

EVOLUTION

Darwin's Place on Campus Is Secure—But Not Supreme

Professors at many U.S. universities say their students are learning about evolution without abandoning their belief in some form of creationism

During a visit to Stanford University in 1994, Cornell University biologist Will Provine bet geneticist Marcus Feldman that there were “a bunch of creationists” among undergraduates at the prestigious California school. He says Feldman scoffed. But when Provine asked Feldman’s biology students “how many of you believe humans came to be in the last 10,000 years?” a sizable number raised their hands.

Provine says there’s no evidence that much has changed since then. The debate over evolution has heated up in recent years, with creationists and proponents of intelligent design (ID) clamoring for a place in the curricula of public schools around the country (see sidebar, p. 770). Ironically, this is occurring in the face of an expanding application of evolutionary theory throughout the sciences. Yet polls indicate that the proportion of Americans whose beliefs lie somewhere in the creationism spectrum has held steady for decades.

Interviews with two dozen professors suggest that the same firmness of conviction can be found on many U.S. campuses. “Students may become more accepting of evolution, but they don’t throw out creationism,” says biology professor Randy Moore of the University of Minnesota, Twin Cities.

Hard-core beliefs

For decades, polls have indicated that close to half of the U.S. adult population is skeptical of the basic tenets of Darwinian evolution. Although more educated people are more likely to endorse evolution, a college degree is no guarantee that the graduate agrees with Darwin.

Provine himself has been surveying his Cornell students since 1986, when he started teaching an evolution course for nonbiology majors. He says that for many years, about 70% of students held views somewhere along the creationist spectrum, from biblical literalism



Feting the founder. Celebrating Darwin Week in South Carolina means posters at the College of Charleston and a change of costume for biologist Jerry Waldvogel of Clemson College.

about the sudden appearance of Adam and Eve to the belief that human existence could not have come about without divine intervention. The percentage holding those views declined after agriculture and business students were no longer required to take the course, he says, but not enough to make them stand out from the general population. “Human evolution is a flash point; that’s where the rubber meets the road,” says biologist James Colbert of Iowa State University, Ames. “It’s very common to see students who simply can’t believe humans evolved from apes.”

For the past 3 years, Colbert has surveyed students in his introductory biology class, asking them if they believe God created humans within the past 10,000 years. Last fall, 32% of the 150-member class said they did. Colbert

says he finds this percentage particularly unsettling “when one considers that these students are academically among the upper half of high school graduates, and they are students choosing to major in a life science”—often to become doctors or veterinarians.

For the past 5 years, Moore has done the same surveys in his giant introductory biology class at Minnesota. He says only a little more than half of his students say they were taught anything about evolution in high school; of those, about half say creationism was discussed. That jibes with figures from teacher surveys in both 1994 and 2004, in which one-quarter report that they talk about creationism in their biology classes.

Moore says students don’t necessarily know how to define ID, which asserts that there must be a “designer” because life forms are too complex to have arisen solely from the process of random mutation and natural selection. But when Moore presents them with a range of beliefs, 15% to 20% side with the ID movement. And “virtually none” has changed his or her mind by the end of the semester, he notes. Colbert agrees that although postcourse surveys show students have learned a good deal about evolution, they tend to stick to their views

on God’s role in creating humans.

Plant biologist Massimo Pigliucci of Stony Brook University in New York says he encountered “all sorts of interesting reactions” when he taught at the University of Tennessee, Knoxville. They included notes posted on an Internet discussion board warning students that they would go to hell if they listened to what he was saying about evolution.

But teachers say they rarely have in-class clashes with such students. Rather, says biologist Robert Dillon of the College of Charleston in South Carolina, students will come by “several times a semester” to express their concern that “if there was no Adam, that means Christ died in vain for our sins. We’ll have a theological discussion,” he says.

The discussions aren’t limited to biology courses. Geologist Robert C. Thomas of the University of Montana–Western in Dillon says he is encountering a growing number of students “who do not understand or believe in the most basic concepts of geologic time and evolution,” and that they have become “far more vocal and in some cases disruptive” in

Is ID on the Way Out?

Last month, a teacher in a rural southern California high school began a monthlong course on the “Philosophy of Design,” exploring issues such as “why is intelligent design [ID] gaining momentum?” In response, 11 parents, with help from Americans United for the Separation of Church and State, sued the El Tejon Unified School District on 10 January. Fresh from a decisive December win over proponents of ID in Dover, Pennsylvania, evolution’s defenders geared up for another court battle.

But they didn’t get one. Facing projected legal costs of \$100,000, the school board agreed to a settlement, ending the course early and promising not to teach any course that “promotes or endorses creationism, creation science, or intelligent design.”

For some observers, the board’s swift capitulation was further proof that the ID movement has crested. Although the specifics of the cases were different, “the very decisive win in Dover meant [the California board] knew they had no chance of winning this,” says philosopher of science Robert Pennock of Michigan State University, East Lansing, an expert witness in Dover. “ID is on its way out,” agrees evolutionary biologist Joel Cracraft of the American Museum of Natural History in New York City, who has been active in defending evolution. “[Creationists] will be avoiding that term.”

