teachers have the support of their communities. In other cases a teacher may continue for years before parents or administrators learn what is happening. It doesn't always occur to students to mention what they were taught, and even the most attentive parents may not happen to see one or a few homework assignments covering the material, or recognize them as such (*see box, p 26*).

Two of the more recent strategies are to argue that individual teachers have a constitutional right to present creationist material and that "evidence against evolution" should be taught in the science classroom as a way to improve teaching and learning. The former insists either that free speech or the free exercise of religion is unconstitutionally abridged when teachers are not permitted to teach creationism in the science classroom. The second usually resorts to a litany of so-called "problems" and "anomalies" in the scientific evidence which proponents claim casts doubt on evolutionary explanations and models.

The "Right" to Teach "Creation Science" — Two Failed Legal Strategies

When they hear that their teachers are teaching "creation science" in the science classroom, school district administrators or board members who understand the scientific issues — or at least the legal repercussions — will often tell them to stop, and sometimes that's the end of the story (for example, in Lakewood, OH, as described in *NCSE Reports* 1996; 16[1]:6). But 2 instances in which teachers responded by suing their school districts have led to major legal decisions, each upholding the district's actions:

- In 1990, the Seventh Circuit Court of Appeals decided the case of a teacher who claimed that a school district had violated his *free speech rights* by forbidding him to teach "creation science". The Appeals Court upheld a lower court's ruling that the teacher's claim was outweighed by a public school's obligation to ensure that religious views are not injected into curricula (*Webster v New Lenox School District* #122, 917 F. 2d 1004).
- In 1994 the Ninth Circuit Court of Appeals upheld a lower court's ruling that a teacher's right of *free exercise* of religion is not violated by a requirement to teach evolution. The decision issued by the Court specifically rejected the claim that evolution is a "religion" (*John E Peloza v Capistrano Unified School District*, [1994] 917 F. 2d 1004). The Supreme Court refused to hear an appeal of the *Peloza* decision.

While circuit court decisions do not apply to every state in the US, they do apply within their districts and may be consulted by other circuit courts considering similar cases. Ninth Circuit decisions apply to Washington, Oregon, Idaho, California, Nevada, and Arizona; Seventh Circuit decisions apply to Wisconsin, Illinois, and Indiana.

A New Approach — Teaching "Evidence Against Evolution"

In recent months, NCSE has been consulted by residents of 2 districts in which teachers are claiming they have a right to present "evidence against evolution". In Faribault, Minnesota, after a series of discussions with school and district officials, high-school teacher Rodney LeVake was re-assigned from teaching a biology class to a general science class. A complaint to the State of Minnesota's Third Judicial District Court, filed on Levake's behalf by the Midwest office of the American Center for Law and Justice (ACLJ), alleges that the school district's action has violated a number of LeVake's rights under both state and federal constitutions, including a right to protection from "discriminat[ion]...in terms, conditions and privileges of employment on the basis of his religion...." (ACLJ is a conservative Christian legal organization launched by Pat Robertson, founder of the "Christian Coalition".)

The ACLJ complaint quotes LeVake's statement, in a "position paper" requested by school administrators, that, "I will teach, should the department decide that it is appropriate, the theory of evolution. I will also accompany that treatment of evolution with an honest look at the difficulties and inconsistencies of the theory without turning my class into a religious one." (Minnesota's *Science Curriculum Framework* specifies that "biological evolution" should be taught in grades 9-12.)

The full text of the "position statement " attached to the complaint contains a litany of familiar "creation science" and "intelligent design" arguments, for example:

> "neither evolution nor creation can be considered a science..."
>
> "amazing lack of transitional forms in the fossil record..."
>
> "mutations generally have a negative impact..."
>
> "evolution is in clear violation of [the Second Law of Thermodynamics]..."
>
> "no reservations [about 'microevolution', but] ... recent literature doesn't support...macroevolution..."

LeVake's statement also refers to "irreducible complexity", a concept introduced in Michael Behe's *Darwin's Black Box*, and even lists Behe's example of the structure of flagellae, while stating that LeVake has not read this book (but recommends it anyway!).

Many of LeVake's arguments are familiar, and his legal complaint repeats some claims that have been made in other cases — such as a right to teach anti-evolution as a matter of "academic freedom". However, this appears to be the first time that supposed *employment discrimination* against a teacher has been alleged against a district that would not permit teaching "evidence against evolution".

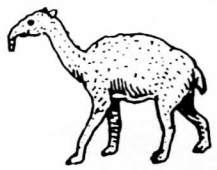
Of Pandas and Lawsuits

In Burlington, Washington there has been controversy for over a year concerning Roger DeHart's use of the "intelligent design" textbook *Of Pandas and People* in a middle-school science class. In 1998, school board members who had supported DeHart said they did not want to risk being sued by the ACLU. A new superintendent ordered DeHart to stop using *Pandas* and explicitly said he could not teach "creation science" (*RNCSE* 1999; 19[1]:7).

In the summer of 1999, DeHart sought approval of some portions of *Pandas* by the district's Instructional Materials Committee (IMC). Local newspapers suggested that attorneys had contacted the school district on DeHart's behalf (Burlington *Argus*, March 3, 1999:1). Although the IMC committee refused to approve the material, the school's principal gave DeHart permission to use a few pages from *Pandas*. According to an article in the *Seattle Times*, the principal said, "He's introducing 'irreducible complexity'.... He also has to have a supporting theory of how evolution addressed complex things...." (June 14, 1999 <www.seattletimes.com/news/local/html98/altcrea_19990614.html>). It is clear that District officials believe they have made a compromise. On July 14, the *Skagit Valley Herald* reported that Superintendent Rick Jones commented, "When I came to this district he was teaching a great deal about intelligent design and now there is nothing being taught. We've made radical changes... but no one seems to be thinking about that."

At the time of publication, no court documents have been filed by either the school district or DeHart's attorneys, so NCSE does not know whether new legal strategies will be attempted. Some correspondence on DeHart's behalf by an attorney for the Rutherford Institute implies that refusing to use *Pandas* would somehow be unconstitutional. While the concept of "intelligent design theory" has appeared in a federal court (in the *Freiler v Tangipahoa* case, see *RNCSE* 1997; 17[3]:5-7), the situation in Burlington may evolve into the first lawsuit in which the constitutionality of using *Pandas* is an issue.

Coming to a Classroom Near You?



Resources for teachers who want to teach "evidence against evolution" are abundantly available from both "creation science ministries" and conservative religious groups for whom "creation science" is just one concern. For example, a booklet distributed to teachers by Focus on the Family lists 8 organizations with resources for teachers (and here at NCSE we know of many more!). A 1998 International Creation Conference included 11 sessions for teachers, with titles like "Complexity of Blood Clotting: A Laboratory Practicum" and "Funny Bones — Using Humor to Teach Creation in Human Anatomy Courses". Audiotapes of each session are available (*see a complete list at <http://trfn.clpgh.org/csf/icc98ta.html>).* The abundance of resources suggests a wide audience, and numerous surveys finding that many teachers want to

teach "creation science" confirm this impression (more than 30% of a national sample of high school biology teachers described in Eve and Dunn, 1989).

What can you do? If you have children in school, you can tell whether evolution is being taught (and how well) when helping with science homework or visiting the science classroom on parents' night. You can read your child's textbooks and supplemental materials and check out the school library — books, magazines *and* other materials such as audiotapes, videotapes, posters, and so on. If you don't have children in school, but know people who do, share your interest in NCSE and good science education. Don't be surprised if some day one of these friends calls and asks, "My child's teacher is talking about 'evidence against evolution'. What can I do?" This has happened to other NCSE members (*see* NCSE Reports *1996; 16[1]:21-2*). And then? Call NCSE — we're here to help.

