

A sceptic's guide to intelligent design

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ADVOCATES of intelligent design argue that it deserves to be taken seriously as a rigorous scientific alternative to evolution by natural selection. But just what is it, and is it science at all?

Intelligent design (ID) is more sophisticated than its predecessor, "creation science", which sought to gather scientific evidence in support of the Christian creation story. By starting from a pre-conceived conclusion and selectively using evidence to back it up, creation science was clearly unscientific.

ID is different. Its supporters argue that we can use science to find evidence of a designer's handiwork in nature, while claiming to be agnostic about exactly who the designer is. "Often people think the designer is the Big Guy in the Sky. But it doesn't have to be that at all," says William Dembski, a mathematician, philosopher and leading ID proponent affiliated with the Discovery Institute, a creationist think tank in Seattle. He describes ID as a scientific programme that leads to an understanding of a generic supernatural intelligence.

Like many creation scientists ID advocates are happy to accept a small role for natural selection, for example, in the evolution of antibiotic resistance. Unlike creation scientists, many of them are also willing to accept that all organisms came from a common ancestor. But that's where advocates of ID and

"Predicting that we should find evidence of a designer is merely a catch-all for what natural selection has yet to explain"

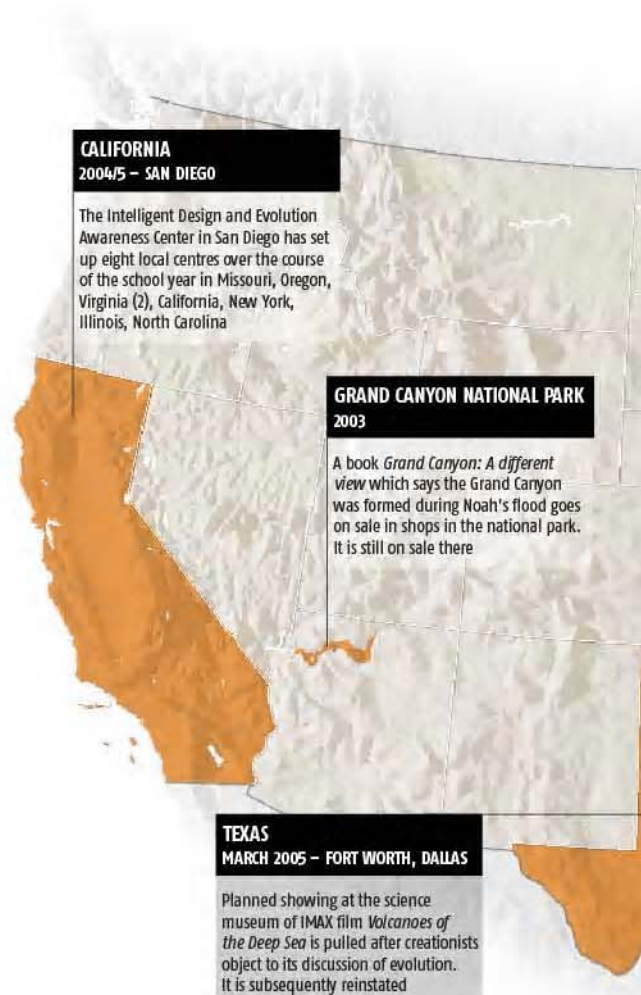
Darwinism part company.

The difference, says Michael Behe, a biochemist at Lehigh University in Bethlehem, Pennsylvania, and a leading proponent of ID, "is that Darwinism postulates random mutations and natural selection for essentially all aspects of life. ID says that at least some parts of life did not happen randomly but through purposeful design." Nevertheless, the arguments for the inadequacy of Darwinian evolution are nearly identical to those used unsuccessfully by traditional creationists.

Their case centres on the question of how complex structures originated. Living things are full of multi-component structures that only function if all their parts are present. The bacterial flagellum, a spinning whip-like tail, for example, is made up of 40 or more proteins; blood clotting involves the coordinated interaction of 10 different proteins.

