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Intelligent Design

Should alternatives to evolution theory be taught?

The Kansas Board of Education is likely to vote in September to replace the state's newly updated science-teaching standards with a revised version that plays down evolution and rejects the idea that science is a search for "natural" explanations only. The change would open the doors of biology classrooms to supernatural explanations of human life and origins, including the increasingly popular concept of "intelligent design" — the idea that life is so complex it could only have been created by an intelligent being. School boards and lawmakers in nearly half the states, including Georgia, Pennsylvania and New York, are examining similar proposals. Most scientists say intelligent design is just a new, more acceptable name for biblical creationism. But intelligent-design supporters argue that they only want an equal hearing for alternate theories of life's origins and a chance for students to examine what they say are serious gaps in evolutionary science.



Believers in intelligent design see evidence of a higher power in such complex natural systems as the double helix structure of DNA.

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Cover: Believers in intelligent design see evidence of a higher power in such complex natural systems as the double helix structure of DNA. (Corbis Images/Steve Allen)

Intelligent Design

BY MARCIA CLEMMITT

THE ISSUES

The word “science” will have a new meaning in Kansas if the state School Board has its way in September. Under a new definition the board is expected to adopt, the teaching of science in Kansas classrooms will include supernatural explanations for natural phenomena.

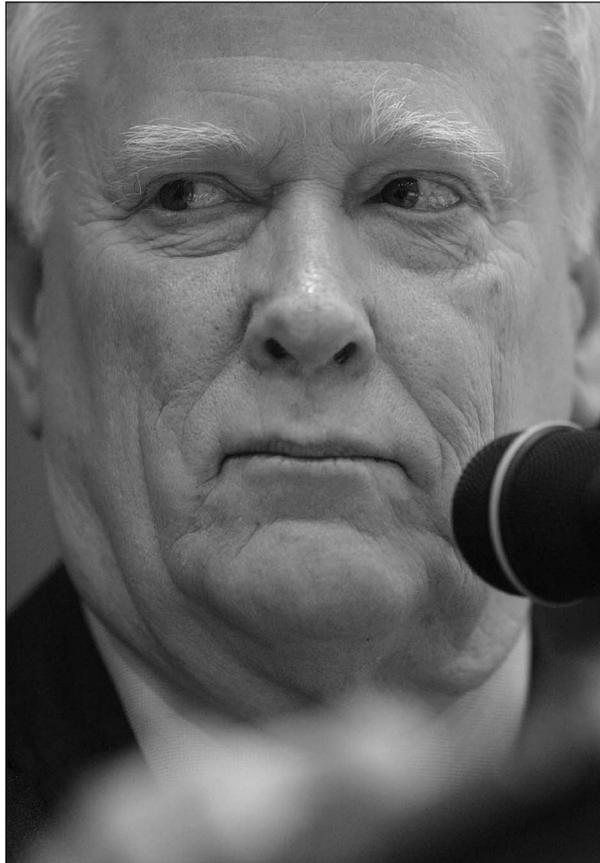
Under the new definition, biology teachers will be required to discuss alternatives to Charles Darwin’s theory of evolution, such as intelligent design — the idea that humans were purposely designed by a higher intelligence.

The changes will be a significant victory for John Calvert — a retired lawyer and founder of the Kansas-based Intelligent Design Network, which pushed for the new definition. In Calvert’s view, there is substantial evidence that living things were actually designed by an intelligent being, and the “Evidence should not be censored,” he told CNN.¹

But most scientists say no such evidence exists. “In the scientific community, evolution is an accepted fact,” said Alan Leshner, CEO of the American Association for the Advancement of Science (AAAS), the world’s largest scientific organization.²

“Without evolution, the building will fall down. It’s the cornerstone of biology,” said Al Frisby, a biology teacher at Shawnee Mission Northwest High School.³

Conservative Christians have long tried to oust evolution from public-school classrooms — or at least require the in-



Getty Images/Larry W. Smith

John Calvert’s Intelligent Design Network is pushing the Kansas Board of Education to require teachers to discuss alternatives to Charles Darwin’s theory of evolution, such as intelligent design — the idea that life was designed by a higher intelligence. Kansas is the only state that has passed legislation suggesting that alternatives to evolution be taught, but anti-evolution measures are pending or have been considered in at least 16 states, including Michigan, New York, Pennsylvania and Wisconsin.

clusion of alternative ideas, such as Bible-based creationism, which holds that God created all the species on Earth just as they are. In the past decade, however, many evolution opponents have stopped raising religious issues directly, arguing instead that there is as much evidence of intelligent design as there is that humans evolved naturally.

“Our strategy has been to change the subject a bit so that we can get intelligent design — which really means the reality of God — before the academic world and into the schools,” said Phillip E. Johnson, the former Uni-

versity of California law professor who launched the intelligent-design movement in the early 1990s.⁴ (See sidebar, p. 648.) Johnson’s strategy worries Michael Ruse, a professor of philosophy at Florida State University. “As far as the scientific community is concerned . . . intelligent design is religion tarted up to look like science to get around the U.S. Constitution,” Ruse said. Intelligent-design advocates are “being pushed by people with a much more right-wing agenda.”⁵

Focusing on intelligent design instead of creationism has enabled evolution opponents to turn the effort to ban or limit evolution teaching into a nationwide battle. While only Kansas has passed legislation suggesting that alternatives to evolution be taught, anti-evolution bills are pending or have been considered in at least 16 states. (See map, p. 640.)

And this year, serious challenges to teaching evolution in public schools have arisen in such traditionally liberal states as Michigan, New York, Pennsylvania and Wisconsin.

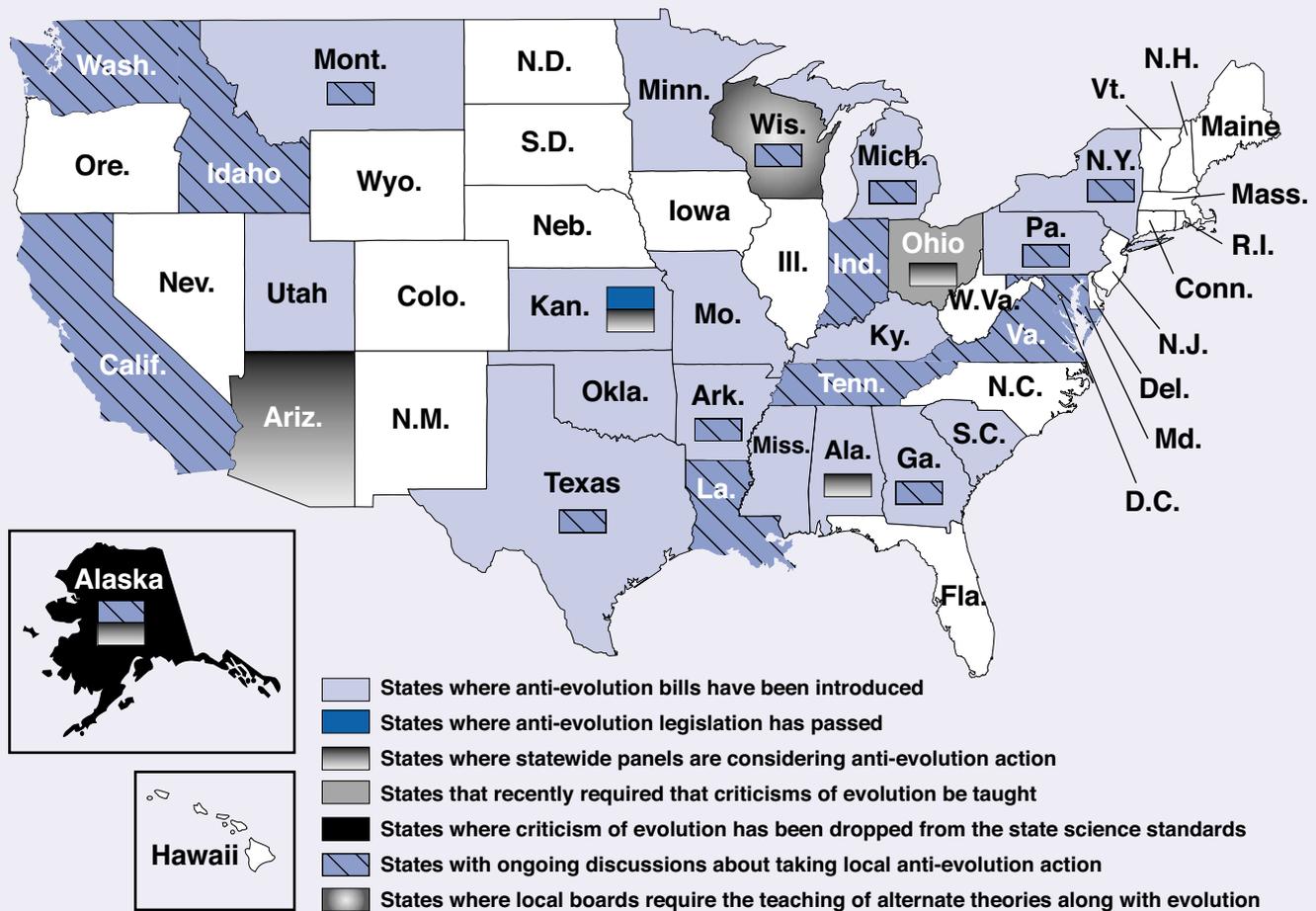
“I used to call it a glass wall,” says Larry Scharmann, a professor of science education at Kansas State University, referring to the invisible wall that once separated the Midwest from the fervent religious lobbying in Southern states where evolution was driven out of the biology curriculum. “Now I say, ‘How did it happen here?’ ”

Although rising religious conservatism helps explain evolution opponents’ recent success, Americans’ sense of fair play — which demands that alternate ideas also are entitled to a hearing — is helping intelligent-design supporters as well.⁶

Many Anti-Evolution Measures Are Being Considered

Anti-evolution measures have either been introduced or considered by state and local education boards and groups in at least 25 states in the past two years. Only one state, Kansas, has recent legislation governing the teaching of alternatives to the theory of evolution. Some of the proposed proposals would require that criticisms of evolution be taught along with the evidence in its favor; others would require the teaching of biblical creationism. Other proposals call for disclaimer stickers on textbooks stating that evolution is only a theory or that such disclaimers must be announced before evolution is taught.

