G. BRUMFIEL

Who has designs on your students' minds?

The intelligent-design movement is a small but growing force on US university campuses. For some it bridges the gap between science and faith, for others it goes beyond the pale. Geoff Brumfiel meets the movement's vanguard.

O. YAGOLNIKOV

Salvador Cordova sets out the basic principles of intelligent design at a campus meeting.

For a cold Tuesday night in March, the turnout is surprisingly good. Twenty or so fresh-faced college students are gathered together in a room in the student union at George Mason University in Fairfax, Virginia, the state's largest public university. They are there for the first meeting of Salvador Cordova's Intelligent Design and Evolution Awareness (IDEA) club.

"I have a great deal of respect for the scientific method," Cordova tells his attentive audience as he outlines the case for intelligent design. Broadly speaking, he says, the concept is that a divine hand has shaped the course of evolution. The arguments are familiar ones to both advocates and opponents of the idea: some biological systems are too complex, periodic explosions in the fossil record too large, and differences between species too great to be explained by natural selection alone. Cordova — who holds three degrees from the university, the most recent one in mathematics — argues that the development of life on Earth would be described better if an intelligent creator is added to the mix.

Most scientists overwhelmingly reject the concept of intelligent design. "To me it doesn't deserve any attention, because it doesn't make any sense," says Bruce Alberts, a microbiologist and president of the National Academy of Sciences. "Its proponents say that scientific knowledge is incomplete and that there's no way to bridge the gap except for an intelligent designer, which is sort of saying that science should stop trying to find explanations for things."

But despite researchers' apparent lack of interest, or perhaps because of it, the movement is catching on among students on US university campuses. Much of the interest can be traced to US teenagers, more than three-quarters of whom believe, before they

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reach university, that God played some part in the origin of humans (see graphic, right). But others are drawn to the idea out of sheer curiosity.

"Students are in the challenge-authority mode at that time in their life, and I think they're intrigued," says Stephen Meyer, director of the Center for Science and Culture at the Discovery Institute, the nation's largest intelligent-design think-tank in Seattle, Washington. Since the first IDEA club began at the University of California, San Diego, in 1999, more than 20 chapters have opened on college campuses around the country. In addition, a small number of academics have begun to offer courses on intelligent design (see 'Cast out from class', overleaf).

Relative unease

Darwinists are divided in their response to the idea's growing profile on campus (see 'Natural divisions', overleaf). Many feel that the very presence of intelligent design in universities is legitimizing the movement and eroding the public's perception of science. "Intelligent-design advocates want to split open the public's understanding of science and convince people that you can call on the supernatural for a scientific explanation," warns Barbara Forrest, a philosopher at Southeastern Louisiana University in Hammond and co-author of *Creationism's Trojan Horse: The Wedge of Intelligent Design*.

But others feel that the movement deserves an airing at the university level, even if they oppose its teaching in public schools. "I think that college is a place for experimentation," says Eugenie Scott, director of the National Center for Science Education, a group based in Oakland, California, that promotes the teaching of evolution in public schools. If intelligent design is gaining ground on college campuses, she adds, then scientists are as much to blame as anyone. "I think college professors can do a better job of teaching evolution," she says.

Back in the student union, Cordova is carefully pointing out what intelligent design can, and can't, do. The concept makes no attempts to verify the creation myth or other major biblical events, such as the flood, he says. Nor does it worry about whether Earth is a few thousand years old, as most creationists believe, or four-and-a-half billion years old, the current geological estimate. Intelligent design, Cordova notes, does not even attempt to prove the type of deity involved, it just points to some sort of supernatural intervention. In other words, he says: "Intelligent design doesn't have any theology to it."

It is that distinction that has helped propel the small community of intelligent-design proponents to the forefront of US politics. In 1987, the US Supreme Court struck down a Louisiana law that mandated teaching 'creation science' in schools because the premise of the research was based on biblical texts. As intelligent design does not draw directly from biblical sources, Christian fundamentalist groups have seized on it as a possible way to force creationism back into the classroom. Last October, a school board in Dover, Pennsylvania, voted to include intelligent design in its local curriculum. And similar plans are now being considered in at least six states including Kansas, Mississippi and Arkansas. These plans include giving teachers new guidelines, and placing stickers on biology textbooks that question the scientific status of evolutionary theory.