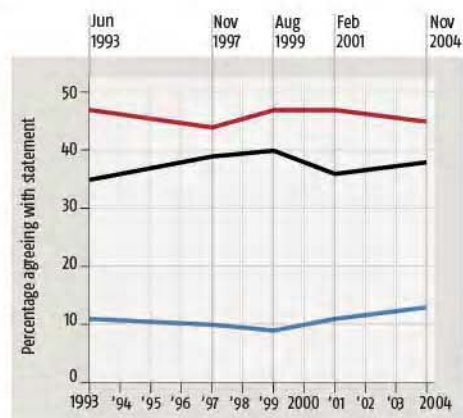
These systems are examples of what Behe calls "irreducible complexity", meaning that they cannot function properly without all their components. Such systems, he says, could not evolve by the accumulation of chance mutations, since partial assemblies are useless.

Dembski argues that the odds against getting complex structures from chance mutations are insurmountable. For two proteins to interact to perform some new function, for example, their shapes would have to fit together. So in principle, he says, we can calculate the probability that one protein could change by chance to fit perfectly with another. Two such studies have been done. In both cases, Dembski claims the odds were so long as



VIEWS ON EVOLUTION IN THE US

- God created human beings pretty much in their present form at one time within the last 10,000 years or so
- Human beings have developed over millions of years from less advanced forms of life, but God guided that process
- Human beings have developed over millions of years from less advanced forms of life, and God had no part in this process



NEW YORK
MAY 2005

Assembly bill introduced that would demand both intelligent design and evolution be taught. It eventually died at committee stage

KANSAS
AUGUST 2005 – TOPEKA

State school board is expected to revise school standards to accommodate ID supporters, including redefining science as accepting "adequate" and not just "natural" explanations

KANSAS
MAY 2005 – TOPEKA

Kansas education board hearings on evolution and ID branded a show trial by scientists

PENNSYLVANIA
JANUARY 2005 – DOVER

ID textbooks introduced into secondary schools

JUNE 2005

Pennsylvania House of Representatives subcommittee on basic education holds hearings on a bill to allow school boards to include intelligent-design teaching alongside evolution

WASHINGTON DC
JUNE 2005

Smithsonian Institution shows creationist film. It blames the incident on an administrative mistake

OKLAHOMA
JUNE 2005 – TULSA

Tulsa Zoo displays a biblical account of creation

VIRGINIA
MARCH 2005 – ARLINGTON

The National Science Teachers Association releases a national survey of more than 1000 teachers. 30% said they felt pressure to omit or downplay evolution in class, mostly from parents and pupils

GEORGIA
JANUARY 2005 – ATLANTA

Bill introduced in the Georgia House of Representatives which states that whenever evolution is taught "factual scientific evidence inconsistent with or not supporting the theory shall be included in the course of study"

SOUTH CAROLINA
JUNE 2005

Bill introduced into the South Carolina Senate that would emphasise the controversy over evolution

"Most advocates of intelligent design are professed Christians, yet avoid spelling out the kind of designer they have in mind"

pathogenic bacteria use to inject toxins into their host's cells. Similarly, jawless fish accomplish blood clotting with just six proteins instead of the full 10.

So while it is true that no biologist has worked out the precise series of events that resulted in a flagellum, that in itself is not a refutation of natural selection, says Miller. It has long been argued that natural selection works by adapting pre-existing systems for new roles. The evidence so far points to exactly this process for the flagellum.

Crucially, ID does not make testable predictions. Its prediction that we should find evidence of a designer is actually nothing of the kind, say scientists: rather, it is a catch-all that takes up anything that natural selection cannot – so far, at least – explain. Dembski admits as much in his 2004 book *The Design Revolution*: "To require of ID that it predict specific novel instances of design in nature is to put design in the same boat as natural laws, locating their explanatory power in an extrapolation from past experience."

