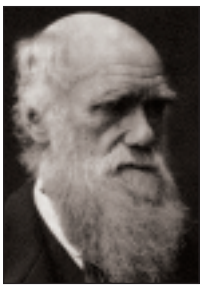
The Little Engine That Could... Undo Darwinism

What critics of Intelligent Design theory can't accept is that its proponents are making scientific, fact-based arguments.

IMAGINE A NANOTECHNOLOGY MACHINE far beyond the state of the art: a microminiaturized rotary motor and propeller system that drives a tiny vessel through liquid. The engine and drive mechanism are composed of 40 parts, including a rotor, stator, driveshaft, bushings, universal joint, and flexible propeller. The engine is powered by a flow of ions, can rotate at up to 100,000 rpm (ten times faster than a NASCAR racing engine), and can reverse direction in a quarter of a rotation. The system comes with an automatic feedback control mechanism. The engine itself is about 1/100,000th of an inch wide—far smaller than can be seen by the human eye.

Most of us would be pleasantly surprised to learn that some genius had designed such an engineering triumph. What might come as a greater surprise is that there is a dominant faction in the scientific community that is prepared to defend, at all costs, the assertion that this marvelous device could not possibly have

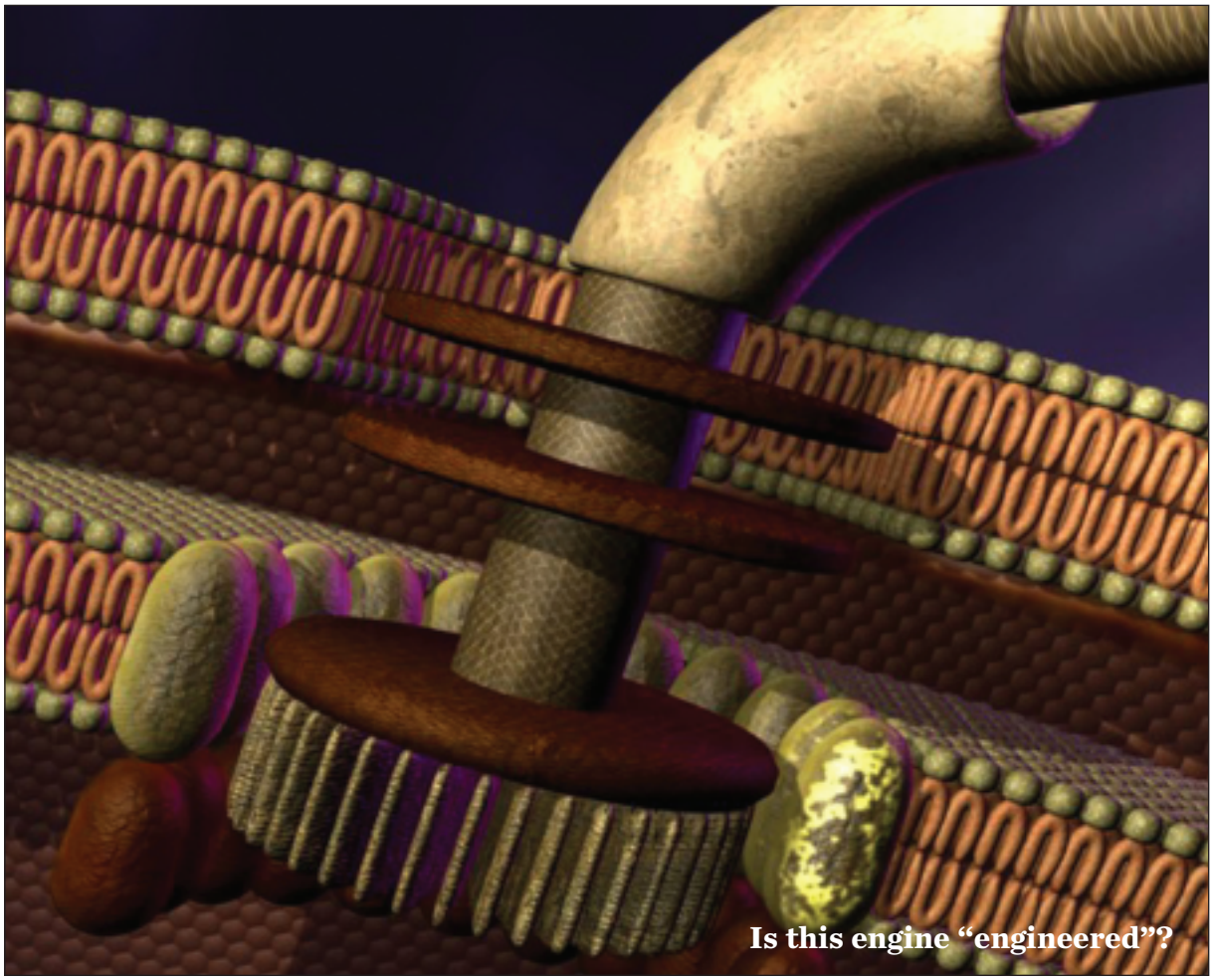


been designed, must have been produced blindly by unintelligent material forces, and only gives the appearance—we said *appearance!*—of being designed.

As you may have guessed, these astonishingly complex, tiny, and efficient engines exist. Millions of them exist inside you, in fact. They are true rotary motors that drive the "bacterial flagellum," a whip-like propulsion device for certain bacteria, including the famous *E. coli* that lives in your digestive system.

Oddly enough, this intricate high-speed motor is at the center of a controversy that has been kindling in scientific circles for a decade, and is now igniting hot debate outside those circles. That's because, even more oddly, the implications of whether this little engine was designed are incalcu-