References

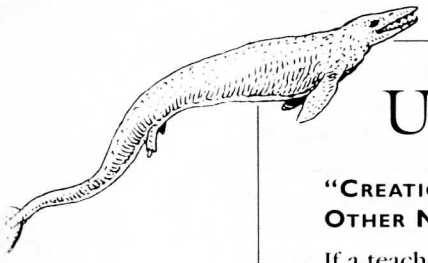
[Anonymous] *Teacher's Guide ... Of Pandas and People: The Central Question of Human Origins* (Dallas, TX: Haughton Publishing Company, nd) (While the authors and publication date of *Pandas* itself are known, the *Teacher's Guide* does not give this information).

Eve RA, Dunn D. High school biology teachers and pseudoscientific belief: Passing it on? *The Skeptical Inquirer* 1989 Spring; 13:260-3.

Peloza v Capistrano. Text of 9th Circuit Court decision is available at <http://207.138.39.170/scripts/getcase.pl?navby=search&case=/uscircs/9th/3/37/517.html>.

Prentice DA. *Setting Up Non-religious, Scientific Models for Teaching Creation and Evolution in the Public School Classroom*. New Orleans: Origins Resource Association, 1995.

Sarfati J. *Refuting Evolution: A Response to the National Academy of Sciences' Teaching About Evolution and the Nature of Science*. Green Forest, AR: Master Books, 1999. (A study guide presenting this book's arguments in question-and-answer form is available at <http://www.answersingenesis.org/docs/4059.asp>.)



Unmasking Classroom Creationism

"Creation Science" by Other Names...

If a teacher says, "I'm not teaching creationism, this is (fill in the blank from the list below)..." *call NCSE*!

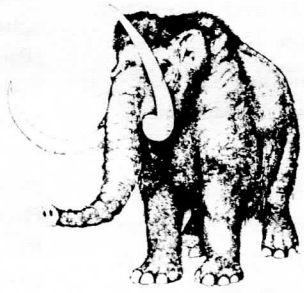
- Intelligent design theory
- Abrupt appearance theory
- Irreducible complexity
- Arguments against evolution (or problems with..., unanswered questions about..., evidence against... and so on)
- The difference between microevolution and macroevolution

... And In Strange Disguises

Even the most attentive parents don't see every homework assignment, and few who are not veteran creationist-watchers would recognize the significance of questions like these:

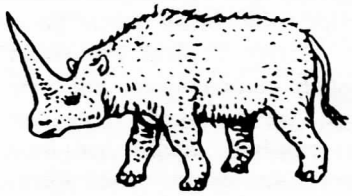
- "Compare the initial complexity and initial primitiveness models"(these terms appear in Prentice, 1994:7);
- "Is the kind of complexity found in living cells more nearly like the complexity of proteinoid microspheres or pickup trucks?" (Anonynous nd);
- "Define operational science" ("Operational science" is a term used by "scientific creationists", who contrast it with "origins science" [see for example Sarfati 1999:28-9]).

Surprising homework questions or study materials *could* mean that scientists have made a few new discoveries since you studied about evolution, and your child is reading about them. It's worth investigating a bit — asking your child what the question is about or finding out where *that* article about whale evolution was first published. If there is still doubt — call NCSE!



Stealth Anti-Evolutionary Delivery Systems

Brian J Alters
McGill University



Introduction

Popular among students in American Protestant Christian culture are "Study Bibles." These books contain the entire text of the Bible but also have added commentary, usually from well-known Protestant Christian leaders or theologians. Skimming through a study Bible, one generally sees approximately 2000 pages of what appears to be a typical-looking Bible with its book, chapter, and verse notations. However, at the bottom of virtually every page are notes written by the annotator in an attempt to help the reader better understand the biblical verses printed above on the same page and to direct the reader to other related passages in the Bible. In addition, the annotator may provide historical or modern examples to which he thinks (rarely, if ever, *she* thinks) the biblical verses may be referring, or situations to which counsel given in a verse may be applied. These notes can range anywhere from a sentence or 2 for almost an entire page of biblical text, to an entire page or more of notes illuminating just 5 biblical verses (or approximately 10 sentences).

The *theological* position of most of the Protestant Christian community is that the biblical text itself is the utmost authority and that any commentary on the Bible is only a human attempt to understand the word of God and therefore cannot be considered authoritative. However, much of the *lay* Christian community has significant respect for and confidence in those who author the commentaries in their study Bibles. This attitude that the commentary is of great importance is often not just a product of congregation members alone but is sometimes engendered by the annotators themselves. One study Bible popular for many years is *The Ryrie Study Bible* (1994), which is annotated by Charles Ryrie, Professor Emeritus of Systematic Theology at the Dallas Theological Seminary — an institution well-known and influential among evangelical Christians. At the beginning of his study Bible Ryrie has written the following instructions: "Every time you read this Bible, whether carefully or casually, be sure to look at the notes at the bottom of the page. These are designed to illuminate and help you understand the verses you are reading" (p vi).

Which study Bible one carries to church or uses at home is often a sign to others of one's theological stance, which of course is quite important to many believers. If one attends a very conservative church, as many creationists do, and is seen carrying a liberal study Bible at church, that person might be thought of by others in the congregation as somehow missing the mark — not reading the "good" material. Some of the more caring (or forward) members in such a church will often politely but firmly recommend a study Bible that they and the church believe to be the better text, possibly even pointing out many of the shortcomings inherent in the study Bible that person is currently using. If the person continues to use the more liberal study Bible as a resource, it would not be surprising to have a fellow member of the church present the "better" study Bible as a gift.

"Stealth" Creationism

Unfortunately, though many of these study Bibles may seem to be scientifically benign, they can actually act, in part, as "stealth" delivery systems for anti-evolution dogma. Even when the vast majority of people would think a particular biblical verse could have no possible bearing on or relevance to evolution, the creationist study Bible commentators often attempt to make a link. Henry Morris, the President Emeritus of the Institute for Creation Research (ICR), has authored a study Bible containing over 1600 pages dedicated to "defending the faith from a literal creationist viewpoint" (1995, cover jacket). This study Bible may be the most significant publication in recent history that attempts to tie the entire Bible, verse by verse wherever conceivably possible, to literal creationism.

There are many other popular creationist books that are wholly or partly dedicated to discussing various sections of the Bible in an attempt to muster scriptural support and relevance to literalist cre-

Brian Alters serves on the Faculty of Education at McGill University in Montréal and is a visiting scholar/affiliate at the Philosophy of Education Research Center at Harvard University. He is also a consulting editor for RNCSE.

ationist theology. However, none of which I am aware systematically covers the entire Bible with such a focused intent as Morris's study Bible. For example, the book of Matthew contains an admonition concerning how to detect false prophets: "A good tree cannot bring forth evil fruit, neither can a corrupt tree bring forth good fruit" (7:18). Typical Protestant Christian commentaries concerning this verse generally state that false prophets cannot produce good results; by the same token neither could a true prophet produce bad results. In juxtaposition, consider Morris's comments on the verse:

> This criterion of fruit inspection can be applied both to individuals and to systems. For example, the evolutionary philosophy has produced no good fruits whatever. Instead, it has generated atheism, humanism, communism, fascism, racism and all manner of evil fruits. It, therefore, is a false and evil philosophy" (p 1015).