Though almost all ID advocates are professed Christians, they avoid spelling out exactly what kind of designer they have in mind. "The reason is they think the designer is God, and if they mention God then the jig is up," says Nick Matzke, a spokesman for the National Center for Science Education (NCSE), a pro-evolution organisation based in Oakland, California. This helps ID's supporters argue that it is not subject to the ban on teaching creationism in science classes, he says. But being vague about how the designer is supposed to operate also makes ID impossible to test.

And this is the nub of it. A scientific theory must be falsifiable in principle; it must

to rule out an explanation based on chance events.

But these calculations are logically flawed because they focus on a single, specified outcome, says Kenneth Miller, a cell biologist at Brown University in Providence, Rhode Island, a leading critic of ID. "It's what statisticians call a retrospective fallacy." It is like equating the odds of drawing two pairs in poker with the odds of drawing a particular two-pair hand – say a pair of red queens, a pair of black 10s and the ace of clubs. "By demanding a particular outcome, as opposed to a functional outcome, you stack

the odds," Miller says. What these calculations fail to recognise is that many different protein sequences can be functional. It is not uncommon for proteins in different species to vary by 80 to 90 per cent, yet still perform the same function.

The "improbability argument" also misrepresents natural selection. It is correct to say that a set of simultaneous mutations that form a complex protein structure is so unlikely as to be unfeasible, but that is not what Darwin advocated. His explanation is based on small accumulated changes that take

place without a final goal. Each step must be advantageous in its own right, although biologists may not yet understand the reason behind all of them.

There is also evidence that "irreducible complexity" is an illusion. Take, for example, the bacterial flagellum with its 40 proteins. One species, the stomach bacterium *Helicobacter pylori*, has a flagellum with just 33 proteins – "irreducibility" reduced. More tellingly, a subset of flagellar proteins turns out to serve an entirely different function, forming a mechanism called the type III secretory system, which

be possible to imagine evidence that would knock it down. This is not the case for ID. So even if proponents of ID were persuaded that, say, the bacterial flagellum was indeed the product of natural selection, that would not send them packing. ID says that we should be able to find evidence of design in nature, not that every structure has been designed. So ID proponents could simply concede that natural selection operated there, and then shift their ground to another molecular structure.

ID's appeal to supernatural forces by definition puts it outside the scope of science, says Eugenie Scott head of the NCSE. After all, saying "God did it" can never be disproved.

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And that's the point. Underlying the ID agenda is a challenge to the basis of scientific method. The infamous *Wedge Strategy*, written in 1999 by fellows at the Discovery Institute, bemoans the "devastating" cultural consequences of scientific materialism. It also details a 20-year plan to defeat it "and its destructive moral, cultural and political legacies". The strategy aims "to replace materialistic explanations with the theistic understanding that nature and human beings are created by God".

In response to the controversy that followed the document's release on the internet, the Discovery Institute says the *Wedge Strategy* is merely a "fund-raising document", and should not be portrayed as some kind of sinister master plan. "We are challenging the philosophy of scientific materialism, not science itself," it states. But far from just redefining science, most scientists would argue that introducing the supernatural will destroy it. ●

www.newscientist.com/channel/life/evolution

Survival of the slickest

Scientists must use different tactics to argue against intelligent design, says director of the Center for Education and Research in Cosmology and Astrophysics at Case Western Reserve University, **Lawrence Krauss**

SCIENCE only functions with the presumption of honesty. It flounders when confronted by those who knowingly and willingly distort the truth. But this is exactly what faces scientists as we attempt to defend science in high-school classrooms against intelligent design (ID).

When I first took up the defence of science in my home state of Ohio, I presumed that those attacking evolution were well-meaning, but scientifically misguided. But my experience in March 2002 at a "debate" on evolution versus ID, sponsored by the state's school board in Columbus, changed all that. During the debate it became clear that I was competing with a well-organised marketing machine. These intelligent individuals were willing to tailor their message, even if it meant hiding their true motivations.