BY DAN PETERSON



Is this engine "engineered"?

lably profound. They involve questions such as: What constitutes science? Did living things "just happen" by natural causes or were they designed by an intelligence? And what follows from those two competing alternatives—in morality, education, culture, and science itself?

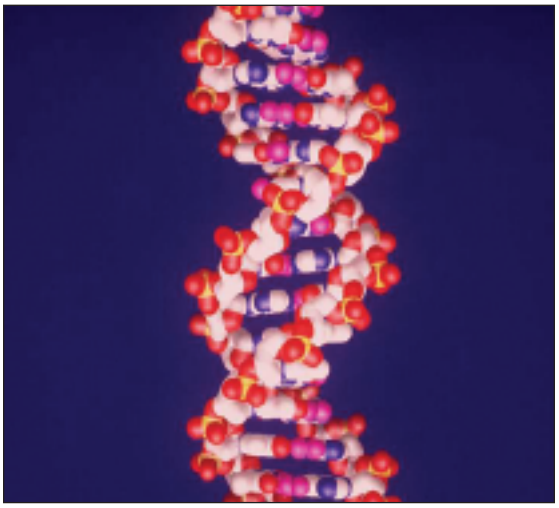
THE CONTROVERSY STEMS from the work of a growing cadre of scientists, mathematicians, and scholars in the field of "intelligent design," or ID for short. In the life sciences, the proponents of intelligent design are challenging the reigning orthodoxy that life developed entirely by the blind operation of natural forces. Their arguments are essentially of two kinds.

First, building on recent discoveries in cell biology, molecular genetics, and other disciplines, they contend that life, and the complex processes by which cells do their work, cannot have been produced by that combination of chance and necessity known as Darwinian evolution. Second, using the analytical techniques of information theory, they contend that the kind of information embodied in things that are designed can only be produced by an intelligent agent, not by undirected material causes. Design, they say, is empirically detectable—and it is detectable, in fact, in living things. (Some of the ID proponents have demonstrated that the physical laws of the universe also show overwhelming evidence of being designed. For reasons of space rather than interest, I can only discuss here the work that ID is doing in the biological sciences.)

Of course, if the hypothesis that the universe and life are designed is true, the ready inference is that this designer has to be an incomprehensibly potent and awesome Intelligent Agent. A lot of influential people in science, the media, the schools, and other institutions don't much like the notion of the Big Intelligent Agent. Hence the controversy over ID, and the slanted treatment of it that is often seen.

