

When science meets religion in the classroom

SIR – In the Editorial “Dealing with design” (*Nature* 434, 1053; 2005), *Nature* claims that scientists have not dealt effectively with the threat to evolutionary biology posed by ‘intelligent design’ (ID) creationism. Rather than ignoring, dismissing or attacking ID, scientists should, the editors suggest, learn how religious people can come to terms with science, and teach these methods of accommodation in the classroom. The goal of science education should thus be “to point to options other than ID for reconciling science and belief”. In this way, students’ faith will not be challenged by scientific truth, and evolution will triumph.

This suggestion is misguided: the science classroom is the wrong place to teach students how to reconcile science and religion. For one thing, many scientists deem

such a reconciliation impossible because faith and science are two mutually exclusive ways of looking at the world. For such scientists, *Nature* apparently prescribes hypocrisy. The real business of science teachers is to teach science, not to help students shore up world-views that crumble when they learn science. And ID creationism is not science, despite the editors’ suggestion that ID “tries to use scientific methods to find evidence of God in nature”. Rather, advocates of ID pretend to use scientific methods to support their religious preconceptions. It has no more place in the biology classroom than geocentrism has in the astronomy curriculum.

Scientists are of course free (some would say duty-bound) to fight ID outside the classroom, or to harmonize religion with science. But students who cannot handle

scientific challenges to their faith should seek guidance from a theologian, not a scientist. Scientists should never have to apologize for teaching science.

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Teaching about ID helps students see its flaws

SIR – I have regularly taught seminars for university biology majors, which compare the scientific claims of evolution and ID. In doing so, I am not advocating the scientific merits of ID, as discussed in your News Feature “Who has designs on your students’ minds?” (*Nature* 434, 1062–1065; 2005). I view these seminars as analogous to media literacy courses. To understand why 80% of Fox News viewers had misperceptions about Iraq, such as believing that weapons of mass destruction had been discovered there (see www.pipa.org), media students need to learn how Fox News operates. Such a media literacy course does not necessarily vouch for the veracity of any particular Fox show.

My interest in ID was sparked in 1999 by a local high-school teacher who used ID materials in a biology course. Parents and citizens successfully defended the teaching of mainstream science against proponents of ID, in this case the Discovery Institute (see www.scienceormyth.org). This taught me how effective pro-evolution groups are when they work with the school administration, and are supported by faculty from local colleges and universities. But to be effective in its support, the scientific community needs to understand the empirical claims of ID.

Although it seems to have been resurrected for religious or cultural agendas, ID’s proponents have made empirical claims that can be examined. Many college students are curious about ID but have little knowledge of the claims made for it. In my experience, upper-level biology students with the appropriate background in molecular biology, genetics, developmental biology and evolution are capable of distinguishing

the scientific merits of evolutionist and ID claims — to the great disadvantage of ID.

Students who themselves determine that ID does not cut the scientific mustard will be more effective in their support of teaching mainstream science. Students who remain creationists or fence-sitters will at least have a better understanding of why ID has not been widely accepted in the scientific community.

It may seem contradictory to offer a course on ID and evolution in colleges and oppose teaching ID in high schools. But high-school students are just learning the basics of science. To expect them to make a well-reasoned judgement about the status of any scientific theory, including evolution, is unrealistic.

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Evolution is a short-order cook, not a watchmaker

SIR – The visual shock of last week’s ‘intelligent design’ cover was matched by the perceptiveness of your News Feature (*Nature* 434, 1062–1065; 2005) on the seepage of this sly religious ideology into science curricula. This stuff should certainly be kept out of high schools, but I am ambivalent about its presence in our universities, where free discussion is of greater value than correctness — political, scientific or otherwise.

On the other hand, I’d be properly rebuked and sanctioned for incompetence if I were to assert in my undergraduate physical-chemistry course that the intricate, precisely exponential distribution of velocities observed in a collection of gas molecules is simply too perfect and beautiful to have arisen from random collisions, but that we

should instead consider a mechanism by which intelligent designers — let’s call them “Maxwell’s angels” — individually push on each molecule, while keeping in intelligent communication with each other to maintain this distribution.

One reason that scientists famously fail in rebutting ID is that we use the wrong analogies. Evolution is not a blind watchmaker or any other kind of engineer, but rather a short-order cook, and — looking at the phenomenally complicated structures — one who is less like Isaac Newton than Rube Goldberg or W. Heath Robinson.

A terrific argument against ID came to me recently after two consecutive talks, one on the Wnt signalling pathway, the next on G-protein crosstalk in control of cellular calcium. Just look at the details, and you’ll immediately abandon all thoughts that biological systems were designed with any intelligence whatsoever.

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Seeking evidence of God’s work undermines faith

SIR – Your Editorial about the promotion of ID in schools and universities (*Nature* 434, 1053; 2005) asks us to persuade our students that science and faith do not compete, but for Christians this should always have been clear. In the Bible (John 20: 25–29), Thomas doubts that the man speaking to him is the resurrected Christ until Jesus reveals his wounds. Thomas then believes, but Jesus says: “Blessed are those who have not seen and yet have believed”.

The Bible throughout teaches that faith is

more valuable when expressed in the absence of evidence. For a Christian, when science is allowed to be neutral on the subject of God, science can only bolster faith. In contrast, and I imagine without realizing it, ID proponents have become professional Doubting Thomases, funded by Doubting Thomas Institutes. When advocates of ID use the vocabulary of science to argue for God's presence in cellular machinery or in the fossil record, they too poke their fingers through Jesus' hands. In so doing, ID vitiates faith.