Intelligent-design advocates have mixed reactions to the Christian right's support of their work. On the one hand, the movement is largely dependent on funding from wealthy conservative philanthropists. That, according to Meyer, is why a 1999 funding document from the Discovery Institute argued that intelligent design had "reopened the case for a broadly theistic understanding of nature", and would eventually lay the groundwork for a series of debates and legal challenges over what should be taught in America's classrooms.

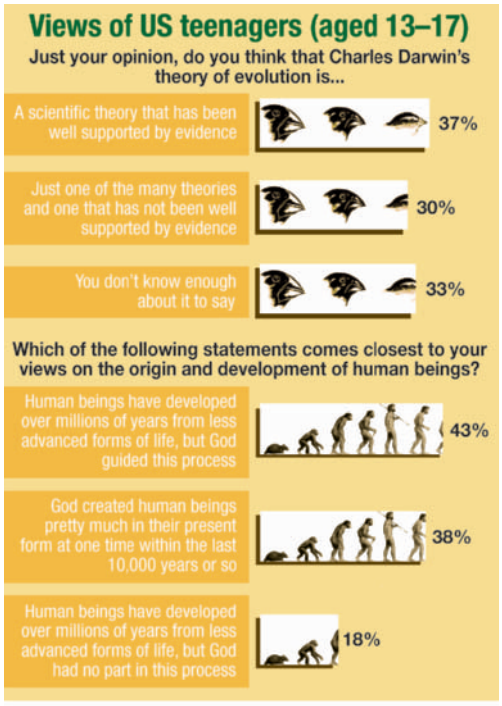
Although Meyer is willing to promote such perceptions, he concedes that they can cause problems. For intelligent-design researchers who would like to see the concept peer-reviewed and accepted by the scientific community, the politics are frustrating, and potentially dangerous. The political goals associated with intelligent design lead many scientists to reject it outright as little more than creationism in a cheap tuxedo. "Some of the policy proposals that have been made, for example the Dover case, are frankly, from our point of view, distracting," says Meyer. "We want to focus on intelligent design as an emerging research programme."

Even considered on its research merits, scientists mostly agree that intelligent design rests on shaky foundations. For one thing, Alberts points out, the concept often makes its claims based on gaps in the current body of scientific knowledge. "The whole history of science is that these gaps are always filled," he says. For example, one common argument used by intelligent-design advocates is that the bacterial flagellum, a whirling tail that some bacteria use to move around, is too complex to be explained by evolution alone. "I'm quite sure that within a decade or two we'll understand where it came from because we're sequencing more and more bacterial genomes," Alberts says. "But to give up now is totally ridiculous."

Crisis of faith

Perhaps surprisingly, many theologians are equally upset by intelligent design. "The basic problem that I have theologically is that God's activity in the world should be hidden," says George Murphy, a Lutheran theologian, PhD physicist, and author of *The Cosmos in the Light of the Cross*. Murphy says Lutherans believe that God's primary revelation came through Jesus Christ, and many find it distasteful that additional divine fingerprints should appear in nature. Catholics, for their part, have accepted evolution based on the idea that God could still infuse the natural human form with a soul at some point in the distant past. And even the evangelical Christians who make up the backbone of intelligent design's political supporters sometimes object to its inability to prove whether Christianity is the true religion.

And yet the students listening to Cordova's lecture seem intrigued. Everyone in the room is Christian, and half are working towards degrees in science, medicine or engineering. It seems perfectly natural to them to mix science and faith. Many are also frustrated by the



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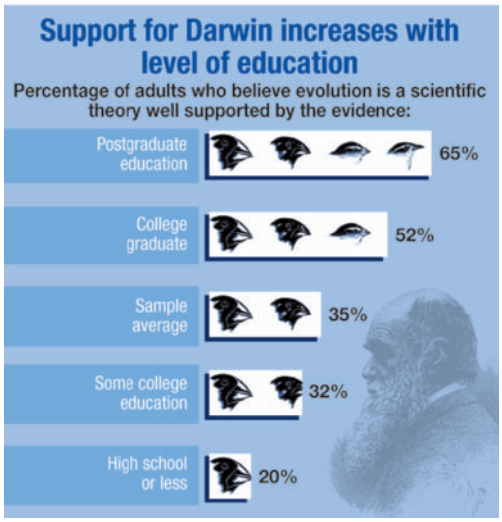

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A decision last year at a school in Dover, Pennsylvania (left), to include intelligent design on its curriculum led residents to form a protest group (above) to combat the change.

exclusively secular tone of their science classes, and to these students intelligent design offers an appealing alternative that puts God squarely back in the centre of things.