State and Local Measures on the Teaching of Evolution
(in 2004-2005)



Source: National Center for Science Education

For example, according to a June 2005 Harris Poll, 55 percent of Americans want schools to teach more than just evolution. (See polls, p. 641.) And at least 70 percent of the people in Minnesota, New Mexico and Ohio oppose teaching evolution only.⁷

But Leshner says intelligent-design proponents have clouded the issue by calling their idea a “theory,” thus equating it with the “theory” of evolution. But in science, “if there are no data or tests, it’s not a theory,” he says. Evolutionary scientists can produce confirming evi-

dence of many kinds to support their theory, he points out, but intelligent-design theorists cannot.” (See sidebar, p. 642.)

Moreover, he adds, scientists “are bound by data,” but design supporters are “ideologues, and ideologues

are not bound by the same ground rules.”

But such arguments don't faze Johnson. "Christianity is a permanent thing," he said. "A couple of centuries from now, you won't hear about Charles Darwin except in courses on British intellectual history . . . but Jesus Christ will still be a prominent part of the culture It's just a matter of what is permanently good and true outlasting the faddish ideas we're attracted to in our foolish youth." ⁸

The situation in Kansas came to a head in April, when the Kansas Board of Education's newly elected conservative majority heard testimony that teaching criticisms of evolution will be good for students, even though only eight of 26 members of the state's teaching-standards panel support the changes. Mainstream scientists and science educators boycotted the gathering.

"It was a "kangaroo court" where pro-evolution views could not get a fair hearing, says Scharmann.

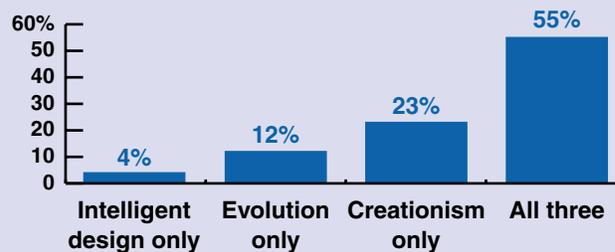
Intelligent-design supporters, however, claim scientists didn't participate because they cannot effectively refute design theory. "I'm waiting for the day when the hearings are not voluntary but involve subpoenas in which evolutionists are deposed at length on their views. On that happy day, I can assure you that they won't come off looking well," says William A. Dembski, a professor of science and theology at Southern Baptist Theological Seminary in Louisville, Ky., and fellow at the Seattle-based Discovery Institute. ⁹

Some pro-evolution activists warn that by refusing to take part in such debates, the American science community is undercutting the country's science leadership. "The United States is "losing the advantage we got after World War II because of [these] trends" to weaken science teaching, says Scharmann." ¹⁰

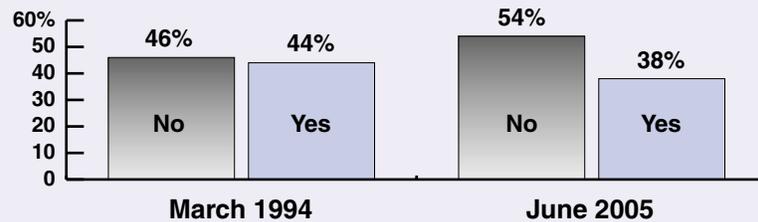
Majority Supports Teaching All Theories

More than half of Americans believe evolution, creationism and intelligent design all should be taught in public schools. Almost half believe God created humans without any help from evolution, and 40 percent believe humans evolved naturally, but with God's help.

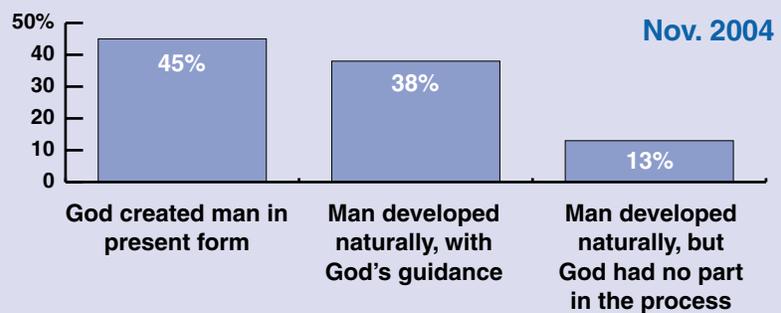
What should children be taught about evolution in public schools?



Did human beings develop from an earlier species?



What contributed to the origin and development of human beings?



Sources: Harris Poll, June 17-21, 2005 (questions 1 and 2); Gallup Poll, Nov. 7-10, 2004 (question 3). Percentages do not add to 100 because respondents who were unsure or didn't answer are not included.

The absence of scientists' input at the April meeting in Kansas, for instance, allowed intelligent-design supporters to lay out their position unchallenged — and led to unbalanced press reports.

Rob Boston, assistant director of communications at Americans United for Separation of Church and State, worries that only a handful of scientists are taking on the intelligent-design debate.

Making the Case for Evolution

Intelligent-design advocates claim that the scientific evidence to support Charles Darwin's theory of evolution is thin. "All the books cite the same examples: the fossil examples, the genetic examples and so on," said Phillip E. Johnson, the now-retired University of California law professor who founded the modern intelligent-design movement. "A relative handful of them [are] used over and over."¹

But biologists say numerous types of evidence support Darwin. In the case of the theory of evolution, "An enormous amount of scientific investigation has converted what was initially a hypothesis into a theory that is no longer questioned in science," a National Academy of Science expert panel said. "At the same time, evolution remains an extremely active field of research, with an abundance of new discoveries that are continually increasing our understanding of exactly how the evolution of living organisms actually occurred."²

Darwin theorized in *The Origin of Species* that species are born with randomly varying characteristics but because of "natural selection" species evolve over time because only those whose inherited traits work well in their environments survive to reproduce. Darwin also posited that widely different species share a single, common ancestor.

Even non-scientists can observe some of the phenomena that tend to confirm Darwin's theory, such as the fact that kangaroos, wombats and most of the world's other marsupials are native only to Australia, which because of its isolation enables

species to develop through unique evolutionary paths that do not occur elsewhere.

The fact that almost all marsupials are native to Australia suggests that the kangaroo and the wombat, different as they are, branched off from the family tree of a single marsupial ancestor — evolutionary developments unique to the island continent.

Intelligent-design theory doesn't offer as neat an explanation for kangaroos and other marsupials, except to say that an intelligent designer could have placed them on one isolated continent only. But there's also no apparent reason why a designer would have done so. Kangaroos, for example, are grazing animals that thrive in dry places and could be suitable inhabitants for other dry lands.

The fact that all living organisms use the same molecules for their genetic codes — DNA and RNA — also supports Darwin's theory. In fact, Darwin's theory of a common, distant ancestor actually predicts a common genetic code. On the other hand, an intelligent creator *could* have decided to use the same genetic material for all organisms. But why wouldn't a designer have used different material for different species? As with kangaroos, organisms sharing common, genetic material do not provide evidence for or against intelligent design.

To test a theory's validity, researchers ask: How easily can it be proven false? If a theory is so flexible it can accommodate

"You see the same names over and over again," he says.

The AAAS is keenly aware that weakened evolution education affects all scientists, says Jim Miller, an AAAS senior program associate. His office — the Dialogue on Science, Ethics and Religion — will publish an online book this summer that Miller hopes will serve as "vaccination by education" against the idea that evolution is anti-religious. "Almost all the points of view on evolution cut across the Christian denominations," says Miller, an ordained Presbyterian minister. By laying out the full spectrum of Christian understandings of the science, "we're trying to broaden the playing field."

Since Darwin's day, science and religion in Western culture generally have been considered two separate, non-overlapping ways of explaining the world. But Miller believes an individ-

ual can hold both views, a belief shared by geneticist Francis Collins, an evangelical Christian who heads the National Genome Research Institute. "There's a common assumption that you cannot both be a rigorous, show-me-the-data scientist and a person who believes in a personal God," Collins said. "From my perspective, these two areas are entirely compatible."

For instance, he continues, "I take the view that God, in His wisdom, used evolution as His creative scheme, . . . creating a group of individuals that He can have fellowship with — us. Why is evolution not an appropriate way to get to that goal?"¹¹

However, ethical dilemmas created by technological developments like cloning are challenging the traditional wall between faith and science, and today nearly all branches of religion "have some kind of active reflection

going on" about how faith and science should interact, says Miller.¹²

Even the Roman Catholic Church, which in the past has seen no contradiction between Christian theology and evolution, is jumping into the current debate. In July, Cardinal Christoph Schonborn, archbishop of Vienna and a leading theologian, poured cold water on the idea that the church accepts evolutionary science. A close associate of newly installed Pope Benedict XVI, Schonborn wrote that "scientific theories that try to explain away the appearance of design [in nature] as the result of 'chance and necessity' are not scientific at all" but "an abdication of human intelligence."¹³

As teachers, scientists, faith communities and intelligent-design supporters debate the place of evolution in America's classrooms, here are some of the questions being asked:

a huge range of observations, the theory may be true. However, it gives scientists little, if anything, to build on as they look for natural laws. That's one of the quarrels scientists have with intelligent design as a scientific hypothesis. There seem to be few constraints on what an intelligent designer could do, making it hard to decide what observations, if any, could prove the idea false.