Among certain sectors of the media, for example, it's an article of faith that those who believe in God, or

advocate principles supporting that belief, are just a mob of Bible-thumping, knuckle-dragging, Scripture-spouting, hellfire and brimstone-preaching, right-wing, gun-toting, bigoted, homophobic, moralistic, paternalistic, polyester-wearing, mascara-smeared, false-eyelashed, SUV-driving, Wal-Mart shopping, big hair, big gut, fat butt, holy-rolling, snake-handling, Limbaugh-listening, Bambi-shooting, trailer-park-dwelling, uneducated, ignorant, backwater, hayseed, hick, inbred, pinhead rubes—mostly from the South, or places no better than the South—who voted for Bush.



So, many of the news stories refer to intelligent design theory as "creationism" and ignore the science behind it. They imply that ID is just religion in disguise: "Creationism in a cheap tuxedo," as one headline put it.

Let's look at the science, then, because the truth about the intelligent design school could not be more different from those stereotypes. The proponents of ID base their arguments on biological and physical data generally accepted in science. They use the same kinds of analytical methods and mathematical tools as other scientists. The ID theorists do not reason from religious premises. Neither do they attempt to prove the truth of Scripture, or of any particular religious views. As a rule, they do not contest that life on Earth is billions of years old, or that evolution has occurred in the sense of "change over time" in biological forms.

What they do contest is that undirected material causes alone can explain life's origin and development. Instead, they argue that design is the best *scientific* explanation for the stunning complexity of the cellular processes that underlie life, and for the evidence of how life actually developed. That conclusion, if true, certainly has religious implications. But, as will become evident, the reasoning and methods used by the ID proponents are fact-based and scientific.

BEFORE GETTING TO THE SCIENCE, though, let's take a moment to see who the ID proponents are. Many of the prominent ID theorists are affiliated with the Center for Science and Culture (CSC) at the Seattle-based Discovery Institute (most of them hold day jobs, too). Some background on the individuals whose work is mentioned in this article may be helpful in deciding if the ID movement is really just a confederacy of dunces allied against the enlightened.

The most prolific of the ID proponents is William Dembski. A bespectacled, youthful-looking man, Dembski has a Ph.D. in mathematics from the University of Chicago, a Ph.D. in philosophy from the University of Illinois, and a Master of Divinity from Princeton Theological Seminary. He has done post-doctoral work in mathematics at MIT, in physics at the University of Chicago, and in computer science at Princeton, as well as being a National Science Foundation doctoral and postdoctoral fellow. He is the leading thinker in applying information theory in the field of intelligent design, and has written or edited ten books.

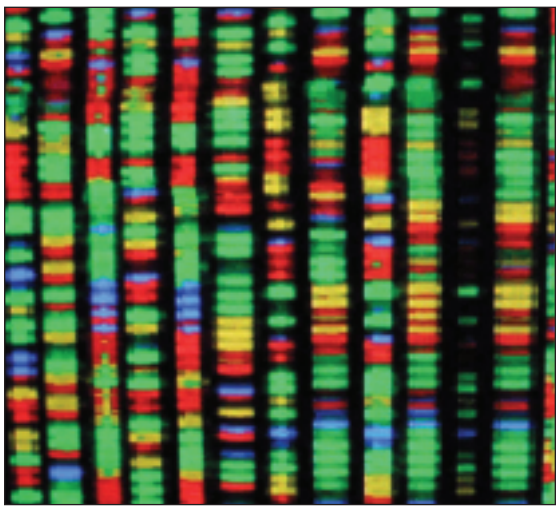
Michael Behe, who popularized the flagellar motor as an example of intelligent design, is a professor of biochemistry at Lehigh University in Pennsylvania, with more than 35 articles in refereed scientific journals (and many popular works) to his credit. Stephen Meyer, director of the Discovery Institute's CSC, has undergraduate degrees in physics and geology, and a Ph.D. in the history and philosophy of science from Cambridge University in England for his dissertation on the history of origin of life biology.