Others, including Cordova himself, arrived at intelligent design from almost the opposite direction. Over a coffee earlier that day, he explains how intelligent design helped him resolve his own spiritual crisis five years ago. Since high school, Cordova had been a devout Christian, but as he studied science and engineering at George Mason, he found his faith was being eroded. "The critical thinking and precision of science began to really affect my ability to just believe something without any tangible evidence," he says. The breaking point came in 2000 when a woman from his Bible study group put her faith before her personal safety — travelling to Afghanistan as part of a covert Christian mission in a country that was, at the time, a militant Islamic theocracy. He felt unhappy accepting the promotion of such activities unless he could be sure Christianity was a true faith.

Scientific vacuum

So Cordova turned to his scientific training in the hope of finding answers. "If I could prove even one small part of my faith through purely scientific methods that would be highly satisfying intellectually," he says. He has since read a stack of books on cosmology and intelligent design, and has become a major advocate for the movement — representing the idea at public debates, challenging evolutionary theory in online chats and starting clubs at George Mason and several other Virginia colleges.

Cordova's story is more common than many scientists might think, according to Keith Miller, a geologist at Kansas State University in Manhattan who is an evangelical Christian. "I think a lot of students go through a period of being very conflicted about their faith, especially if they have an innate interest in science," Miller says. He knows a number of students who have fallen away from their beliefs as a result of their university experience. "They've so identified their faith with a particular view of what creation means, that it becomes an all-or-nothing kind of thing," he says. "I do think intelligent design offers an alternative, although I would argue it's not a good one."

But university lecturers are rarely able to offer students other alternatives that allow them to reconcile faith and science. Part of the problem has to do with time constraints, says Larry Rockwood, a population ecologist at George Mason. "The pressure is to work with the graduate students, do your research and teach your classes," he says. "What's the reward for working with undergraduate student clubs? Not much."

More fundamentally, most lecturers are unsure of how to handle the concerns of

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Cast out from class

Caroline Crocker says that she hadn't meant to start a controversy when she mentioned intelligent design while teaching her second-year cell-biology course at George Mason University in Fairfax, Virginia, last semester. But many of her colleagues say that the soft-spoken molecular biologist, who received a PhD in immunopharmacology from the University of Southampton, UK, has gone too far. Sitting in an empty teaching lab, Crocker tells how she has been barred by her department from teaching both evolution and intelligent design. "It's an infringement of academic freedom," she says. She is appealing the case to a grievance committee.

Crocker is one of a handful of professors nationwide who are introducing intelligent design into college-level teaching. Some, like Crocker, try to work the idea into their biology classes, but increasingly, intelligent-design advocates are teaching their material outside the science curriculum in special seminars and one-time courses, says Barbara Forrest, a philosopher at Southeastern Louisiana University in Hammond.

Those efforts meet with a mixed response from faculty members and administrators on campus. Michael Behe, an intelligent-design advocate and biochemist at Lehigh University in Bethlehem, Pennsylvania, teaches an elective first-year seminar on 'popular arguments on evolution'. "The majority of my colleagues disagree with me," he says. "But my chairman supports my right to have my own views and argue them in a public setting."

In contrast, William Dembski, a mathematician at Baylor University in Texas and another prominent intelligent-design researcher, says that he is no longer allowed to teach on campus.

"Essentially I've had about a five-year sabbatical," he complains. Stories such as Dembski's make some intelligent-design supporters fearful of expressing their views in public. One researcher, approached by *Nature* for this article, declined to be interviewed because he did not yet have tenure.

Darwinists are divided over whether intelligent design deserves a classroom airing. Forrest says that she believes professors shouldn't be allowed to teach unsubstantiated scientific concepts to their students. "This is not a question of academic freedom, this is a question of professional competence," she says. But Eugenie Scott, director of the National Center for Science Education in Oakland, California, which vehemently opposes teaching intelligent design in high schools, takes a different view. She thinks such discussions are more acceptable in a college environment, but believes it must be made clear to students that intelligent design is theology, not science.