Indeed, the leaders of the ID movement prefer a more subtle approach to undermine the teaching of evolution: Urge schools to teach the “controversy” over evolution. “We oppose mandating the teaching of ID,” says John West of the Discovery Institute in Seattle, Washington, the leading promoter of ID. “We opposed that [El Tejon] class,” which was laden with young-Earth creationism as well as ID; the institute also opposed the Dover policy. Their latest video for school districts, entitled “How to Teach the Controversy Legally,” does not mention ID.

Such language is echoed in the draft Kansas Science Standards (*Science*, 4 November 2005, p. 754), which call on teachers to teach the evidence “for and against” evolution, as well as in the warning labels put on textbooks in



Poor design? The El Tejon class drew protests before it was canceled.

Cobb County, Georgia (*Science*, 21 January 2005, p. 334). Much of this year’s crop of antievolution legislation follows suit. A Michigan bill, for example, proposes that students “critically evaluate scientific theories including, but not limited to, the theories of global warming and evolution.”

Given these shifting tactics, the battle over teaching evolution “isn’t over,” says Alan Leshner, CEO of the American Association for the Advancement of Science, which publishes *Science*. “These people are well-financed and ideologues in the true sense, and they are not giving this up.”

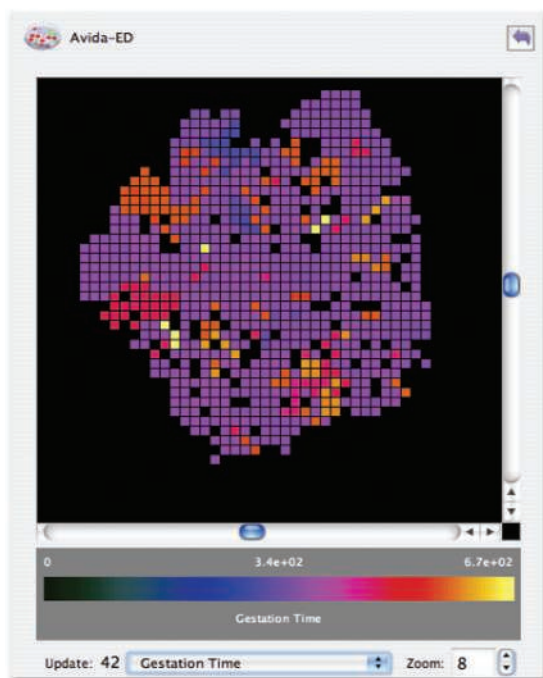
—ELIZABETH CULOTTA

class. “I think the earth sciences are on the front lines of this battle,” says geologist Joseph Meert of the University of Florida, Gainesville. “If you have an old earth, evolution has a chance to happen.”

Last fall, the Geological Sciences of America (GSA) meeting in Salt Lake City, Utah, featured a panel on young-Earth creationists. GSA sees the movement as “a serious attack on legitimate science, not just evolution,” says geologist Edward Crisp of West Virginia University, Parkersburg. He says that although most students will accept the validity of the scientific method, more than half fall away “when you throw man into the mix and ask about a common ancestry with great apes.”

Crisp surveyed students in several introductory biology classes this winter and found that 25% of

206 students believed in a young Earth. The postcourse surveys of 115 students showed that 17% retained that belief. Asked after the



Virtual petri dish. Avida-ED allows students to track mutations, proliferation, metabolic rates, and other bacterial characteristics on their computers.

course if they accepted biologic evolution as a “fact,” one-third expressed doubts. That’s not a big drop from the 42% in the precourse survey who had doubts. In answer to a separate question, about half said creationism should get equal time with evolution in public schools.

Why the resistance to change? “Sometimes students want to take science courses so they can get better in their arguments with scientists,” explains Crisp. He adds that although most of his students won’t become scientists, they may still be in a position to influence the young. “Over 50% of my students are majoring in elementary education,” he notes.

Teaching in the city that hosted the infamous 1925 Scopes Trial, invertebrate paleontologist Kurt Wise of Bryan College, a Christian school in Dayton, Tennessee, says other scientists have an exaggerated fear of fundamentalists like himself. (Wise claims to be the first “young age” creationist with a doctorate in paleontology, earned in 1989 from Harvard University.) After all, he notes, “if you’re working for an oil company, it doesn’t matter if you think the oil is only 500 years old.”

But Wise’s is distinctly a minority view. Most geologists agree with Meert when he

says that “it’s time to stop pussyfooting around. ... Young-Earth creationism and the ID movement are challenging the foundations of not just biology but also geology, physics, chemistry, astronomy, and anthropology.”

Darwin days

Public controversies over Darwinism have inspired college presidents to defend science and professors to sign petitions. They’ve also inspired courses to explore the evolution debate. University of Kansas religion professor Paul Mirecki made national headlines when he announced a course that would label ID as “religious mythology.” Mirecki was subsequently beaten up by thugs and excoriated when some fundamentalist-bashing—and Catholic-bashing—e-mails he had written became public. He also stepped down as department chair, although university officials say they still hope to offer such a course.