That's not the case with Darwin's hypotheses. For example, a great deal of doubt could be thrown on the theory of common descent if new species were found containing genetic material other than DNA. Although this has yet to happen, the constant discovery of new species makes it possible that the theory of common descent someday could be disproved.

Darwin's theory also offers plausible explanations for some of nature's odder phenomena, such as the dodo, a flightless bird once found on the island nation of Mauritius, hunted to extinction by European sailors.

"The ancestors of the dodo could fly," since they populated "many widely spread islands," wrote British science historian John Maddox. But once dodos were established on islands with few natural predators, "natural selection would have favored the individuals that gave up flying, saving the huge metabolic cost the process expends. Flight muscles would atrophy, and in due course there would be genetic variations more permanently disabling the apparatus of flight.

Natural selection [could not] have anticipated that a time would come when flight might again be an advantage" to the unlucky bird — "when European sailors came hunting," Maddox explained.³

Although evolutionary theory provides plausible explanations for many observations, biologists can't yet detail step-by-step mechanisms through which natural selection or other evolutionary change occur. But it's not unusual for an established scientific theory to lack such detail. For example, physicists have long known precisely what gravity does, but they still know very little about how it works.

Intelligent-design supporters, however, argue that biologists' relatively slim understanding of evolution's mechanisms is evidence that intelligent design, not evolution, likely accounts for major changes in life forms, such as creation of a new species. "Does natural selection have the fantastic creative power that's assigned to it?" asks Johnson. "There is this huge gap between what natural selection is supposed to be able to do and what it has actually been seen doing, which is practically nothing."⁴

¹ Quoted in Stephen Goode, "Johnson Challenges Advocates of Evolution," *Insight*, Oct. 25, 1999.

² *Teaching About Evolution and the Nature of Science*, National Academy Press, 1998; www.nap.edu/readingroom/books/evolution98/.

³ John Maddox, *What Remains to Be Discovered* (1998), p. 239.

⁴ Jeff Lawrence, "Communique Interview: Phillip E. Johnson," *Communique: A Quarterly Journal*, spring 1999; www.am.org/docs/johnson/commisp99.htm.

Is intelligent design a scientific theory?

Intelligent-design advocates argue that their ideas constitute a true scientific enterprise. But most scientists say intelligent design doesn't meet the tests that differentiate science from other intellectual activities, such as the collection of reliable data.

Nature follows predictable laws that operate the same regardless of who tests them, mainstream scientists say. So it's critical to stick to natural explanations "when playing the game of science," says Kansas State's Scharmann.

Ironically, one thing preventing intelligent design from qualifying as science is that it potentially explains too much. "A hypothesis that can explain all possible observations and data is not testable nor is it scientific," notes Douglas Theobald, a biochemist at the University of Colorado at Boulder.¹⁴

Critics say that's the problem with the arguments in *The Privileged Planet*, a book about intelligent design by Iowa State University astronomy professor Guillermo Gonzalez and theologian Jay Richards, a Discovery Institute senior fellow. It cites as evidence for a designer the fact that Earth supports human life despite the fantastically small probability that the universe would give rise to intelligent life. But, asks William Jefferys, an astronomer at the University of Texas at Austin, "What if we had observed that the universe was actually quite conducive to the existence of intelligent life?" That scenario could also be construed as evidence for a designer, one who planned a human-friendly universe, he suggests.

An elementary rule of reasoning, he points out, is that "if evidence E supports hypothesis H, then observing that E is false would undermine H." So, if

contradictory facts can be used to argue both for and against something, the argument is "scientifically useless," he writes in a review of the book.¹⁵

Proponents of intelligent design dispute such claims. "Intelligent design is very open to being falsified," says Lehigh University biochemist and Discovery Institute fellow Michael Behe. Certain complex structures inside living cells are "irreducibly complex" — functioning structures so intricate and efficiently made that the probability that they evolved through random variation is so low that they must have been engineered by a designer, he contends. If a biologist could grow a bacteria colony that eventually developed such a structure, "that would blow my idea out of the water."

"One of the classic ways to argue against evolution has been to point to an exceptionally complex . . . structure

What Is Intelligent Design?

“Intelligent design refers to a scientific research program as well as a community of scientists, philosophers and other scholars who seek evidence of design in nature. Through the study and analysis of a system’s components, a design theorist is able to determine whether various natural structures are the product of chance, natural law, intelligent design, or some combination thereof. In nature, design theorists cite information-rich systems like the genetic code, irreducibly complex systems like the bacterial flagellum and the fine-tuning of the laws of physics as evidence of intelligent design.”

Source: “Discovery Institute’s Critique of PBS’s ‘Evolution’”; www.reviewevolution.com; accessed July 26, 2005

European Southern Observatory

and then to challenge an evolutionist to ‘Evolve this!’” writes Kenneth Miller, a professor of evolutionary biology at Brown University.¹⁶ But if such an experiment succeeded, he says, it would demonstrate only that a designer wasn’t needed for that one structure, not that no designer existed.

Calvert — the retired lawyer, trained in geology, who established the Intelligent Design Network — says scientists have rigged the rules of the game to exclude intelligent design because they prefer a materialistic worldview to the possibility that a designer created life. But confining scientific explanations to the measurable is actually anti-scientific, Calvert argues, because in science, “you can’t let the implications of the evidence affect your official conclusion.”¹⁷

“The world contains events, objects and structures that exhaust the explanatory resources of undirected natural causes,” said the Southern Baptist Theological Seminary’s Dembski.¹⁸ So banning supernatural explanations “is not an aid to intellectual clarity but a wet blanket designed to stifle inquiry.”¹⁹

But allowing supernatural explanations would halt discovery, scientists say. “Who would have thought a thou-

sand years ago that the size of an atom . . . would ever be discovered?” asks University of Glasgow chemist A.G. Cairns-Smith. “With so many past scientific puzzles now cleared up, there have to be very clear reasons not to presume natural causes.”²⁰

Can a person believe in evolution and still believe in God?

Intelligent-design advocates insist that evolutionary theory and belief in a personal God are incompatible, primarily because the physical nature of evolutionary science makes it atheistic.

People of faith who claim that they accept Darwin’s theory either do not really accept evolution or do not believe in the God of the Bible, said Johnson, the architect of modern intelligent design. “Theistic evolution” — the idea that one can believe in evolution while retaining faith in a personal God — “is the same thing as atheistic evolution with a certain amount of God talk.” Theistic evolutionists effectively deny what design supporters hold as their first principle — “that God left us some fingerprints on the evidence.”²¹

Some atheistic scientists agree that evolution and religion are incompatible. “The total amount of suffering per

year in the natural world is beyond all decent contemplation,” wrote British biologist Richard Dawkins. “During the minute that it takes me to compose this sentence, thousands of animals are being eaten alive, many others are running for their lives, whimpering with fear. . . . The universe that we observe has precisely the properties we should expect if there is, at bottom, no design, no purpose, no evil, no good, nothing but pitiless indifference.”²²

But Keith B. Miller, a professor of geology at Kansas State University, says scientists like Dawkins “have tried to use science to promote an atheistic philosophy.” However, such attempts “step clearly outside of the realm of science,” he writes. The scientific enterprise is no more based on a philosophy that denies God than is plumbing or auto mechanics,” which also avoid supernatural explanations, he continues. “Science works . . . because it is religiously neutral. As a result, scientists representing widely different . . . beliefs can communicate.”²³

Many thinkers who accept both faith and evolution argue that intelligent-design proponents are fighting to preserve not God so much as an outdated human-drawn picture of God. By denying that an active god can coexist with evolution, design supporters require “that the source of each and every novelty of life was the direct and active involvement of an outside designer whose work violated the very laws of nature he had fashioned,” writes Brown University’s Miller. Thus, “the world of intelligent design is not the bright and innovative world of life that we have come to know through science” but a static world “unable to adapt except at the whims of its designer.”²⁴

“Theology needs to face the Darwinian account without flinching,” writes Georgetown University theologian John Haught. “What if God is not just an originator of order but also the disquieting wellspring of novelty?” Haught

writes. “Suppose God is less concerned with imposing a plan or design . . . than with providing a ‘vision’ for the universe that allows it to participate in its own creation.

“If God were ‘powerful’ only in the very crude sense of possessing the capacity to manipulate or design things coercively, then the facts of evolution might be theologically problematic,” Haught continues. “But an infinite love . . . will not manipulate. . . . God’s creative love constitutes the world as something . . . distinct from God.”²⁵

Intelligent-design supporters strongly disagree that theology should be rethought to accommodate science. “If your question is, ‘Can you reconcile some vague or weak Christianity with evolution?’ . . . Of course, if you want to badly enough, you can,” Johnson once told a reporter.²⁶

He’s scornful of people of faith who accept scientists’ claim that science alone can determine the facts of nature, while religion is confined to discussions “of morality or the meaning of life.” Religious people are free to “accept dialogue on these terms” if they want to, he wrote, but “don’t let those religious people think they get to make an independent judgment about the evidence that supposedly supports the ‘facts.’”²⁷

People who attempt to reconcile religious belief with evolutionary science often describe “God as guiding or persuading creation,” Dembski wrote. “But all such talk is empty.” The god Haught envisions “always bows to the freedom of creation.” In traditional Christianity, “creation always bows to divine freedom.”²⁸

Should public-school science classes “teach the controversy” surrounding evolution and intelligent design?

Unlike earlier efforts by creationists to confront evolution, intelligent-design supporters hope their new low-

key approach will be more successful. Rather than asking schools to require that intelligent design be taught, they ask only that schools “teach the controversy” surrounding evolution, arguing that broadening the discussion would foster critical thought.