Crocker hopes that she will be allowed to continue talking to students about intelligent design. Her lectures drew criticism from some and praise from others — notably, she says, her Muslim students seemed to like it. She maintains that the talks help students to think independently about ideas such as evolution. "My goal is to teach students to think for themselves," she says.

Whether and in what form her intelligent-design teachings will continue is now up to faculty members and administrators. "The university doesn't have a policy or a rule on whether certain topics should be discussed," says Daniele Struppa, a mathematician and dean of the College of Arts and Sciences at George Mason University. But, he adds, he questions whether a concept with theological underpinnings really belongs in a science course. "I'm a Buddhist," he says. "But I don't think we should teach reincarnation in biology classes."

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REASONS

D. MURPHY

Darwinist Eugenie Scott (above) rejects intelligent design on scientific grounds whereas Lutheran George Murphy rejects it for theological reasons.

deeply religious students, says Jo Handelsman, a plant pathologist at the University of Wisconsin at Madison. "When I talk to these students individually I don't feel it's my place to replace what their families or churches have taught them," she says. "There's a lot of confusion about where the line is, and how much it's OK to offend your students."

Scott, who is perhaps the nation's most high-profile Darwinist, is frustrated by the scientific community's inability to grapple with the issue. "The point here is that Americans don't want to be told that God had nothing to do with it," she says. "And that's the way the intelligent-design people present evolution." Scientists need to do a better job of explaining that science makes no attempt to describe the supernatural and so has no inherent conflict with religion, she argues. "College professors need to be very aware of how they talk about things such as purpose, chance, cause and design," she says. "You should still be sensitive to the kids in your class."

Back at George Mason, Cordova is wrapping up his lecture, and planning his next steps for promoting intelligent design on campus. According to a survey he commissioned from the Campus Freethinkers — an atheist student group — 75% of students would be interested in taking a course on intelligent design if it were offered. Cordova says he hopes the poll will help convince college administrators to offer such a course. "I would love to see an intelligent-design class on one of these campuses," he says. "I don't want to indoctrinate the students; I would just like them to get to know the theory."

As for his personal future, Cordova adds that he would like to continue pursuing a career in science. Next year, he plans to apply to study cosmology at graduate school. ■

Geoff Brumfiel is *Nature*'s Washington physical sciences correspondent.

Natural divisions

From the very beginning, the purpose of Intelligent Design and Evolution Awareness (IDEA) clubs has been to facilitate debate, says Casey Luskin, who founded the first IDEA club (see picture, below) at the University of California, San Diego, in 1999.

"We want to inform everyone about all sides of the issue, so we actually invite Darwinists to the clubs to talk about natural selection," says Luskin, who now runs the IDEA Center, a small non-profit organization in San Diego that helps set up new groups on US campuses.

Evolution advocates say that researchers should be careful about how they respond to such overtures. If the request is for a public debate with an intelligent-design advocate, the best answer is 'no', argues Robert Pennock, a philosopher of science at Michigan State University in East Lansing. "A public debate is an artificial setting for getting into scientific issues," he says. "There's no way in that format to thoroughly give a scientific response, especially to a lay audience."

"A formal debate is not how we do science," agrees Eugenie Scott, director of the National Center for Science Education in Oakland, California. "But I think it's appropriate for scientists to meet with students and educate them about what the real science is saying."

That's what Victor Hutchison and his colleagues in the zoology department at the University of Oklahoma in Norman have been doing for the past few years. "We will not agree to debate the creationists publicly," he says. "But we encourage faculty members and graduate students to attend their meetings and challenge them in the discussion."

And intelligent-design supporters on campus are tolerant, more or less, of the scientists' presence. "When people remain civil, the questions that scientists ask can be illuminating," says Russell Hunter, a senior philosophy major and head of the IDEA chapter at Oklahoma. But, he adds, when scientists become too confrontational, it can have the opposite effect. "When somebody comes and gets into a yelling match, it just reinforces the beliefs of members who see the opposition as part of a political movement to make sure religion doesn't gain any ground in America," he says.

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