This commentary might be shocking to our readers, but this example from Morris is useful in illustrating the extent to which some prominent creationists will go in their attempts to relate biblical verses, which otherwise seem unrelated, to an anti-evolution position. His language is blunt and deliberate; this is characteristic of the rest of his study Bible.

The most important point about this discussion of study Bibles is that many Christians who normally might never purchase creationist literature *are* likely to purchase a study Bible. Unlike Morris's study Bible, the titles of many other study Bibles whose annotators infuse creationist notes might not indicate to the purchaser that the Bible's commentary presents a strict literalist creationist viewpoint.

Spreading the Word

There is a strong and long tradition in conservative Protestant Christianity of giving Bibles to others as gifts, especially to young people — Christians and non-Christians alike. This custom is so common that many Bibles and study Bibles have a page specially printed at the front on which the presenters of the gift Bible can fill in the name, date or occasion, and to whom the Bible is being presented. Those Christians who unknowingly receive a creationist study Bible are more likely to read it than other creationist publications because most other creationist publications have few uses for the reader other than to learn about creationism, how to defend it, and what is "evil" about evolution. (Creationist leaders would contend that these other creationist publication *are* about other Christian concerns because, they assert, literal creation is foundational to Christianity and pervasive throughout the Bible.)

Whether read at church or elsewhere, creationist study Bibles are significant in comparison to other creationist publications because of the medium in which the creationist message is delivered. It should be noted that Christian creationists would likely find such a contention to be ironic, for they would hold that it is not the commentary in study Bibles that delivers the literalist creationist viewpoint but rather the biblical text itself. However creationists, noncreationists, Christians, and non-Christians alike would probably agree that when young people encounter the word "day" in the 5th verse of Genesis, "And God called the light Day, and the darkness he called Night. And the evening and the morning were the first day," that they are far more likely to come away with more of a literalist creationist interpretation than they would otherwise after reading from commentaries from study Bibles like the following:

> Since daytime closes at evening and the night ends with the morning, the phrase indicates that the first day and night had been completed. Evening and morning cannot be construed to mean an age, but only a day; everywhere in the Pentateuch [the first five books of the Bible] the word *day*, when used (as here) with a numerical adjective, means a solar day (now calibrated as 24 hours) (Ryrie 1994, p 4).
>
> The use of "Day" (Hebrew *yom*) in Genesis 1:5 is its first occurrence in Scripture, and here it is specifically defined by God as "the light" in the cyclical succession of light and darkness which has, ever since, constituted a solar day. Since the same word is used in defining all latter "*yoms*" as used for this "first" *yom*, it is incontrovertible that God intends us to know that the days of creation week were of the same duration as any natural solar day" (Morris 1995, p 4).
>
> This cannot mean an age, but only a day, reckoned by the Jews from sunset to sunset. ... 'Day' with numerical adjectives in Hebrew always refers to a 24-hour period" (MacArthur 1997, p 16).

When colleagues have been shown such quotations as above without their references, they naturally thought they were taken from overtly creationist books that tend to have titles like *Modern Creationism*, *Biblical Creationism*, *Science and the Bible*, *Evolution: The Fossils Say No*, and *Scientific Creationism*. Such assumptions are certainly justified because many creationist books do contain sections where they discuss the biblical justification for their creationist beliefs. When they learn that the source of such writings is not from publications that they would readily recognize as overtly creationist, but rather are taken from popular study Bibles, their reaction is generally one of astonishment. This is because they long thought that one very good way of comforting Christian students with creationist leanings was to have them to consider that the Bible can easily be interpreted to be in harmony with evolution (or at least not in conflict) — posi-

tions that are held by the majority of Christian colleges and seminaries, and by millions of lay Christians. However, when such creationist commentary appears directly in many study Bibles, particularly if it is one that the student is using, such attempts at reconciliation are quite often viewed by the student as anti-biblical.

"Scientific" Information in Biblical Commentaries

Of course there are those study Bibles that do not contain commentary that is openly anti-evolutionary; the annotators often are not literalist creationists. Some of these non–anti-evolutionary commentators, however, make statements that many would consider to be in the scientific realm and that would be considered misconceptions in most science classrooms. For example, the popular *Quest Study Bible* published jointly by 2 large companies, Zondervan Publishing House and Christianity Today, Inc, asserts that the book of Genesis "tells about many beginnings: the first plants and animals; the first man and woman" (Shelley 1994, p 1). When the annotators discuss Noah's flood they state that "the case is strong that this flood covered the whole world" (p 11). The annotators also discuss the possibility that it may have been a local flood, but using the phrase "the case is strong" favors the view that the flood covered the whole world. In either case, the annotators do not discuss here the possibility that Noah's flood may be a metaphor. Furthermore, all their support for the competing views are biblical justifications — not geological. Whether intentional or not, the implicit message is that the primary, or indeed the only, evidence to contemplate is the biblical record regarding whether this physical event was worldwide or not.

One might object at this point in favor of this study Bible's approach: Noah's flood is a biblical account; it may seem reasonable therefore, to limit the discussion of this event to only biblically-derived information. However, when sea cows are mentioned in the book of Exodus, for example, the information given in the commentary is similar to that found in science books: "This large, aquatic mammal (8 to 15 feet long and up to 1500 pounds) was related to the manatee and could be found in the Red Sea" (p 109). This information is not typical fare for most theological discussions. The inclusion of such references to scientific information creates a problem: the reader may not recognize a demarcation between biblical commentary and scientific evidence on purported physical events. Imagine the potential difficulty when a student reading this study Bible comes to believe that the biblical evidence is, in fact, strong that the flood covered the entire world and then winds up in a science class encountering strong physical evidence to the contrary.

It is not surprising that a study Bible is very appealing to many who purchase a Bible, given the convenience that one can have both biblical text and supposedly helpful explanatory commentary between the same 2 covers. So for some young people who reject evolution for religious reasons, their rejection may not necessarily be engendered by an upbringing in a creationist home or creationist church, or as the result of reading overtly creationist publications. It could very possibly be from occasional readings of the only religious material they *may* own, a study Bible with a stealth anti-evolutionary message.

References

MacArthur J. *The McArthur Study Bible*. Nashville: Word Bibles, 1997.

Morris H. *The Defender's Study Bible*. Grand Rapids (MI): World Publishing, 1995.

Ryrie C. *The Ryrie Study Bible*. Chicago: Moody Press, 1994.

Shelley M, ed. *The Quest Study Bible*. Grand Rapids (MI): Zondervan Publishing House, 1994.

Author's Address

Brian J Alters, PhD
Faculty of Education
McGill University
3700 McTavish Street
Montréal, PQ CANADA
H3A 1Y2
alters@education.mcgill.ca

The National Center for Science Education, Inc.

Subscription rates and policy for 1999-2000 Publication:
Reports of the National Center for Science Education
ISSN 1064-2358
1999 Volume 19, 1-6
2000 Volume 20, 1-6
Frequency: bi-monthly.
Volumes correspond to calendar years.

SUBSCRIPTIONS

Rates:

Domestic	$30.00
Foreign Surface	$37.00
Foreign Air	$39.00

(Canadian subscriptions are at the foreign surface rate — no air rates available.)
Subscription agency discount: 10%.

Payment and minima
Subscriptions are accepted for a minimum of 4 months (2 issues). No maximum. Payment must be via check (cashable at a US branch of bank if a foreign check) or VISA or Mastercard. Purchase orders from institutions are accepted.