In the interests of fair play, they say, public schools should "teach the controversy" over Darwinian evolution. This phrase has become the mantra of the ID movement.

It is a brilliant manoeuvre, because it implies that there *is* a scientific controversy. In this sense the ID movement has already won the PR battle. Most Americans believe that Darwinian evolution is controversial – more so than relativity or quantum mechanics, say. By contrast, ID is neither well-defined nor debated in the scientific literature.

Who could disagree with fairness and open-mindedness? These qualities are vital to education and science. But this is not really the ID movement's aim. One of my debating opponents was Jonathan Wells, a fellow of the Discovery Institute, a creationist think tank in Seattle, who has a PhD in biology. He claimed his attacks on evolution follow from his years of studying biology. But in an essay entitled "Darwinism: Why I went for my second PhD", he says that as a follower of the Unification Church's founder, Reverend Sun Myung Moon, he was given a mission to undermine Darwinism. Only then did he decide a degree in biology

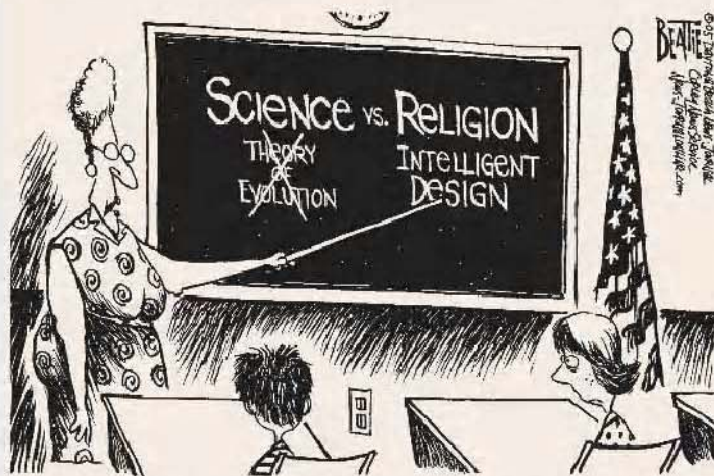
would boost his credentials.

At a recent debate, Stephen Meyer, also at the Discovery Institute and my other debating opponent in Ohio, indicated that one of the reasons why humans and chimpanzees cannot share a common ancestor is that humans have immortal souls and chimps do not. Comments such as these underscore the theological rather than scientific nature of the Discovery Institute's attacks on evolution. They also suggest that these attacks are based on *a priori* religious beliefs, and not on an unbiased analysis of the data.

In fact, the "fairness" argument is itself disingenuous. Scientific ideas that have become sufficiently mainstream to be taught in high school have survived a gauntlet of stringent tests. The first takes place when proposals are published in peer-reviewed journals, often resulting in severe criticisms that must be addressed. After publication, the proposals must be compelling enough to prompt exploration by other researchers. If they survive perhaps 20 years of testing against evidence, they may make it into high-school texts. ID proponents wish to bypass these messy steps and go directly into classrooms. Key aspects of other theories such as relativity and quantum mechanics remain hotly debated in the literature, yet there is no call to "teach the controversy".

So having lost the PR battle, how can scientists hope to win the war over educating young people? Scientists must learn that fighting lobbyists is not the same as debating scientific ideas in journals. In science, incorrect ideas will ultimately be weeded out. But in a society in which marketing is king, the scientific community will have to learn to use the weapons of sound bites and emotional arguments. In short, we must deploy all the tools that are used to sell cars, diet drugs and intelligent design.

Lawrence Krauss's book, *Hiding in the Mirror: The mysterious allure of extra dimensions from Plato to string theory and beyond*, appears in October



"While we're at it... does the Earth REALLY travel around the sun?"