But for all the media coverage of the controversy, few academics are proposing new approaches to teaching evolution in biology or geology class. “There are fewer people than I would have thought trying to reach out” to skeptical students, says physicist Lawrence Krauss of Case Western Reserve University in Cleveland, Ohio, who has been active in the public debate over teaching creationism and ID in public schools. Brown University biologist Kenneth Miller, who has been publicly confronting creationists for years, says he’s not aware of any attempts to recast courses in light of the current controversy. But he says evolutionary concepts are dispersing in other ways, in emerging fields such as rational drug design, comparative genomics, and computational biology.

Technology is also providing new teaching opportunities. At Michigan State University (MSU) in East Lansing, scientists are developing a computer program to bring students face to face with evolution. With a grant from the National Science Foundation, a group is adapting a research platform called Avida to enable undergraduates to watch digital organisms called Avidians develop complex functions through replication, mutation, and natural selection.

“The thing we’ve seen anecdotally is it lets students see that evolution works as advertised,” says MSU philosophy professor Robert

Pennock. It’s “a good way to teach students about the nature of science,” says plant biologist Diane Ebert-May, who notes that Avida-ED (as it’s called) is also “your best counterattack to ID, which is not science.”

Indeed, a much larger reality than the creationism debate is the spread of evolutionary thinking throughout the sciences, including social and behavioral science. Evolutionary

students see evolution not as a dogma but rather as “a powerful way to understand the world,” he says, they’ve “basically been immunized to intelligent design.”

Another approach is being developed at the University of Georgia, where evolutionary geneticist Wyatt Anderson, ecologist Patty Gowaty, and others have established a Center for the Study of Evolution. The center will feature speakers from a variety of disciplines, a certificate program, and outreach to public schools. “It’s not as evangelical” as Wilson’s program, says Gowaty. “We just want the quality of discussion to be better.” Anderson hopes the center will also “be a voice for the science of biological evolution” at the state level.

Evolution is also being spread around at the University of Alabama, where faculty members have organized a lecture series called ALLELE, for Alabama Lectures on Life’s Evolution. Psychologist David Boles says he got the idea from polls showing that 45% of Americans—and 56% of Alabamians—believe God created humans within the past 10,000 years. Representatives from the education and philosophy departments, as well as various branches of science, design events suited to their fields, and members of the public, especially schoolteachers, are welcome. Geologist Fred Andrus says “we’ve been very pleasantly surprised at the turnout.”

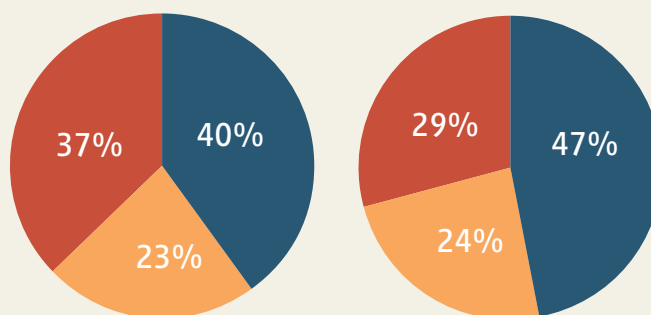
Another means of spreading the word are Darwin celebrations on campus that coincide with the biologist’s 12 February birthday. The College of Charleston started a “Darwin Week” 6 years ago to combat attempted antievolution “mischief” in the state legislature, says Dillon. The University of Alabama is having its first “Darwin Day” this year, and Provine says Cornell is considering starting one. The University of Tennessee, Knoxville, has celebrated the great man’s birthday since 1997, when Pigiucci sought to rebut an “equal time” bill being considered in the state legislature.

“The first time we offered Darwin Day, a local TV station made fun of the whole thing by taking shots of chimps at the zoo,” recalls Pigiucci. Ecology grad student Marc Cadotte says the media have moved on but that quite a few local high school teachers are attending the Darwin Day teachers’ workshop: “It’s an encouraging sign that our activities are making a difference.”

—CONSTANCE HOLDEN

A Survey of Student Attitudes

The question: Do you accept that modern man and modern great apes had a common ancestor several million years ago?



Presurvey
206 students

Postsurvey
115 students



Resistant to change. Pre- and postcourse surveys of biology students at West Virginia University, Parkersburg, indicate that human origins are a sticking point for those who embrace the Bible.

biologist David Sloan Wilson of Binghamton University in New York is one scientist who has seized on this phenomenon to generate a program that introduces evolutionary theory to every corner of the university. In 2003, Wilson created a course for nonbiology majors on “evolution and human behavior.” His approach was to face moral and political objections to the theory head-on and have students apply evolutionary theory to a wide variety of behaviors, from drug abuse to yawning.

The course, now called “Evolution for Everyone,” has spawned a campuswide Evolutionary Studies Program (bingweb.binghamton.edu/~evos) allowing core faculty members to offer courses in virtually any discipline taught from an evolutionary perspective. Outside lecturers are also regularly invited to give public symposia on subjects such as Darwinian medicine or “the deep structure of the arts.” Wilson says his surveys show that students are absorbing the basic message regardless of their political or religious orientation. Once