In a current debate in Dover, Pa., for example, many supporters of intelligent design, including the Discovery Institute, where Behe, Dembski and Johnson are fellows, have refused to back the local school board’s push to require the teaching of intelligent design as an alternative to evolution.²⁹

“I don’t think [intelligent design] should be taught in the sense of a teacher standing up and telling a class that this is something we know to be true,” says design theorist Behe. “But I do think that it could be very good pedagogically to teach it with evolution and other theories of origins.”

But most scientists say there is no fundamental controversy about evolution, so there is no need to teach alternatives.

“Teaching critical thinking doesn’t mean presenting irrelevant and ill-founded ‘alternatives’ to basic knowledge that we want all students to understand,” wrote Molleen Matsumura, network project director at the National Center for Science Education. “Students learning basic concepts about chemistry and physics aren’t taught ‘alternative theories of matter’ such as the medieval four elements.

“While students discuss alternative interpretations of evidence . . . (for example, how to interpret the motivation of characters in a novel), we . . . don’t ‘balance’ valid knowledge with unsupported claims or poor evidence (for example, teaching students in a European-history class ‘evidence that the Holocaust never happened’).”³⁰

Intelligent design does raise some “serious questions” of broader interest, such as whether “complex, specified information is a marker of an intelligent designer,” the AAAS’s Miller says. But theories that still consist main-

ly of speculation don’t belong in the classroom, he says: “Even if these are fruitful avenues of scientific inquiry, they are so preliminary that it’s not appropriate for them to be brought into the schools. It’s just too early.”

But if schools completely avoid discussion of broader, philosophical questions — and of religious objections to evolution that students hear at home or in church — it may further alienate the public from science, others say.

Science classes should stick to teaching what’s been established through the scientific method, particularly since most American students’ exposure to science is already drastically “watered down,” says Robert Wheelersburg, an associate professor of anthropology at Pennsylvania’s Elizabethtown College. That means keeping questions about creation and human origins out. But this “doesn’t mean that you shouldn’t teach the other origin myths and theories elsewhere,” says Wheelersburg, a Catholic who says “there’s no question that things evolved” but who doubts that Darwin’s theory can fully account for the origin of humans.

“When you have these dramatically opposed views” in society on subjects such as evolution, “but the answer in the classroom is, ‘We can’t talk about it,’ the kids just give up,” he says. They may “stay away from science in droves” to avoid confronting questions that they then are discouraged from grappling with, he says.

Wheelersburg wants teenagers to be offered comparative religion or comparative literature classes where competing philosophical and religious ideas can be discussed. “The problem is that public high schools have become sanitized,” and few if any offer such courses, he says.³¹

Others agree that, ideally, the history and philosophy of science should be discussed in schools. National education standards recognize the importance of those studies, says Miller. “But with time constraints, it gets lost.”

Reasonable solutions might include discussing creation and evolution theories “in a separate course” like “religious perspectives on creation,” or “starting a science course with a frank acknowledgement of differing approaches to cosmologies, some of which have different bases than the scientific method,” said Richard Foltin, legislative director of the American Jewish Committee, at a 2003 forum on religion in the schools. However, design proponents “are not going to be satisfied” with such options because they want their ideas about the origin of species to be “identified as science,” Foltin noted.³²

The relationship between religion and science is “one of the most momentous questions in modern history,” and “students are unlikely to take science seriously unless they are educated about the difference between scientific and religious claims,” wrote Charles Haynes, a senior scholar at the First Amendment Center in Arlington, Va., run by Vanderbilt University and the Freedom Forum.³³

Nevertheless, “teach the controversy” school-board resolutions sponsored by intelligent-design advocates are “meaningless — even dangerous” under current conditions, Haynes continued. “Most science teachers aren’t prepared to tackle this debate. As a result, we’re likely to get teachers dismissing the ‘other side’ (as if there were only two) — or, worse, pushing a religious or ideological agenda.”

If “school boards are really serious about fostering ‘critical thinking’ . . . then they must prepare teachers to teach about the debate in ways that are accurate, fair, informed — and grounded in good science,” Haynes noted.³⁴

Science teachers can be trained to deal effectively with the evolution/intelligent-design debate, says Kansas State University’s Scharmann, who says he’s been accused of being a “closet creationist” for expressing this view.

Scharmann says it’s inevitable that teachers will face tough questions, such

as “Why do I need to study evolution, when the Bible says it isn’t true?” Furthermore, many young teachers in training are themselves fundamentalist Christians who have been raised to reject evolution.

He recommends against trying to draw a strict line between hypotheses — saying “this is science” and “this is not science” — or insisting that students “believe” in evolution.

Instead, Scharmann says, “Tell them that you don’t care that theories are true, just that they work,” and that scientific theories can be arranged along a continuum from “stronger to weaker,” depending on how well they do three main jobs: “Do they solve problems? Do they predict? Do they explain? The stronger scientific theory is the one that can do all three things better.”

“I’ve had very strong Christian students” who end up acknowledging that intelligent design is weak as a scientific theory — even though they may still say that they believe it, says Scharmann.

“I ask, ‘What does intelligent design predict?’ They say, ‘I don’t know.’ I say, ‘I need a cure for AIDS. The theory says that AIDS is intelligently designed to be irreducibly complex. Does that solve the problem?’ They say, ‘No.’

“Intelligent design *is* an alternative explanation,” Scharmann continues, but students can come to understand “that it doesn’t do two of the three functions that science needs to do.” ■

BACKGROUND

Modern Science

In the 1830s, when Charles Darwin began to think about evolution, geologists already knew that some animals that had lived on Earth had vanished, while different ones had taken their place.

Natural philosophers had speculated for centuries about whether each plant and animal species had appeared in its current form or whether modern varieties had evolved from older forms.

The notion that modern organisms evolved from earlier ones — often popularly credited to Darwin — was not a new idea in his time.

“Organic life beneath the shoreless waves/Was born, and nursed in Ocean’s pearly caves,” wrote Darwin’s grandfather, the botanist, physician and philosopher Erasmus Darwin, in a poem published in 1803. “First forms minute . . . move on the mud . . . These, as successive generations bloom,/New powers acquire, and larger limbs assume.”³⁵

While speculation that species evolved was not new, the methods of scholars who studied nature were undergoing profound change in Darwin’s day, says Ronald Numbers, a historian of science at the University of Wisconsin, Madison.

“For centuries, people who studied nature were known as natural philosophers,” not “scientists,” says Numbers. Until the late-18th and early-19th centuries, most intellectuals didn’t specialize in a single discipline — such as theology or physics — but freely engaged in cross-disciplinary thinking. A thinker interested in botany would study plants, but unlike for biologists today, “one of the purposes of these studies was to learn about God.”

In the early-19th century, European and American scholars were gradually coming to “a new agreement” about studying nature, creating “science” as we know it today, says Numbers. The new idea: “Don’t inject supernatural explanations.” The new scientists generally “believed that God made the rules,” but, in a huge cultural shift, “they wanted to study the rules themselves” rather than draw conclusions about God from their nature observations or conclusions about nature from their religious faith.

Continued on p. 648

Chronology

1700s-1800s

Natural philosophy — exploring nature to find out about both God and natural laws — is replaced by modern science.

1800

Englishman William Paley publishes *Natural Theology*, describing how observations of nature indicate that a good God designed the world.

1859

British biologist Charles Darwin publishes *The Origin of Species*, outlining his theory of evolution by natural selection.

1877

After finding fossils of toothed birds in the Midwest, paleontologist Othniel C. Marsh theorizes that birds descended from dinosaurs.

1900s-1950s

At least nine state legislatures and education boards ban or limit the teaching of evolution.

1925

Biology teacher John Scopes is convicted of violating Tennessee's law against teaching evolution in schools and fined \$100; the conviction is overturned on a technicality.

1953

American geochemist Clair Patterson uses uranium-lead dating to calculate that the Earth is 4.5 billion years old.

1960s-1980s

Federal courts strike down several state anti-evolution laws,

arguing they amount to government establishment of religion.

1961

The Genesis Flood, an influential book by American anti-evolutionist Henry Morris, seeks to provide a scientific basis for "Young-Earth Creationism" — the idea that the world literally was created as described in Genesis, 7,000 years ago.

1968

U.S. Supreme Court strikes down Arkansas' ban on evolution teaching (*Epperson v. Arkansas*).

1982

Federal court in Arkansas strikes down a 1981 state law requiring that evolution and creationism be given "balanced treatment" in classrooms (*McLean v. Arkansas*).

1987

U.S. Supreme Court Justice Antonin Scalia's dissenting opinion in *Edwards v. Aguillard* argues that criticisms of evolution should be taught in schools.

1990s-2000s

Intelligent design replaces creationism as the main focus of anti-evolution activism.

1990

Federal court in Illinois rules in *Webster v. New Lenox School District* that the district did not curtail a teacher's free-speech rights by prohibiting him from teaching creation science because creationism is a form of religious advocacy not permitted under the Constitution.

1991

University of California, Berkeley, law professor Phillip E. Johnson, founder of the modern intelligent-

design movement, publishes his first anti-evolution book, *Darwin on Trial*.

1995

Alabama requires warning stickers on public-school biology texts cautioning students to keep an open mind when reading about evolution.

2000

Kansas requires the teaching of criticisms of evolution and then reverses itself, after public outcry and election of a new Board of Education.

2003

No Child Left Behind Act recommends that students be taught about controversies surrounding evolution.

October 2004

Dover, Pa., school board requires high-school biology classes to teach intelligent design alongside evolution.