Start dates
Subscriptions can begin with any issue, however there are 3 standard expiration dates based on even-umbered issues. New subscriptions that begin with even-numbered issues will expire on the standard cycle and be charged for the additional issue ($4.00), since they will run for 7 issues.

Expiration dates
Yearly subscriptions have 3 expiration dates on the 4th, 8th, and 12th months. Subscribers are grouped into 1 of these 3 cohorts to simplify billing and renewals.

Cancellations
Cancellations are accepted. Refunds will be issued for any unmailed issues.

Claims
Claims for missing issues are accepted for up to 12 months. Claimed issues will be mailed from the main office of The National Center for Science Education, Inc. Only one replacement issue will be sent.

Back Issues
Back issues are available for $4.00 each plus $1.00 shipping for the first issue and $0.75 for each additional issue.

For more information contact:
Erik Wheaton, Office/Circulation Manager
PHONE: 510-526-1674
(toll free: 800-290-6006)
FAX: 510-526-1675
EMAIL: ncse@natcenscied.org.
WEB PAGE: <http://www.natcenscied.org>

NCSE
925 Kearney St
El Cerrito CA 94530-2810
or:
PO Box 9477
Berkeley CA 94709-0477

Cheering with the Enemy, or Boosting Your Mileage with the Best from Bad Reviews

Wade Tarzia, PhD

Introduction

How can ideas that have failed to find acceptance in the scientific arena continue to be promoted as scientifically valid? A common rhetorical strategy among anti-evolutionists is reminiscent of advertisements for bad movies — comb the bad reviews for excerpts you can use to your advantage. In this case the Bhaktivedanta Institute excerpted my negative review in *Creation/Evolution* (Tarzia 1994) to promote the creationist archaeology book, *Forbidden Archaeology: The hidden history of the human race* by Michael A Cremo and Richard L Thompson. It is a simple method — counter a theory of evolution through acrobatic selective citation. For a Christian creationist example of the method, see Henry Morris's book *That Their Words May Be Used Against Them* (1998). However, the example I will explore here shows the use of selective citations from negative reviews to promote the book through advertisement on a web site.

The Institute had much material to work with because several scholars published negative reviews of the book. Some of these reviewers made positive remarks about certain aspects of *Forbidden Archaeology* even if their final judgment was that the book was a work of pseudoscience or had severe shortcomings. Showing resolution before critical adversity, the publishers established a World Wide Web site (<http://www.webcom.com/ara/col/books/science/fa.html>) composed of positive statements from many negative reviews. Of course, these selective citations have been removed from the context of the overall negative assessments. The publishers introduce these citations with this upbeat statement:

> *Forbidden Archeology* is an extremely controversial book that has attracted a great deal of attention in the academic world. As might be expected, its anti-Darwinian thesis has provoked many negative reviews, some of which misrepresent the substance of the book. But even those who disagree with the book's conclusion have sometimes recognized it as a genuine scholarly contribution and correctly represented the substance of the book to their readers, as shown by the following excerpts. (<http://www.webcom.com/ara/col/books/science/rev.html> last accessed on July 19, 1999).

A Trio of Reviews

I will show a few detailed examples from 3 sources I have at hand (Marks 1993; Feder 1994; Tarzia 1994). All of these are excerpted on the *Forbidden Archaeology* web site. In the examples below, the material in italics is all that appears on the web site. However, I have included adjacent text from the original reviews which illustrates the authors' overall assessment.

From Karl Feder's Review

> *While decidedly anti-evolutionary in perspective, this work is not the ordinary variety of anti-evolutionism in form, content, or style. In distinction to the usual brand of such writing, the authors use original sources and the book is well written. Further, the overall tone of the work is far superior to that exhibited in ordinary creationist literature.* Nonetheless, I suspect that creationism is at the root of the authors' argument, albeit of a sort not commonly seen before. It is impossible in the context of this short review to deal in an in-depth way with any of the myriad cases cited by the authors to buttress their claims. Instead, their general approach can be summarized.
>
> *The authors base virtually their entire book on a literature search and most (though not all) of that literature dates to the early twentieth century. In so*

Wade Tarzia teaches at Naugatuck Valley Community-Technical College in Waterbury Connecticut. He reviewed Forbidden Archaeology *for* Creation/Evolution, *the predecessor of* RNCSE.

doing, the authors have resurrected nineteenth-century claims of "Tertiary Man" (see Grayson 1983), apparently superimposing on this a belief in the instantaneous appearance of anatomically modern Homo sapiens *at some point in the very distant past, asserting that the evidence for this is at least as good, and usually better, than that cited for a much later and evolutionary origin for our species*. The authors maintain that the analytical techniques applied by nineteenth century scientists to incised bones and "eoliths" that led some to conclude that these very ancient items were the result of human activity, are nearly the same techniques as those applied today to accepted evidence. Therefore, the authors assert, the conclusions reached by nineteenth- and early twentieth-century researchers that these very ancient objects were cultural in origin are of equal validity to the identification of more recent (late Pliocene) cultural objects by modern scientists. Thus, when a nineteenth-century researcher using a standard microscope of the time claims that striations found on bones dating back tens of millions of years are butchering marks, this is the equivalent, in the authors' view, of a modern researcher identifying cut marks using a scanning electron microscope. I doubt that many working in the field would agree. ... When you attempt to deconstruct a well-accepted paradigm, it is reasonable to expect that a new paradigm be suggested in its place. The authors of *Forbidden Archaeology* do not do this and I would like to suggest a reason for their neglect here. Wishing to appear entirely scientific, the authors hoped to avoid a detailed discussion of their own beliefs (if not through evolution, how? If not within the last four million years, when?) since, I would contend, these are based on a creationist view, but not the kind we are all familiar with.

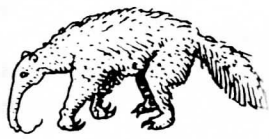
From Jonathan Marks's Review

The explicit aim of the authors is to reconcile paleoanthropology to the Vedic ideas that "the human race is of great antiquity" and that "various human and apelike beings have coexisted for a long time" (p xxxvi). That does not sound particularly challenging; but unsatisfied with the apparently easy harmony between normal science and their nebulous theology, the authors decided to redo anthropology. *The argument is simple: think of all the generalizations we can make about human evolution. Now think of all the exceptions, paradoxes, mistakes, and hoaxes. Now switch them. That is this book*. As the Fire-sign Theatre once proclaimed: "Everything you know is wrong!" (But then, they were trying to be humorous, too). For unclear reasons, given the looseness of their religious thesis, this book is anti-evolutionary. The authors are trying to argue that humans have always been on earth, even unto the pre-Cambrian, when there was not much for them to eat or breathe.... The best that can be said is that more reading went into this Hindu-oid creationist drivel than seems to go into the Christian-oid creationist drivel. At any rate, this is a must for anyone interested in keeping up with goofy popular anthropology; at well over 900 pages, it is a veritable cornucopia of dreck.

From Wade Tarzia's Review:

Forbidden Archeology, a new Bhaktivedanta Institute book, *argues that anatomically modern humans have existed for millions of years, which disproves the theory of human evolution; the authors make no specific claims for other kinds of biotic evolution. The book also claims that archaeologists have become a "knowledge filter"* (p xxv ff) *since the 19th century, laboring under a predisposition to ignore evidence for anatomically modern humans having existed for millions of years*. Sometimes the book develops a dishonesty theory—evidence is said to be "carefully edited" (p 150) by scientists so that younger investigators do not see evidence that invalidates the theory of human evolution.