Not realizing this, many Christians now believe they are making a stand against evil by supporting religion-infused alternatives to evolution. For them, the fundamental debate is not over which is wrong and which is right, but over which is good and which is bad, and the majority opinion is clear. So if we want to ensure the continued learning of evolution in our schools, we cannot only argue that science and faith can be reconciled; we also have to show that ID actively undermines the basis of Christianity.

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Leave well alone and stick to teaching what you know

SIR – Your Editorial “Dealing with design” (*Nature* 434, 1053; 2005) is another piece of evidence of the peculiar angst among certain scientists about the ID strategy of a rather robust fraction of the US population. On the basis of some decades of work in this area, I do not believe that your advice to those who feel so threatened is wise, for two reasons.

There are some very skilled experts on the topic of how to deal with different cultures or belief systems. Their advice, from experience, would be: leave well alone. Act like a scientist, confident in your own — always tentative, always open to change — axioms and laws. Read the literature, for God's (or Darwin's) sake. It will prove to you that even graduates of MIT and Harvard do not know simple scientific facts that are irrelevant to their work, such as why the Earth experiences winter and summer, despite having been explicitly taught such facts several times during their education. This amazing ignorance does not affect their performance as scientists. I do not know a single materials scientist or engineer whose technical work would be affected by their beliefs about evolution/ID. My advice: relax. It can do very little harm. Ham-fisted efforts will simply alienate much larger numbers of people from the rest of science.

As to the suggestion that scientists should “offer some constructive thoughts of their own”: beware of the ignorance, nay illiteracy,

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of many scientists on matters of social and political concern. I recommend Huston Smith's book *Why Religion Matters* (HarperSanFrancisco, 2002) for advice on how to handle the ID debate.

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Intelligent design or intellectual laziness?

SIR – Much of the concern over ID (*Nature* 434, 1053 and 1062–1065; 2005) has focused on veiled attempts to inject religion into public education. Sheltered within the confines of academia, most biologists find it hard to believe that the slain need to be slain again. Those in the trenches — school boards, school biology teachers and their national representatives — often don't know how to respond, in part because they themselves never really achieved a deep understanding of evolutionary biology at college.

However, there is a related and equally disturbing issue: the legitimization of intellectual laziness. Have a problem explaining something? Forget about it: the Designer made it that way. Any place for diversity of opinion as to who/what the Designer is/was? The ID literature makes it very clear that there is no room for scientific discourse on that. Think I'm exaggerating? To get a good idea of what IDers would have the face of science look like, check out the journal *Perspectives on Science and Christian Faith* (www.asa3.org/ASA/PSCF.html).

Two factors have facilitated the promotion of ID. First, IDers like to portray evolution as being built entirely on an edifice of darwinian natural selection. This caricature of evolutionary biology is not too surprising. Most molecular, cell and developmental biologists subscribe to the same creed, as do many popular science writers. However, it has long been known that purely selective arguments are inadequate to explain many aspects of biological diversity. Building a straw man based on natural selection alone makes it easy for opponents to poke holes in evolution. But features of the genome, such as genomic parasites or non-coding introns, which aren't so evolutionarily favourable (nor obviously 'intelligent' innovations), can be more readily explained by models that include random genetic drift and mutation as substantial evolutionary forces.

Second, IDers like to portray evolution as

a mere theory. But after a century of close scrutiny, evolutionary theory has passed so many litmus tests of validation that evolution is as much a fact as respiration and digestion.

Less widely appreciated is that evolution has long been the most quantitative field of biology, well grounded in the general principles of transmission genetics. Yet few students at university, and almost none at high school, are exposed to the mathematical underpinnings of evolutionary theory. The teaching of evolution purely as history, with little consideration given to the underlying mechanisms, reinforces the false view that evolution is one of the softer areas of science.

Here is a missed opportunity. Our failure to provide students with the mathematical skills necessary to compete in a technical world is a major concern in the United States. Mathematics becomes more digestible, and even attractive, when students see its immediate application. What better place to start than with the population-genetic theory of evolution, much of which is couched in algebraic terms accessible to school students?

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Solidarity with the oppressed flat-Earthers

SIR – I was disturbed by your News Feature “Who has designs on your students' minds?” (*Nature* 434, 1062–1065; 2005), in which the proponents of ID are mostly portrayed as a persecuted minority. They are said to be afraid to reveal their identity and to be frequently censored into silence by anti-democratic scientists and administrators.

Your reporter clearly does not realize that ‘intelligent designers’ are not the only minority bullied into submission by the scientific establishment. The vast majority of flat-Earthers, tea-leaf readers, astrologers, geocentrists and phlogiston theorists cannot publish their studies in respectable journals. It is rumoured that *Nature* has rejected without review a study showing that storks bring babies into the world. I have even heard of a physician who was fired from a university hospital for trying to cure his patients by altering the ratio of blood to yellow bile and phlegm to black bile.

Thanks to your News Feature, I am now convinced that by replacing “small, medium and large” with “tall, grande and venti” — as in my local coffee-shop — the disreputable theory of biblical creationism can be turned into a respectable scientific discipline called ‘intelligent design’.

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