2005

After Dover parents sue the school board, it shifts policy in January and requires biology teachers to inform students that intelligent design is an alternative to evolutionary theory. . . . Kansas Board of Education hears testimony in April in support of changing state science standards to include more criticisms of evolution. . . . In June, the Alaska Board of Education says evolution is a key part of the state's science standards, after having earlier required that alternative theories be taught. . . . American Association of University Professors asks local and state officials to reject requests to weaken evolution teaching. . . . Kansas state Board of Education is expected in September to require schools to teach criticisms of evolution and define "science" to include supernatural as well as natural explanations.

Phillip Johnson's Campaign Against Darwinism

At some point during his 30-year career as a law professor, Phillip E. Johnson found his true passion: marshalling his legal skills to destroy the theory of evolution.

Johnson founded the modern intelligent-design movement and has spent the past 15 years working with other intelligent-design advocates at the Seattle-based Discovery Institute to sow seeds of doubt about evolution among academics, legislators and the public.

"I wouldn't be surprised if Darwinism as we know it goes belly up," said William A. Dembski, an institute senior fellow and professor of theology and science at Southern Baptist Theological Seminary.¹

According to Johnson, the key rule for scientists — examine only natural explanations — makes them agnostics. Because of science's many technological triumphs, its influence extends throughout society — especially among educated people — leading to what he sees as a corrupt, godless, science-dominated culture and moral emptiness.

"Agnosticism is a more effective dismissal of God than atheism," he said in 1999. "The atheist raises the issue by saying that God does not exist. But the agnostic simply has nothing to say on the subject, so you don't discuss it."²

"Before 1962, America was unified by the concept that people of different races and religious traditions all worship their common Creator, the God of the Bible; by 1962, that had been reversed," Johnson told the first intelligent-design conference, at Biola University, a Christian school in La Mirada, Calif., in 1996. That changed after the 1962 Supreme Court decision outlawing prayer in public schools, which Johnson blames on the theory of evolution.³

"The 1959 Centennial [of Charles Darwin's *The Origin of Species*] proclaimed that a blind, material process of evolution is our true Creator," Johnson wrote. Following on that idea, the U.S. Supreme Court in 1962 decided that "even a very general evocation of God was a divisive sectarian practice" and that government endorsement of religion "is inherently associated with religious strife and oppression." That decision "symbolized a tremendous change in the ruling philosophy in our country."⁴

Before converting to Christianity at age 38, Johnson was well acquainted with the emptiness of agnosticism, he says. As a young man, he had adopted the "secular, pragmatic and rational" philosophy that science promotes, "because that's what you did if you wanted to be a big deal."⁵

Born in Aurora, Ill., in 1940, Johnson attended Harvard University and the University of Chicago Law School. He describes himself as a highly gifted but often bored student who drifted into becoming a professor. His one faith: "If you're a bright person with the right credentials, you'll have a happy and meaningful life."

At Berkeley, he felt repelled by student radicals who protested the Vietnam War — which he, too, opposed — but he also envied them. "Misguided as they were, they believed in something."⁶

When his marriage broke up in the 1970s, Johnson eventually sought answers at a local church. But after converting to Christianity, he remained puzzled about what had made his apparently successful pre-Christian life feel empty.

Then he began reading about the theory of evolution, including works by the British biologist Richard Dawkins, who holds that natural selection is a strong argument against the existence of a personal Creator. "I read these books, and . . . almost immediately I thought, 'This is it. This is what it all comes down to, the understanding of creation.'"⁷

Continued from p. 646

Darwin began his studies with one foot planted in Bible-based natural philosophy. By 1859, when *The Origin of Species* was published, he was a fully professional scientist whose theory of how species evolved relied entirely on observable science.

As a boy, Darwin was an avid — some say obsessive — nature hobbyist and beetle collector. "I am dying by inches, from not having anybody to talk to about insects," he wrote to his cousin in 1828.³⁶

His father, a physician, hoped that his son would follow him into medicine. But surgery performed without anesthetics was too much for the squeak-

ish Darwin, and he settled for his father's next suggestion — studying for the ministry. "I did not then doubt the strict and literal truth of every word in the Bible," he wrote.³⁷

As a student, Darwin encountered what Georgetown theologian Haught calls the best pre-Darwinian "explanation for the ordered and adaptive features of living organisms . . . divine 'intelligent design.'"³⁸ This centuries-old idea was most famously expressed by Englishman William Paley in his 1800 book, *Natural Theology*, which Darwin admired.

According to Paley, each species has a form that perfectly suits its needs — for example, a fish has a round,

not an oval eye, better suited to see underwater. So, just as we correctly conclude that a watch was made by a watchmaker, in nature, too, "the marks of design are too strong to be gotten over," wrote Paley. Species are well designed for their functions. "Design must have had a designer . . . That person is God."³⁹

Voyage to Evolution

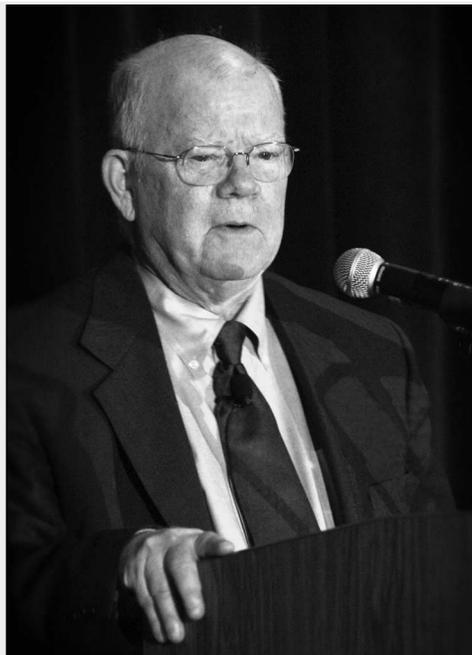
Offered a chance to serve as the naturalist on a five-year voyage of the *H.M.S. Beagle* to map coastlines, the 22-year-old Darwin — still planning to become a parson — took it.

Evolutionary science is based on the false assumption that biologists should seek only natural explanations, Johnson says. Thus, science can lead only to the conclusion that nature proceeds according to material laws only, without God's intervention, a conclusion he says is both untrue and dangerous.

As a result, he says, "Getting the right relationship with God and getting to heaven" have become "unimportant" in our time. What has become important "is how we apply scientific knowledge to make a heaven here on Earth. That's a dream of various kinds of reform programs, [such as] socialism," which the conservative Johnson opposes.⁸

Dedicating his life to the anti-evolution cause energized the formerly aimless lawyer. "I'm like a kid in a candy store," he said in 1997. "I can't think of anything I would rather be doing."⁹

The anti-evolution movement had existed for decades before Johnson joined, but he used his legal debating skills to unify anti-evolutionists of varying beliefs behind a single strategy. "Get . . . Genesis out of the debate because you do not want to raise the so-called Bible-science dichotomy," he said. "Phrase the argument in such a way that you can get it heard in the secular academy and in a way that tends to unify" re-



Brian Gage

Intelligent design "really means the reality of God," says former University of California law professor Phillip E. Johnson, who launched the intelligent-design movement in the early 1990s.

ligious anti-evolutionists. Concentrate on debating this question: "Do you need a Creator to do the creating, or can nature do it on its own?"¹⁰

In the end, he concludes, "Christianity is a permanent thing. A couple of centuries from now, you won't hear about Charles Darwin except in courses on British intellectual history. But Jesus Christ will still be a prominent part of the culture. It's just a matter of what is permanently good and true outlasting the faddish ideas we're attracted to in our foolish youth."

¹ Quoted in Tim Stafford, "The Making of a Revolution," *Christianity Today*, Dec. 8, 1997; www.amn.org.

² Quoted in Stephen Goode, "Johnson Challenges Advocates of Evolution," *Insight*, Oct. 25, 1999; www.amn.org.

³ The case is *Engel v. Vitale*, 370 U.S. 421 (1962).

⁴ Phillip E. Johnson, "How to Sink a Battleship: A Call to Separate Materialist Philosophy"; www.leaderu.com.

⁵ Quoted in James Kushiner, "Berkeley's Radical: An Interview With Phillip E. Johnson," *Touchstone: A Journal of Mere Christianity*, June 2002.

⁶ Stafford, *op. cit.*

⁷ *Ibid.*

⁸ Goode, *op. cit.*

⁹ Stafford, *op. cit.*

¹⁰ Kushiner, *op. cit.*

Darwin's shipmates marveled at "the young man who caught 68 species of beetle in a single day and shot 80 species of birds in a morning's walk," writes biographer Ronald W. Clark. "Throughout the voyage he regularly sent back parcels" containing hundreds of skeletons, bird and animal skins and other specimens.⁴⁰

Initially, Darwin was impressed by Paley's special-design idea. But his observations of nature gradually changed his thinking.

Three main observations form the basis of Darwin's theory of the origin of species. He noticed that virtually all organisms produce many more offspring than survive to reproduce and that individuals

of one species — even closely related ones, like kittens from the same litter — differ in apparently random ways.

Through his travels, he saw that different places, especially islands, often are home to different versions of the same animals and plants. In the Galapagos Islands, 650 miles off the coast of Ecuador, for example, tortoises from the different islands varied enough that people who knew the area could "at once" identify a tortoise's native isle.⁴¹

By the time he returned to England in 1836, he was developing his own theory about how species originate. But, believing he had no right to propose an answer without intimate knowledge of nature, he spent more than two decades

drawing and classifying thousands of specimens before publishing *The Origin of Species* in 1859. He spent eight years classifying barnacles, for example.

Even then, he only released the nearly 500-page book — which he considered a bare outline — because another scientist, Alfred Wallace, was on the verge of publishing similar ideas.