The authors have worked hard in collecting and quoting an enormous amount of material, much of it from the 19th- and early 20th-century, certainly interesting for its historical perspective. Their evidence is as diverse as it is detailed, including, for example, eoliths (crudely broken stones some have considered early tools), "wildmen" (Big Foot, etc), and even a fossilized shoe sole from the Triassic period. Despite all this hard work, I think the book falls short of a scientific work primarily (but not entirely) because (1) its arguments abandon the testing of simpler hypothes[e]s before the more complex and sensationalistic ones, and (2) the use of so many outdated sources is inadequate for a book that seeks to overturn the well-established paradigm of human evolution — scholars must not work in isolation, especially today, when multi-disciplinary approaches are needed to remain on the cutting edge of knowledge. However, for



researchers studying the growth, folklore, and rhetoric of pseudo-science, the book is useful as 'field' data.

Note that the italicized quotations are carefully selected summaries of the book or, as in the case of my review, selections of kind opinion (despite an overall negative judgment). In any event, the quotes so selected may appear to suggest that the reviewers are re-stating the book's premises — and agree! Note that the introduction to this web-page states that the reviewers correctly summarize the substance of the book — and again gives the impression of overall agreement between the authors and book reviewers.

The entire effort seems legal to me; the web site properly references the reviews. I assume the citations are generally accurate because the 3 I have shown here were cited correctly (although incompletely). The site does not explicitly *claim* that these reviewers agreed with the book.

The Integrity of the Review Process

If the quotations are legal, is there a problem? That is difficult to answer; on its surface the site is advertising a book rather than discussing science and this selective citation is not unusual from an advertiser's point of view. But consider also that the site reproduces so much discussion from and about the book (about 9000 words) that the boundary between advertisement and scientific discussion is blurred. The *Forbidden Archaeology* web site seems firmly in the recent media tradition of technical advertising, so what frame of reference shall we choose to decide whether this use of reviewers' comments is acceptable?

Because *Forbidden Archaeology* professes to be rigorous and competitive in scholarly circles, we might expect its promotion to be similarly circumspect — keeping in mind that even the publishers of genuinely highly-regarded books are apt to select strong quotations from reviews. Still, is this the same thing as extracting summaries of positive statements from negative reviews?

While conceding the cleverness of the publishers, I would point out the "interesting" rhetorical position in which the publishers have placed us. Of course, the letter of the law has been followed in citation rules; readers *can* refer to the complete text of the reviews. However, the unusual arrangement of the material on the web site permits the publisher to "cheer with the enemy" in promoting the book. It seems that, when these reviewers tried to describe fairly some interesting feature of the book amidst its overwhelming methodological flaws, their professional approach to a scientifically worthless book was exploited for promotional purposes. "Exploited"? A strong word, but please read on. The formal arrangement of the citations on the web site seems designed to disorient the reader.

The visitor to the web site looks over bright commentary, self-praise, and lengthy extracts and becomes interested in the promise of exciting new findings dealing with the broadly fascinating topic of human evolution. Then the reader clicks on the link to the reviewers' comments and reads 76 words of a short blurb to the effect, "But even those who disagree with the book's conclusion have sometimes recognized it as a genuine scholarly contribution and correctly represented the substance of the book to their readers, as shown by the following excerpts." There follow 14 selectively good quotes (about 1475 words) removed from the context of the reviewers' overall negative assessments. The reader is overloaded with the positive, and the brief notice admitting that these quotes are from nonadmirers is now some hundreds of words and perhaps a couple of minutes behind. Technically, the web page seems to remain within the bounds of legal citation; at the same time, the reader loses track of the *context* of the reviewers' comments — an outcome scholars usually try to avoid.

If the book is as successful as claimed, one might wonder why its promoters would need to risk the accusation of unfair citation — surely not a charge that scholars would want to risk. If the publisher wants the book to be taken seriously or skeptics won over, one wonders how this approach could possibly help.

Building Confidence in the Scholarly Process

My major disappointment rests in the fact that professional courtesy has been abused. Scientists attempt to be fair, sometimes going so far as to admit to finding something good in an otherwise disappointing piece of work. This is not always or even often a saintly act; a scientific tradition of self-correction sometimes coerces honesty — we fear being proclaimed as unfair, unbalanced, biased. And sometimes — perish the thought — we *delight* in being fair. As a sometimes voluntary, sometimes coercive self-correcting practice, science tries to avoid ignoring or camouflaging different sides of a debate. When it fails to debate the issues openly and accurately, it just isn't science.

The kind of selective quoting of scholarly reviews shown here may be *legal*, but it treads on the very outer fringes of scholarship and into the territory of cynical, unbalanced presentation. It seems to violate the scholarly tradition. It isn't consistent with the self-correcting nature of the review process nor does it build confidence in the integrity of authors, reviewers, and publishers. It may convince reviewers to focus on the negative just to be sure they can't be cynically misquoted next time, and that would be a disservice to all parties with an interest in honest, scholarly discourse.

And so this case leads inductively to a general observation. We're always fighting the *human* in us, aren't we? We rise out of ourselves in ideals in the form of gods

and observational-methodological perfection, and here we are, creationists and scientists, united in our urges even when divided about the details. Same urges, different methods, each with its own uses that may vaporize when mixed. Just a thought, but you can quote me.

Acknowledgment

Thanks to Dr John R Cole for reading a draft and making suggestions.

References Cited

Feder KL. *Geoarchaeology* 1994; 9(4):338.

Marks J. *American Journal of Physical Anthropology* 1993; 93:140-1.

Morris H. *That Their Words May Be Used Against Them*. Grand Rapids (MI): Master Books, 1998.

Tarzia W. *Forbidden Archaeology* : Anti-evolutionism outside the Christian arena. *Creation/Evolution* 1994 Summer; nr 34; 14(1): 13-25.

Further Reading: Review sources cited by the Forbidden Archaeology Web Site

Ethology, Ecology and Evolution 1994; 6:461.

Journal of Field Archeology 1994; 21:112.

Journal of Geological Education 1995; 43:193.

Broodbank C. *Antiquity* 1993; 67: 904.

Davidson J. *International Journal of Alternative and Complementary Medicine* 1994 Aug: 28.

Murray T. *British Journal for the History of Science* 1995; 28: 379.

Patou-Mathis M. *L'Anthropologie* 1995; 99(1):159.

Schwarz H. *Journal of Unconventioanl History* 1994; 6(1):75-6.

Stoczkowsk W. *L'Homme* 1995; 35:173.

Wodak J, Oldroyd D. *Social Studies of Science* 1996; 26(1):196, 207.

Author's Address

Wade Tarzia
Arts & Humanities Division
Naugatuck Valley Community-Technical College
Waterbury CT 06708
wtarzia@nvctc5.commnet.edu

KANSAS: What Just Happened? What Does it Mean? What Next?

Both NCSE's national office, and our members in Kansas, were heavily involved in recent efforts to assure that evolution would be covered in Kansas' new science standards; on August 11, the State Board of Education voted to accept state standards that virtually eliminated evolution. We thank members around the country who have expressed their concern and sent us news coverage (much of it citing information provided by NCSE).

Watch for a full report in the next issue of *Reports of NCSE*.