Set forth amidst the hundreds of explanatory details in *The Origin of Species*, Darwin's theory of natural selection is essentially this: Species were not created once in final form. They change over time as the inheritable variations that occur naturally but unpredictably in individuals make some better able to survive environmental conditions to produce young.

Darwin and God

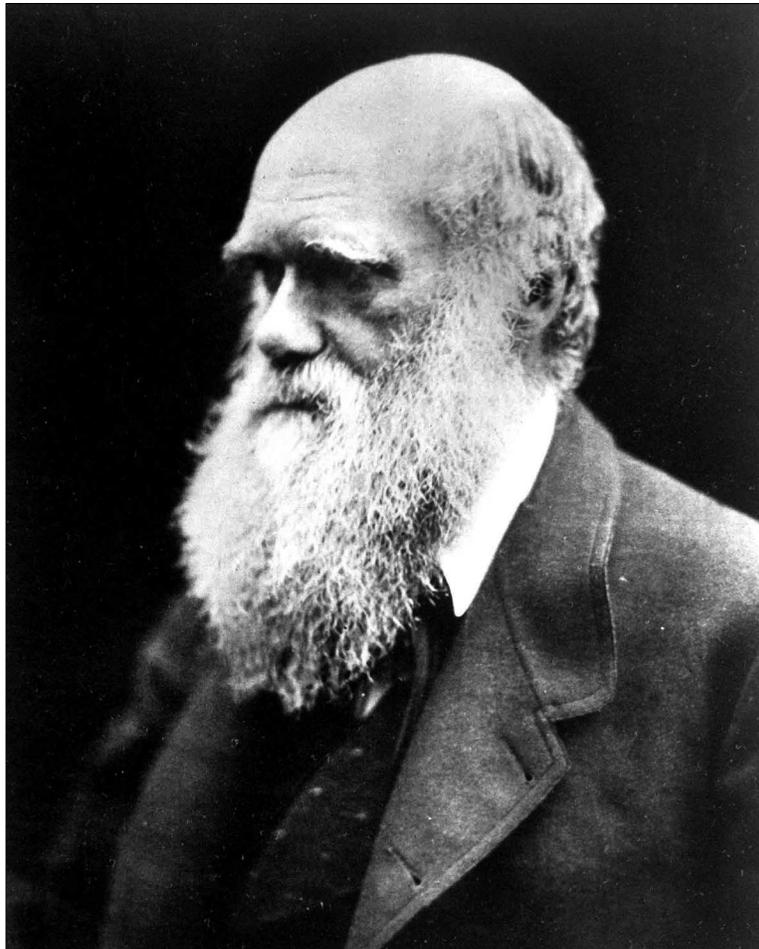
Natural selection quickly became part of the conversation of science, with other researchers contributing evidence for and against it and the author repeatedly revising the concept. Over the nearly 150 years since its publication, Darwin's theory has been woven into the fabric of biology. Some of his proposals have been shown to be false, but the main theory — that natural selection plays a primary role in species change — has been confirmed by many pieces of evidence.

Although in *The Origin of the Species* Darwin did not specifically discuss the evolution of human beings, in 1871 he followed up with his second major book on evolution, *The Descent of Man, and Selection in Relation to Sex*. It explored how natural selection could have led to the emergence of humans as a distinct species.

"Darwin offended his readers in many different ways, but not least for having attributed what he called the 'descent of Man' to people's supposed common ancestor with the great apes," wrote British science historian John Maddox. Many people also were offended by the idea that "variations that arise by chance" lead to new species,

which challenges the belief that "the diversity of life is the product of some Grand Design."⁴²

Darwin himself struggled to reconcile the idea of an intelligent designer with the mass death, chance-driven variation and brute striving for survival he saw in nature.



English biologist Charles Darwin's *The Origin of Species*, published in 1859, grew out of the five years he spent aboard the H.M.S. Beagle as a naturalist.

He wrote of this often in letters and journals. "I cannot persuade myself that a beneficent God would have designedly created the Ichneumonidae [parasitic insects] with the express intention of their feeding within the living bodies of caterpillars, or that a cat should play with mice."

The argument that the existence of suffering casts doubt on "the ex-

istence of an intelligent First Cause" seemed "strong" to Darwin, while "the presence of much suffering agrees well with the view that all organic beings have been developed through variation and natural selection."

On the other hand, "I cannot . . . be contented to view this wonderful universe . . . and to conclude that everything is the result of brute force. . . . The more I think, the more bewildered I become."⁴³

Then and now, many have shared that confusion.

Some believers — mostly Christians but also some fundamentalist Muslims and Jews — say that Darwin's theory contradicts religious scriptures so thoroughly that to believe it is equivalent to being an atheist.

"Before the triumph of Darwinism, atheism was an eccentric position. After that triumph it seemed to be the logical implication of the . . . scientific understanding of reality," said intelligent-design leader Johnson. One cannot simultaneously believe in Darwin's findings and believe in the Christian God, according to Johnson. "If Darwinism is true, Christian metaphysics is fantasy."⁴⁴

Some Muslims also condemn evolution as atheistic and immoral. "If some people commit terrorism using the concepts and symbols of Islam, Christianity and Judaism . . . you can be sure that those people are not Muslims, Christians or Jews," writes a Turkish thinker who uses the pen name Harun Yahya. "The root of terrorism that plagues our planet is not any of the divine religions

TimeLife Pictures/Getty Images

but is in atheism, and the expression of atheism in our times [is] Darwinism and materialism.”⁴⁵

Political, not religious, ideology was behind the historic ban on evolution imposed by Josef Stalin when he ruled the Soviet Union, beginning in the 1930s. He described “survival of the fittest” as a fascist idea, unsuitable for a socialist nation where, in theory at least, all citizens are treated equally. For three decades during and after his dictatorship, evolution supporters were thrown in prison or even executed, and evolution was not taught or permitted in state science programs. The ban greatly slowed the country’s agricultural and medical advancement.⁴⁶

But evolution “has been viewed by many orthodox Christians . . . as a positive contribution to understanding God’s creative and redemptive work,” noted Kansas State University geologist Miller, an evangelical Christian. In Darwin’s time, his chief American defenders included noted scientists Asa Gray, George Frederick Wright and James Dana — all committed evangelical Christians.⁴⁷

The idea that random variation drives species development “creates tension for any theist, including myself, who believes that God guides the cosmos,” says Philip Clayton, a professor of philosophy and religion at California’s Claremont School of Theology. Nevertheless, evolution and faith can be reconciled by giving up two things: “the idea of an all-controlling god” and the notion that, since science finds random change to be the basis of evolution, random change is “all there is.”

Evolution opponents actually pose more risk to religious belief than they do to science, says Brown University biologist Miller, a Catholic and the co-author of a widely used high-school biology text. “They have based their search for God on the premise that nature is not self-sufficient.” But this argument supports “the existence of God only so long as these assertions are true.”⁴⁸

Creation on Trial

By the 20th century, scientists generally accepted natural selection as a key idea in biology, but many in the public had doubts.

During the “roaring” 1920s, many Americans worried that a new culture of permissive behavior — created by declining Bible-based morality — was getting out of hand.⁴⁹ Others, such as William Jennings Bryan, a lawyer and politician involved in the first trial of evolution teaching, worried about social theories that some thinkers drew from evolutionary ideas about inherited biological characteristics and the struggle for survival. Some theorists used Darwin to argue for eugenics programs to institutionalize and sterilize poor people, for example.

During the ’20s, state legislatures in Arkansas, Florida, Mississippi, Oklahoma and Tennessee required that some version of the biblical account of human origins — often called “creationism,” or, later, “creation science” — be taught instead of or alongside evolution. State education boards in California, Louisiana, North Carolina and Texas passed similar rules. Many other states considered but didn’t pass such measures.

The first court test came in 1925, a few months after Tennessee passed a law forbidding the teaching of “any theory that denies the story of the Divine Creation of man as taught in the Bible, and [teaches] instead that man has descended from a lower order of animals.” John Scopes, a football coach and substitute biology teacher in Dayton, Tenn. — who had volunteered to be the defendant in a case to test the law — was found guilty of teaching evolution. He was fined \$100, but the conviction was overturned on a technicality.

Decades later, in the 1960s, science teachers and civil liberties groups began to challenge anti-evolution laws, and a series of court cases around the country examined their constitutionality.

In the first major case, *Epperson v. Arkansas*, the U.S. Supreme Court in 1968 struck down an Arkansas law that banned teaching “that mankind ascended or descended from a lower order of animals.” The court argued that the law violated the First Amendment clause that forbids the government from establishing a religion. The Arkansas law unlawfully endorsed a single religion since it banned teaching ideas that conflicted with the Bible’s creation story, the court ruled.

In 1981, Arkansas enacted a new measure requiring public schools to “give balanced treatment to creation-science and to evolution-science.”

Many in the state’s religious community joined science educators in criticizing the law. A coalition that quickly sued to block implementation of the law included the Arkansas bishops of the United Methodist, Episcopal, Catholic and African Methodist Episcopal churches, the American Jewish Congress and other clergy.

In 1982 a U.S. District Court struck down the statute, ruling in *McLean v. Arkansas Board of Education* that the “balanced treatment” approach also violates the Establishment Clause. The court also declared that creation science is not a science and that the theory of evolution does not presuppose either the existence or the non-existence of a creator. ■

CURRENT SITUATION

Abandoning Genesis

From 1968 through the 1980s, the U.S. Supreme Court and other courts repeatedly declared that anti-evolution laws and balanced-treatment

Intelligent-Design Advocates Turn to Math

Intelligent-design adherents see clear signs of an intelligent force in the creation of Earth's species. The fact that wings, eyes, blood cells and myriad other body parts carry out their functions smoothly is proof, they argue. "Mountains of evidence are already there," writes intelligent-design advocate William A. Dembski, a trained mathematician and professor of science and theology at Southern Baptist Theological Seminary, in Louisville, Ky.¹

However, for skeptics who wear "materialistic blinders," such evidence is not as compelling as the theory of evolution, Dembski says.

To win over doubters — especially scientists — Dembski and other intelligent-design adherents with technical backgrounds point to microscopic aspects of nature that natural-selection theorists may have difficulty explaining. "I'm trying to disabuse people of the notion that they should look at large-scale systems" like birds' wings or human eyes "to see if Darwinian principles work," says Lehigh University biochemist Michael Behe. He argues that tiny functioning structures inside cells have so many well integrated working parts that it's highly improbable they could have evolved through a series of random changes.

But showing something is improbable is not the same as showing it is impossible, critics say. Behe likens that argument to coming upon the Mount Rushmore sculptures of presidents and wondering whether they were designed by intelligent beings. "The burden of proof is with those who say that the wind could have done it."

Dembski, who like Behe is also a senior fellow at the Discovery Institute, in Seattle, wants to develop a mathematical formula to differentiate complex patterns created by intelligent design from equally complicated systems that develop randomly.

He argues that finding such a method should be possible,

since fields such as archaeology, cryptography — the study of codes — and criminology already specialize in similar judgments: "We demand answers to such questions as, Did she fall or was she pushed? Did someone die accidentally or commit suicide? Entire industries are devoted to drawing the distinction between accident and design."²

Such a mathematical formula would give intelligent design "predictive power . . . the sort that can be validated through empirical observation and/or experimentation" — a critical achievement if the idea is to convince doubters, wrote a visitor to Dembski's Web site. A "test to distinguish random (pseudo) from actual (functional) DNA sequences (treating them as information streams) would do the trick," the writer suggested.

Biologists point out, however, that a test that simply separated random from non-random objects wouldn't convince evolution scientists.

According to Darwin's theory, organisms end up looking as if they were specially designed for their home environments, even though no designing mind was involved. That's because, according to the theory of natural selection, animals are born with randomly varying characteristics, but only those whose variations work well in their environments survive to reproduce. To satisfy evolutionists, Dembski's method would have to distinguish between non-random organisms produced by environmental pressures and non-random organisms created by an intelligent designer.

Dembski admits that the project is difficult. "There is still a long way [to go to] hammering out [intelligent design] as a full-fledged research program," he said.³

¹ www.uncommondescent.com.

² William A. Dembski, "Science and Design," *First Things*, October 1998, pp. 221-27.

³ Quoted in Lauri Lebo, "Experts Won't Back Dover School District," *Daily Record* [York, Pa.], June 19, 2005.

laws ran afoul of the Establishment Clause.

But a dissenting opinion by Supreme Court Justice Antonin Scalia and Chief Justice William H. Rehnquist in the 1987 case of *Edwards v. Aguillard* opened the door for a new legal strategy by evolution opponents.

While the court majority reconfirmed the ban on requirements for "balanced treatment" of evolution and creationism, Scalia and Rehnquist said that Louisiana creationists were "entitled, as a secular matter, to have whatever scientific evidence there may be against evolution presented in their schools."⁵⁰

The Scalia-Rehnquist opinion led to a "significant shift" in the approach taken by anti-evolutionists, beginning in 1987, according to Boston of Americans United for Separation of Church and State.

Rather than continuing to seek classroom time for the biblical creation story, anti-evolution activists "began to focus on undermining evolution," arguing that "all we want is evidence against evolution" to be taught. "That has been where all the action is and continues to be," Boston says today.

In the early 1990s, Johnson further revised anti-evolutionists' strate-

gy, launching the modern intelligent-design movement. Through books, speeches and intense networking activities, Johnson convinced most American anti-evolutionists to play down the biblical creation story as their key argument and promote the older philosophical idea that nature's complexity suggests that the world has an intelligent designer.

With a Seattle think tank — the Discovery Institute — as their main base, many prominent anti-evolutionists now say they are developing intelligent design as an alternative scientific

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At Issue:

Should public schools “teach the controversy” surrounding evolution and intelligent design?

REP. MARK E. SOUDER, R-IND.

WRITTEN FOR THE *CQ RESEARCHER*, JULY 2005

The question of biological origins continues to plague discussions about public school science-education policy. But why can't high-school students just learn the standard scientific view and be done with it? Science is science, and that should end the debate.

Normally it would. But evolution is different.

Charles Darwin's theory — and its modern variants — assert that everything we see in the living world is the result of an unplanned, unguided process of random variation and natural selection. It has, from the very beginning, been something more than just a scientific theory. Darwinism quickly became a near-religious conviction for modern agnostics, and since its early days it has been used against people of faith. That history, of course, does not disqualify it as science, but it does help explain why many well-educated Americans have not made, and perhaps never will make, their peace with Darwinian theory.

Still, public doubt alone might not be enough to affect public school treatment of an overwhelmingly established theory. But the Darwinian mechanism as an explanation for macroevolution has long been the subject of cogent and powerful scientific criticisms. And those criticisms have become more compelling in recent years as new evidence piles up: Recently uncovered fossil beds deepen the mystery of the Cambrian explosion, and molecular biology reveals the nanotechnology and digital information inside each lowly cell.

Moreover, any historical theory should be taught with proper modesty and candor. Repeatable experiments involving microevolution in the lab are one thing, but the vast extrapolation of “molecules to man” macroevolution is quite another. Students should understand the huge difference in certainty between one and the other.

There is strong public support for teaching Darwin's theory critically. For example, a 2001 Zogby Poll found that 71 percent of Americans agree that “biology teachers should teach Darwin's theory of evolution but also the scientific evidence against it.”

Whatever its philosophical implications, Darwin's theory dominates current thinking about origins in modern biology, and so a high-school biology education would not be complete without learning the theory.

But the theory should not be taught as an absolute. Instead, it should be taught as a synthesis — the current dominant scientific theory explaining the origin of species — but also as a theory subject to significant limitations, failed predictions and important scientific criticisms. Efforts to exclude from public schools the scientific debate on this sensitive topic serve only to thwart the true purpose of education — and science itself.

ALAN I. LESHNER

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ADVANCEMENT OF SCIENCE (AAAS)

WRITTEN FOR THE *CQ RESEARCHER*, JULY 2005

Science classrooms are for the teaching of science, and intelligent design is not science-based. Science involves well-developed methods of inquiry for explaining the natural world in a systematic, testable fashion. The theory of evolution is based on such rigorous sifting of evidence.

But advocates of intelligent design, while seeking to cloak themselves in the language of science, have yet to propose testable hypotheses that can be subjected to the methods of experimental science. Intelligent design presupposes that an intelligent, supernatural agent is responsible for biological structures and processes deemed to be “irreducibly complex.” But whether such an intelligent designer exists is a matter of belief or faith, not science.

In science classrooms, students learn that scientists reject or accept theories according to how well they explain the evidence rather than on what the researchers would like to believe. Students learn that a scientific theory, such as evolution or gravity, is much more than just an educated guess. A theory is accepted only after repeated observation and experiment.

Discussion of intelligent design may be appropriate in a class devoted to history, philosophy or social studies but not in a biology class. Science teachers should not be asked to teach religious ideas or to balance the scientific theory of evolution against an untestable alternative.

Many scientists are deeply religious and see scientific investigation and religious faith as complementary components of a well-rounded life. There is a place for discussing the role of science and religion in American life, but the science classroom should remain a place for teachers to nurture the spirit of curiosity and inquiry that has marked American science since the days of Benjamin Franklin and Thomas Jefferson.

Our children deserve a first-class science education. Efforts to redefine science by inserting a particular belief into the biology curriculum are in direct conflict with science standards recommended by both the National Academy of Sciences and the AAAS.

Proponents of intelligent design are doing more than attack evolution. They also are undermining essential methods of science by challenging its reliance on observable causes to explain the world around us.

America's students must be taught to distinguish between true science and a system of belief based on faith. At a time when the United States faces increasing global competition in science and technology, public school science classrooms should remain free of ideological interference and dedicated to the rigor that has made American science the envy of the world.

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theory, giving them the right to have their criticisms of evolutionary biology discussed in high-school biology classes and beyond.

Johnson views public acceptance for criticisms of evolution as the leading edge of an intellectual “wedge” that eventually will split modern society apart from the materialistic philosophies it now holds. “The objective is to convince people that Darwinism is inherently atheistic, thus shifting the debate from creationism vs. evolution to the existence of God vs. the non-existence of God,” he said. “From there, people are introduced to the truth of the Bible and then the question of sin and finally introduced to Jesus.”⁵¹

Efforts to build intelligent design into a research program that produces compelling science have not met with much success thus far, however. (*See sidebar, p. 652.*) Although books by some intelligent-design advocates with scientific training have been popular with the public, academic scientists maintain that intelligent design remains a religious and philosophical idea, not a scientific one.

“I’m pretty much an outcast in science these days,” says Lehigh University’s Behe, author of the popular 1996 book *Darwin’s Black Box*. “People see my name and spit on the ground.”

Science Redefined

Most education policies in the United States are set at the state and local levels.

Over the past decade, intelligent-design proponents have been active around the country, encouraging conservative state and local school boards — and committees that periodically review science-teaching standards — to require teachers to introduce students to criticisms of evolution.

For example, after a long-running

controversy, Ohio in 2004 adopted a “science model curriculum” requiring 10th-graders to be able to “describe how scientists continue to investigate and critically analyze aspects of evolutionary theory.” The nationwide intelligent-design community, led by the Discovery Institute and the Kansas-based Intelligent Design Network, joined local conservative groups and individuals to push for the standards.