Letters to the Editor

Arthur Shapiro's letter encourages me to comment on Martin Nickels' 5th paragraph (*RNCSE* 1998 Sep/Oct; 18[5]:24). Nickels writes, " ... we can underscore and reinforce the idea that humans are indeed ... part of the natural world rather than a creature set apart from it." I believe Shapiro would agree that the sentence deserves scrutiny. I don't think I distort Nickels' sense if I write "part of the natural world *and not* a creature set apart from it;" that change merely makes it easier to separate the parts of his suggestion. Then let us look at these:

(1) "*We can underscore the idea that humans are part of the natural world and not a creature set apart from it.*" Once we are inside the science classroom and looking at the ideas in the big book called Science, we can certainly underscore that idea as more important than many others in the book; to do so would be fairly harmless.

But now consider:

(2) "*We can* reinforce *the idea that humans* are indeed *part of the natural world and not a creature set apart from it.* " Suppose someone in the room has the religious belief that humans *are* set apart, and that their powers of reason are a snare set by some devil to delude them and damage their faith. Then, sentence (2) seems to be telling such a person that his or her religious belief *is false* and we don't want to do that in a *science* class.

I find it interesting to see how what is permissible and what is not permissible can be so closely intertwined. I find the concept of a *Big Book Called SCIENCE* to be very useful: what a fat book it is, how enthralling! See how this page agrees with that page! How many parts agree and how few disagree! Nickels has displayed some of the pages in masterly fashion. Yet the option remains of saying, "The book is certainly a wonderful compendium but I don't believe it tells me *truth.* I believe reason is sometimes deceptive and using *more* reason to add more pages doesn't weaken that belief."

Perhaps somewhere in the world of education there is a place to challenge that option, but not in a science class; in science class we simply explore the marvels inside the Big Book, while each reserves a private belief about what the whole book is worth.

Brian Bayly
Tuscon AZ

Arthur Shapiro's assertion (Letters, *RNCSE* 1998 Sep/Oct; 18[5]: 37*)* that "If we take our own philosophical claims seriously, we need to recognize that atheism is a position just as much grounded in faith as is theism" is nonsense and should not go unchallenged.

I am an atheist because there is no credible evidence to support the existence of a supernatural deity. I believe something is true to the extent that the evidence warrants. I explicitly reject beliefs that are not supported by rational standards including beliefs based on faith. The theist, on the other hand, explicitly accepts beliefs that are faith based and claims that these beliefs constitute knowledge. Mr Shapiro's statement is true only if words no longer have any meaning.

Richard Powers
Bothell WA

Edward Davis's essay is diplomatic almost to a fault. The difficulty of accommodating Johnsonists (Phil-n-Mike) is that they wish to claim for their "black box" all that is in Science's "black box". Then they can conclude that their god — whom they arrogantly presume to *know* — controls the little container. Because the Judeo-Christian God gave "Man" dominion over all non-human animals, Franz de Waal is dismissed and all research on non-human animal intelligence beyond pigeon shape selection is blasphemous. When one realizes the amount of power-of-popularity the Johnsonists have achieved with their onslaught on scientific logic, it must be admitted that they have struck a chord in a troubled and poorly educated society. I for one refuse to accept their authority to define the black box. Having heard each expound I would venture to bet that neither one has any understanding of what Karl Popper means.

Scientists should be free to speculate wherever they can formulate a material causal relationship. The rest should, indeed, be left for all religions to explain — in another classroom. Impatient scientists who assert *a priori* that everything will be explained by methodological naturalism do not represent all of us scientists. Accordingly, it is sophistry for Johnsonists to try to use their "wedge" to divide all scientists from the rest of humanity because of a few extremists.

If the penetration of Hawkings and astrobiologists into their Judeo-Christian realm makes them uneasy, 'tis a pity. But this pain is a consequence of their own rigidity and narrow-mindedness, not the fault of science, which cannot suffer bigots. I cannot believe that Johnsonists are ignorant of the destructive consequences of their game for all of society. To place themselves in the role of deciding what a scientist has the right to investigate is to assume the mantle of a god, or at least a high priest. Such hubris in light of the existence of other religions is both undemocratic and destined to lead to theocracy and, eventually, religious wars.

H Winet
Pasadena CA

CORRECTIONS

In *RNCSE* 19[1]:24 we included a summary of a paper from the journal *Nature* describing a new find of a complete skeleton of an early mammal. We referenced the paper as Qiang J, Zhexi L, Shu-An J. A Chinese triconodont mammal and mosaic evolution of the mammalian skeleton. *Nature* 1999; 398: 326-30. An alert reader and colleague emailed us with the gentle reminder that Chinese surnames come first and that the correct citations should be Ji, Luo and Ji.

"Surnames in China come first, and although some Chinese authors have begun to 'westernize' in scientific journals over the past few years, there is often confusion in the bibliographic databases over how to format these names. The 'giveaway' in this citation *should* have been the hyphenated name, Shu-An, which usually indicates a first name in Chinese."

[*Thanks to Colin Groves for helping us correct this error.*]

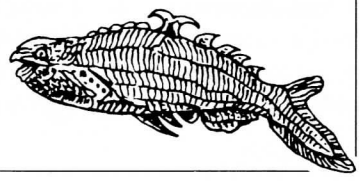
In the article "Equal Time for the Formation of Granite" by Lorence Collins which appears in *RNCSE* 19(2), there were two errors on page 22. The original text read:

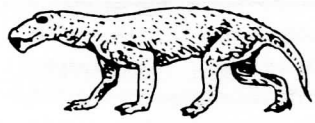
> For example, granites in the bottom of the Grand Canyon give Precambrian ages of 1740 - 1710 and 1700 - 1660 billion years, younger than 2 different units of Vishnu schist with ages of 1750 and 1742 billion years old (Ilg and others 1996), which the granites intrude....

The sentence *should* have read:

> For example, granites in the bottom of the Grand Canyon give Precambrian ages of 1740 - 1710 and 1700 - 1660 **million** years, younger than 2 different units of Vishnu schist with ages of 1750 and 1742 **million** years old (Ilg and others 1996), which the granites intrude....

We apologize for the error and thank Dale Berry for catching this one and letting us know.





BOOKREVIEW

AT THE WATER'S EDGE: MACROEVOLUTION AND THE TRANSFORMATION OF LIFE

By Carl Zimmer, The Free Press, 290 pages/indexed, 1998, $25.00

Reviewed by Jim Sullivan

Evolution books for the general public often focus on or are oriented to the evolution of modern humans, *Homo sapiens,* and those *who* came before. This book looks at a different and earlier (and equally interesting) story of evolution — that of creatures who came from the sea, evolved into four-legged land animals (tetrapods), then went back to the water to live.

Fish have gills, but a few fish, and mammals, swim in the sea using lungs to breathe. And some aquatic creatures have *both* gills and lungs. How did this come about? What does it tell about evolution in general? It's all explained, scientifically, in Zimmer's enlightening book.

> The reason that dolphins and humans have so many similarities is that dolphins are tetrapods, not fish.... The lineage that gave rise to dolphins, whales, and porpoises went through a transformation just as staggering as the one that brought vertebrates on land in the first place: about 50 million years ago a race of wolf-like mammals began to adapt themselves to water. They lost their hind limbs altogether and turned their back on the place that had been their ancestors' for over 250 million years.

Though this book is full of unfamiliar names and nomenclature, and does not shy away from somewhat technical explanations when necessary, a stick-to-it reading by laymen and women will bring big dividends in learning.

Jim Sullivan is an NCSE member in South Bend IN.

RESOURCES

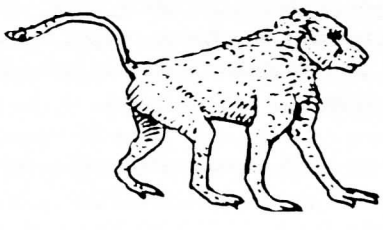
Jean-Henri Fabre and Evolution

A recent issue of *American Entomologist* has an article on Jean-Henri Fabre which examines the bases for his objection to Darwinism. Fabre was a 19th-century French naturalist (1823-1915) who is renowned for his writings on insects and their behavior. He has been praised for his observations (Darwin called him "the inimitable observer"), his writing (he was twice nominated for a Nobel prize in literature), and his humility. Of all anti-evolutionists, probably none other has achieved such universal acclaim.

The article argues that there were 4 important factors which kept Fabre from accepting evolution. These were (1) a hard life which made him turn to God for comfort; (2) isolation from the scientific community and thus from scientific thought; (3) a work ethic which gave him no time to philosophize; and (4) a steadfast humility which made him think it wrong to theorize. The article contains some details on the history of science of the time, Darwin's correspondence with Fabre, and a discussion of where flaws crept into Fabre's reasoning.

Favret C. Jean-Henri Fabre: His life experiences and predisposition against Darwinism. *American Entomologist* 1999; 45(1): 38-48.

[*Contributed by Mark Isaak.*]



National Geographic Features Evolution

The May 1999 issue of *National Geographic* has a typically good photo-article, "From Fins to Feet" on the latest evolution news. The article has lots of good information and copious illustrations.

Westenberg K. 1999. From Fins to Feet. The Rise of Life on Earth. *National Geographic* 1999 May; 195(5): 114-27..

[*Contributed by John R Cole.*]

How to Make a Limb Out of a Fin

Coates MI, Clack JA. Polydactyly in the earliest known tetrapod limbs. *Nature* 1990 Sep 6; 347: 66-9.

Shubin N. The evolution of paired fins and the origin of tetrapod limbs: Phylogenetic and transformational approaches. *Evolutionary Biology* 1995; 28: 39-86.

Shubin N, Tabin C, Carroll S. Fossils, genes and the evolution of animal limbs. *Nature* 1997 Aug 14; 388: 639-48.

Vorobyeva E, Hinchliffe R. From fins to limbs: Developmental perspectives on paleontological and morphological evidence. *Evolutionary Biology* 1996; 29: 263-311.

The wing of *Archaeopteryx* as a primary thrust generator

Burgers P, Chiappe LM. Since the discovery of *Archaeopteryx*, research into the origin of flight in birds has centered around two opposing models: arboreal (take-off from trees) and cursorial (take-off from running). Despite general agreement that birds evolved from bipedal and predominantly terrestrial dinosaurs, 3 unresolved issues have hampered the acceptance of the cursorial model:

1. the difference between the estimated maximum running speed of *Archaeopteryx* (2 meters per second) and its estimated minimum flying speed (6 m/s);
2. the high energy demands of evolving flight against gravity; and
3. the problem of explaining the origin of the "flight" stroke in an earthbound organism.

This article uses an aerodynamic perspective to analyze the take-off run of *Archaeopteryx* through lift-off, and emphasizes the importance of combining functional and aerodynamic considerations with those of phylogeny. The authors write: "Our calculations provide a solution to the 'velocity gap' problem and shed light on how a running *Archaeopteryx* (or its ... ancestors) could have achieved the velocity necessary to become airborne by flapping feathered wings."

[*Nature* 1999: 399, 60 - 2, <http://www.nature.com>.]

Evolution Resources from the National Academy of Sciences

In addition to printed materials, the National Academy of Sciences provides a Web page with links and resources on evolution — from books to court cases to sites on human fossils and evolution.

To visit this resource, connect to <http://www4.nas.edu/opus/evolve.nsf>. You can also find a link to the NAS web site along with other information relevant to evolution at NCSE's site on the web <http://www.natcenscied.org>.

[*Contributed by Donald Horne.*]

Evolution in Hawai'i

Hawaiian Biogeography: Evolution on a Hot Spot Archipelago
W Wagner, VA Funk, editors.
Washington (DC): Smithsonian Institution, 1995

This is a sizable collection of articles on many facets of Hawaiian biology and biogeography, including several pieces on endemic species swarms produced by adaptive radiations in small founder populations. (References to various *Drosophila* species take up 2 entire pages of the index, in the double-column layout that's typical for indices.) Good stuff, though some of it is rather dense going. Lots of interesting material for fighting anti-evolutionists; one that I particularly liked is an article on Hawaiian geology that does a wonderful job of correlating plate drift rate with potassium-argon dates of the major islands in the chain.

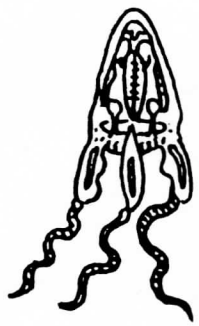
[*Contributed by Jonathon Wolff.*]

Developmental Study Explores Specializations in Snake Skeletons

Andrew J Petto, NCSE Editor

Martin Cohn and Cheryll Tickle reported recently in *Nature* on studies which explore the developmental pathways that produce the distinctive skeletal anatomy of snakes. Of course, the forelimbs of snakes are generally absent, and the skeletal elements of the hindlimbs are greatly reduced. In addition, there is a significant elongation of the trunk produced by repetition of the thoracic vertebrae — those associated with the chest and connected to ribs in other vertebrates. Because elongation of the trunk by repetition of the thoracic vertebrae is known in many vertebrate taxa, Cohn and Tickle reasoned that the developmental mechanism responsible for this condition might be shared in all vertebrates which express it.

In this study, they concluded that 2 developmental changes occur in snakes which account for the skeletal anatomy unique to the taxon. First, a *Hox* (developmental control) gene expands its expression along the body axis and causes an increase in the number of body segments. Second, the hindlimb skeleton begins to develop, but the signals required to promote the continuation of the process and to produce fully functional limbs are not activated. To demonstrate that it is the lack of activation signals which causes limblessness, Cohn and Tickle were able to promote limb development in snakes by introducing into the snake embryos the biochemical components of the signaling complex derived from chick embryos.



Cohn MJ, Tickle C. Developmental basis of limblessness and axial patterning in snakes. *Nature* 1999: 399, 474 -9.

Early hominid stone tool production and technical skill 2.34 Myr ago in West Turkana, Kenya

Roche H, Delagnes A, Brugal J-P, Feibel C, Kibunjia M, Mourre V, Texier P-J

Intensive archeological survey and a series of test excavations conducted in the Nachukui formation of Kenya since 1987 have led to the discovery of more than 25 archeological sites with ages from 2.34 to 0.7 million years old and to the extensive excavation of two sites, Lokalalei 1 in 1991 and Lokalalei 2C in 1997. Lokalalei 2C yielded nearly 3000 archeological finds from a context of such good preservation that it was possible to reconstitute more than 60 sets of complementary matching stone artifacts. These specimens predate the Koobi Fora finds by 500 000 years, and are the oldest ever studied. This article describes a technological analysis of the core reduction sequences, based on these refits. The preservation of the site allows such unprecedented accuracy in the understanding of flake production processes that the authors conclude, "We can thus demonstrate greater cognitive capacity and motor skill than previously assumed for early hominids, and highlight the diversity of Pliocene technical behavior".

[*Nature* 1999; 399, 57 - 60; <http://www.nature.com>.]