In 2002, Cobb County, Ga. (Marietta) approved placing stickers on high-school biology texts that noted they contain “material on evolution. Evolution is a theory, not a fact, regarding the origin of living things. This material should be approached with an open mind, studied carefully and critically considered.” Earlier this year, a judge struck down the requirement, and sticker supporters appealed the ruling.

This year, bills to limit or alter evolution teaching or require the teaching of intelligent design or “scientific creationism” have been introduced in more than a dozen states, according to the National Center for Science Education (NCSE). Most of the bills were eventually shelved, although a few are still pending. Around the country, at least eight local school districts and three state education panels also are discussing such proposals this year, according to the NCSE.

Historically, the federal government has little influence over American schools. However, in explanatory language accompanying the federal No Child Left Behind Act of 2003 (NCLB), Congress gave a boost to state and local advocates who want to see criticism of evolution included in science classes.⁵²

The statement, written by conservative Sen. Rick Santorum, R-Pa., and originally proposed as an amendment to the legislation, notes that “where topics are taught that may generate controversy (such as biological evolution), the curriculum should help stu-

dents to understand the full range of scientific views that exist, why such topics may generate controversy and how scientific discoveries can profoundly affect society.”

The language is not legally binding. However, anti-evolution activists in several states — including Alabama, Arkansas, Georgia and Missouri, as well as local officials in Blount County, Tenn., and Grantsburg, Wis. — have recently used it to help make their case. They argued that the federal government, which is exerting tighter control over its education funding under NCLB, recommends that standards-based science include criticisms of evolution. Earlier this year, the Kansas House of Representatives passed a non-binding resolution directing school boards in the state to take the Santorum language into account as they develop curriculum.

Battle in Kansas

Also in Kansas in 2005, anti-evolutionists are pursuing another new strategy devised by Johnson.

Rather than focusing on criticisms of evolution, intelligent-design supporters are attacking what they call “methodological naturalism” — scientists agreeing to pursue only natural explanations when they do science, regardless of their personal beliefs about religion and the supernatural.

In Kansas’ teaching standards, that means redefining “science” — now defined as a systematic search for natural explanations — as a “systematic method of continuing investigation.” Removing the word “natural” from the definition would open science classrooms to supernatural explanations. Anti-evolutionists say that’s necessary not only to permit discussion of intelligent design but also to begin purging modern science of its current framework, which they say amounts to atheism.

If Kansas adopts such language, as expected, it will be the second time the state has done so. A conservative state Board of Education made a similar change in early 2000, but it was voted out of office later that year after an uproar over the provision. A conservative majority was again elected in November 2004, and it immediately began to push forward on including criticisms of evolutionary theory in the biology curriculum and altering public schools' definition of science.

The University of Wisconsin's Numbers explains that the phrase "methodological naturalism" was coined in the 1980s by a scientist and evangelical Christian who wanted to highlight the difference between the natural-explanations-only rule that scientists stick to in the laboratory and "metaphysical naturalism" — the philosophical belief that nothing exists except the material world.

Many orthodox Christians are professional scientists who practice methodological naturalism while continuing to have faith in a supernatural world, says Numbers. "The analogy I use is history," he explains. "There are lots of Christian historians, and they don't say that God did this or Satan did this. They don't say, 'In the Battle of Bull Run, angels came down.'"

But intelligent-design proponents consider methodological naturalism as their primary enemy, an especially dangerous idea because it is accepted not only by non-believers but also by conservative Christians who practice science, Numbers says.

"Metaphysical naturalism asserts that nature is self-sufficient," the Discovery Institute's Dembski wrote. "Methodological naturalism asks us for the sake of science to pretend that nature is self-sufficient. But once science is taken as the only universally valid form of knowledge within a culture . . . methodological and metaphysical naturalism become functionally equivalent. What needs to be done, therefore, is to break the grip of naturalism in both guises."⁵³



Lehigh University biochemist Michael Behe, left, and William A. Dembski, a professor of science and theology at Southern Baptist Theological Seminary in Louisville, Ky., are Discovery Institute fellows and prominent intelligent-design advocates and authors.

However current debates play out, longstanding controversies over evolution in the United States already have greatly weakened evolution teaching in some states and towns, according to a 2000 study by the Thomas B. Fordham Foundation. It found that 10 states gave evolution a very prominent place in their science-teaching standards while another 20 states and the District of Columbia emphasized evolution but left out some major topics, such as human evolution. The remaining 20 states' standards gave evolution skimpy treatment or, in several cases, declined to mention it altogether.⁵⁴ ■

OUTLOOK

Surviving the Courts

Intelligent-design supporters are likely to continue to make inroads into school classrooms over the next several years.

Intelligent design offers a reassuring vision of the world, says Miller of the American Association for the Advancement of Science,

and satisfies "a desire that people have to have their religious convictions confirmed by science." Faith without evidence is "anxiety-producing" for many, he explains.

Besides placing their ideas in more classrooms, anti-evolutionists also have a somewhat improved chance of winning at least some court cases over the next decade, according to some analysts.

"If George Bush gets a couple more of the kind of people he wants on the Supreme Court, we're going to see intelligent design [in classrooms] in 10

years," Ruse, of Florida State University, told ABC-TV's "Nightline."⁵⁵

Others aren't sure how far the Supreme Court will go in reversing its long-held pro-evolution stance. "Focusing on the strengths and weaknesses of evolution could succeed more easily" than earlier attempts to place evolution alternatives in the schools directly, says Numbers. Ultimately, cases may turn on the question of motivation — whether a line of critical questioning that is not specifically religious on the surface may be excluded from classrooms because its supporters have religious motivations, he says.

In his 1987 dissenting opinion on creationism, Justice Scalia made his

Discovery Institute

position clear on the motivation issue, dubbing it a “questionable premise” that “legislation can be invalidated [on the grounds that it supports a single religion] on the basis of its motivation alone, without regard to its effects.”

But if courts do look to motivation to decide cases, evolution supporters see reasons for hope. Design advocates “target only evolution” as a “fatally flawed” idea, never mentioning criticisms of other concepts like atomic theory or the germ theory of disease, says Boston, at Americans United for Separation of Church and State. “We see that as cutting our way,” showing that design supporters’ sole interest is a creationist view.

For their part, many intelligent-design advocates say that their future is bright because interest in design is growing among students.

“With the Internet it [isn’t] possible for professors to command the deference of students as in times past,” notes the Discovery Institute’s Dembski. “Professors are, therefore, no longer the sole repository of answers for students. . . . This is all to the good of [intelligent design], which thrives as [a] subversive instrument . . . for exposing priestcraft dressed in a scientific lab coat.”⁵⁶

A case in point, according to design supporters, is the growing Intelligent Design and Evolution Awareness (IDEA) Center, which helps college and high-school students form clubs to promote intelligent design. Founded in 2001, IDEA sprouted from a single club founded in 1999 at the University of California at San Diego. Currently, there are around 20 clubs,

mostly at U.S. colleges, and the group says it’s gaining momentum, with seven clubs launched in the 2004-2005 school year.⁵⁷ The Discovery Institute’s Johnson and other institute members form the organization’s board.

But Clayton at the Claremont School of Theology is optimistic that a theology that accepts modern science ultimately will “come back into the mainstream of American life,” perhaps in 15 to 20 years. Current anti-evolution fervor is an attempt by some Christians to “circle the wagons” against serious challenges that science presents to traditional faith. But “we’re in a transition period,” and increasing dialogue between theologians and scientists eventually will produce reconciliation for most people, he predicts. ■

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About the Author

Marcia Clemmitt is a veteran social-policy reporter who recently joined the *CQ Researcher* after serving as editor in chief of *Medicine and Health*, a Washington-based industry newsletter, and staff writer for *The Scientist*. She has also been a high school math and physics teacher. She holds a liberal arts and sciences degree from St. John’s College, Annapolis, and a master’s degree in English from Georgetown University.



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FOR MORE INFORMATION

American Association for the Advancement of Science, 1200 New York Ave. N.W., Washington, DC 20005; (202) 326-6440; www.aaas.org/. An international nonprofit organization dedicated to advancing science around the world; publishes *Science* magazine. The AAAA’s Web site provides information on science topics, such as evolution, that raise religious and ethical questions.

Americans United for Separation of Church and State, 518 C St., N.E., Washington, DC 20002; (202) 466-3234; www.au.org. Citizens’ group that opposes endorsement of a single religion by tax-supported organizations such as public schools.

Answers in Genesis, P.O. Box 510, Hebron, KY 41048; (859) 727-2222; www.answersingenesis.org. Provides news and resources to promote creationism and anti-evolution activism.

Center for Theology and the Natural Sciences, 2400 Ridge Road, Berkeley, CA 94709-1212; (510) 848-8152; www.ctns.org. Provides information about the potential positive interaction between theology and modern science.

Discovery Institute, Center for Science and Culture, 1511 Third Ave., Suite 808, Seattle, WA 98101; (206) 292-0401; www.discovery.org. Supports research and provides education on intelligent design and the effects of materialistic science on culture.

Institute on Religion in the Age of Science, www.iras.org. Promotes exploration and understanding of current scientific topics that raise religious issues.

Intelligent Design and Evolution Awareness Center, P.O. Box 17424, San Diego, CA 92177-7424; (858) 337-3529; www.ideacenter.org. Provides information about intelligent design and helps students and others form local clubs to discuss and promote it.

Intelligent Design Network, P.O. Box 14702, Shawnee Mission, KS 66285-4702; (913) 268-0852; www.intelligentdesignnetwork.org. Provides information about activism to promote the teaching of intelligent design and criticism of evolution in schools.

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National Center for Science Education, 420 40th St., Suite 2, Oakland, CA 94609-2509; (510) 601-7203; www.ncseweb.org. Provides news about anti-evolution activities and information for science teachers and others who support the teaching of evolution.

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