WEB LOCATIONS VISITED IN THIS ISSUE

NEWS ITEMS

TOPIC Anti-Evolutionism in Congress
OWNER Library of Congress
LOCATION <http://thomas.loc.gov/home/r106query.html>
LAST VISIT July 22 1999

NCSE NEWS

TOPIC New Book Program
OWNER NCSE
LOCATION <http://www.natcenscied.org/bookcat.htm>
LAST VISIT July 12 1999

TOPIC Robert Carneiro Elected to National Academy of Sciences
OWNER NCSE Brochure Page
LOCATION <http://www.natcenscied.org/broclist.htm>
LAST VISIT July 1999

TOPIC NCSE Members Receive MacArthur Grants
OWNER John D and Catherine T MacArthur Foundation
LOCATION <http://www.macfdn.org/programs/fel/faq.htm#6>
LAST VISIT July 22 1999

TOPIC NCSE Members Receive MacArthur Grants
OWNER Society of Amateur Scientists
LOCATION <http://www.thesphere.com/SAS>
LAST VISIT July 1999

TOPIC How to Help NCSE
OWNER NCSE
LOCATION < http://www.natcenscied.org/whatcando.htm>
LAST VISIT July 1999

FEATURES

TOPIC *Forbidden Archaeology* Promotion Page
OWNER Bhaktivedanta Institute
LOCATION <http://www.webcom.com/ara/col/books/science/fa.html>
LAST VISIT May 12 1999

RESOURCES

TOPIC Evolution Resources from the National Academy of Sciences
OWNER National Academy of Sciences
LOCATION <http://www4.nas.edu/opus/evolve.nsf>
LAST VISIT July 22 1999

TOPIC 2.34 Million-Year-Old Stone Tools from Kenya
OWNER *Nature*
LOCATION <http://www.nature.com>
LAST VISIT June 1999

TOPIC Evolution of Flight in *Archaeopteryx*
OWNER *Nature*
LOCATION <http://www.nature.com>
LAST VISIT June 1999

INSTRUCTIONS FOR CONTRIBUTORS

Reports of the National Center for Science Education (RNCSE) welcomes contributions from its readers and from anyone interested in issues related to evolution as the foundation for the biological sciences, to the place of evolution in the science curriculum, or to the public perception of scientific method and practice. These contributions may be submitted in one of two forms.

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

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

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

Style and Format

1. Manuscripts must be typed double-spaced, including inset quotations and references. Margins must be adequate for editorial notation.

2. Manuscripts should not exceed 20 double-spaced typewritten pages and must be accompanied by a brief biographical statement identifying the author and giving an address where interested readers may contact the author(s).

3. A printed original and two copies should be supplied by the author. Manuscripts submitted on computer diskette will greatly expedite the editing and publication process. Acceptable diskette formats include (standard or high density 3.5-inch) WordPerfect 5.1, MS-Word, or ASCII formats in DOS/Windows versions and MS-Word 6.0, Claris Works 5.0, or plain text for the Macintosh. Manuscripts and other notes submitted by electronic mail should be in plain text format. Please contact the editorial office for information about other word processing and diskette formats that might be acceptable.

4. Citations within text referring to reference section should be limited to author, date and (when appropriate) page, for example (Smith 1982, p 21). Multiple references within text appear in chronological order, for example (Thomas, Peters, and others 1925; Smith 1943, 1947; Smith and Jones 1983a, 1983b, 1984). Citations of electronic resources should include author(s) and date accessed. When appropriate to include internet locations, these should be enclosed in angle brackets, for example <http://www. natcenscied.org>.

5. Reference sections are alphabetical and should conform to the citation-sequence format in *Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers*, illustrated in the following examples:

Chan L. Exciting potential of scholarly electronic journals. *Canadian Association of University Teachers Bulletin* 1996; 43(7):9. <http://www.caut. ca/bull/ejournal.html>. Accessed April 17, 1997.

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

Kuban GJ. Sea-monster or shark? An analysis of a supposed plesiosaur carcass netted in 1977. 1997; Available from <http://members.aol.com/paluxy2/plesios.htm>. Accessed Mar 28, 1997.

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* 2995 Jan-Feb; 1015(1):22-9.

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

Do not abbreviate names of publications. Include location of book publishers, and use the abbreviation "nd" for undated material. Multiple entries by the same author are listed in the bibliography in chronological order and those in same year are listed as:1982a, 1982b, and so on.

6. Material formatted as footnotes or endnotes should be incorporated into the text or deleted.

7. Text abbreviations based on non-English terms should be translated into the appropriate English equivalent. For example, *e.g.* should be rendered as *for example*.

8. All measurements reported in scholarly and scientific articles are to be expressed in SI or "metric" units.

9. Figures, plates, or diagrams should be submitted in camera-ready form or provided in that form upon acceptance. Submission of these materials and of quotations by writers presumes that authors have obtained permission to use these potentially copyrighted materials. Photographs should be glossy prints and should be accompanied by "permissions" when appropriate.

10. Authors should retain copies of all manuscripts, photographs, and figures submitted; NCSE assumes no responsibility for materials submitted.

11. All submissions are subject to editorial correction of grammar, spelling, punctuation, and consistency as per *Scientific Style and Format: The CBE Manual for Authors, Editors, and Publishers*.

12. Manuscripts cannot be returned unless accompanied by stamped, return-addressed envelopes.

NATIONAL CENTER FOR SCIENCE EDUCATION
PO Box 9477
Berkeley CA 94709-0477

Address Service Requested

Non-Profit Org.
U.S. Postage
PAID
Permit 1197
Berkeley CA

19(3)

Membership in the National Center for Science Education brings you

- One year's subscription to *Reports of the National Center for Science Education* (6 issues)
- 15-20% discount on selected books
- Participation in NCSE's diverse efforts to promote and defend the integrity of science education

MEMBERSHIP / SUBSCRIPTION / DONATION

Name

Address City State Zip

Home Phone Work Phone

Occupation

☐ Check here if you object to our sharing your name with other nonprofit organizations

NCSE MEMBERSHIP **ONE YEAR** US:$30 Foreign: $37 Foreign Air: $39 **LIFETIME** $600	$
TAX DEDUCTIBLE CONTRIBUTION TO NCSE	$
BACK ISSUES *NCSE REPORTS / C/E Newsletter* (Vol 1-16, $3 per issue; $18 per volume; all 18 vols, $300) *C/E Journal* (1-9 copies, $6 each; 10 or more, $5 each; full set, nrs 1-39, $150) *RNCSE* (Vol 17-18, $4 per issue; $24 per volume)	$
SHIPPING $1 for 1 issue; add $.75 for each additional issue; maximum of $10 — even for all 39 back issues.	$
TOTAL	$

☐ Check (US dollars) Charge to: ☐ VISA ☐ Master Card

Credit Card Number Exp Date

Name as it appears on card

Signature

SUBSCRIBER INFORMATION
Subscriptions are fully tax deductible. NCSE is tax exempt under Federal IRS Code 501(c)(3) and the corresponding provisions of the California law. Amounts paid to NCSE are tax-deductible to the extent permitted by law.

MISSING ISSUES
If your issue fails to arrive or is badly damaged in transit, send us the date of issue and we will rush you a replacement.

Printed on recycled paper

MOVING TO A NEW ADDRESS?
Let us know your new address as early as possible and we will update our records of your subscription accordingly. Please allow 4 weeks for an address change.

Please mail all correspondence about your subscription to:

NCSE
PO BOX 9477
BERKELEY CA 94709-0477
(510) 526-1674 (800) 290-6006