Jonathan Wells holds a Ph.D. in molecular and cell biology from the University of California at Berkeley, and another Ph.D. in religious studies from Yale University. He got double 800s on his SATs. Phillip Johnson, whose advocacy will be mentioned in a moment, is professor of law at the University of California-Berkeley. He graduated first in his law school class at the University of Chicago Law School, clerked for Chief Justice Earl Warren on the United States Supreme Court, and published scores of articles and several books during his career.

Highly educated journalists may be forgiven for looking down their noses at hopeless dummies like these. To the rest of us, their credentials may suggest that they could be fairly intelligent men, whose arguments may be worth considering. In fact, they and others like them have put the Darwinist establishment on the defensive in the battle of ideas.

INDEX STOCK IMAGERY/JACOB HALASKA

THERE IS GOOD REASON FOR THAT, when you think about it. Throughout most of the history of Western civilization, the fact that life was designed by God was beyond any serious dispute. Genesis told the story of how God created the heavens, earth, and life. The complexity, beauty, and order we see in life and the cosmos was confirming evidence of his hand at work, and a reflection of his glory. There was no other plausible, competing explanation of how life could be so perfectly designed to fit the environment, and how the environment could be so perfect for life. But in the mid-19th century, Darwin changed all that.



Darwin posited that a purely materialist account, dispensing with God, could explain the origin of species. His central mechanism was natural selection acting on random variation. When variations in living things naturally occurred by chance, those variations that were harmful to the organism's survival would be ruthlessly weeded out. Variations that were conducive to survival or reproduction, however, would gradually come to prevail. The organisms that possessed them would, over time, outcompete those with less adaptive characteristics. This purely naturalistic mechanism—wholly devoid of any foresight, design, or purpose—could, in Darwin's view, explain the development of life and why different species were apparently so well designed for their environment.

Darwin thus provided a "creation story" for a naturalistic or materialistic view of the world. Richard Dawkins—Oxford zoologist, militant atheist, and leading exponent of materialistic Darwinism—has declared that "although atheism might have been *logically* tenable before Darwin, Darwin made it possible to be an intellectually fulfilled atheist." But if atheistic materialism is true, life on Earth by definition cannot have been designed by an intelligence (except perhaps by space aliens, whose own design would remain unexplained). Dawkins therefore asserts that "biology is the study of complicated things that give the *appearance* of having been designed for a purpose." He refers to living beings as "designoid" objects. "Designoid objects look designed," Dawkins contends, "so much so that some people—probably, alas, most people—think they are designed. These people are wrong."

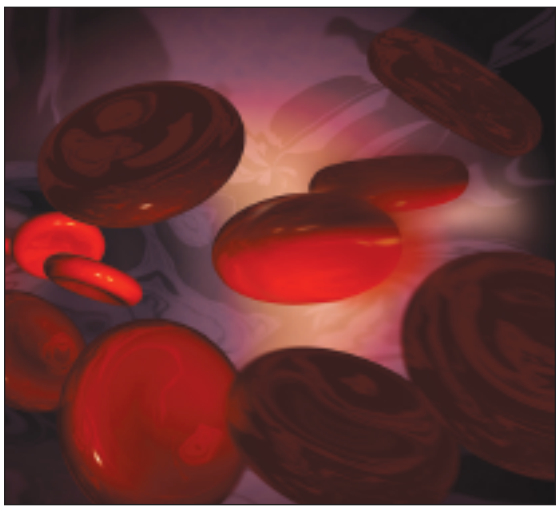
Dawkins' view that we, and all life forms, are only apparently designed has been the emphatically enforced orthodoxy among biologists since not long after Darwin. But, as it turns out, increasing knowledge over the past few decades about the immensely complicated processes and structures within the cell, the operation of DNA, the fossil record of the development of species, and other pertinent evidence has not confirmed Darwinism, but radically undermined it.

Enter the intelligent design theorists. Severe difficulties with the Darwinian theory were becoming increasingly obvious by the 1980s, and some scientists began to state openly that design should be considered as an alternative theory. Then in 1991 Phillip Johnson (the Berkeley law professor mentioned above) published a powerful critique of Darwinism entitled *Darwin on Trial*. In that volume Johnson marshaled the extensive scientific evidence against Darwinism. More importantly, he showed that Darwinism has essentially become a faith in naturalism that is immune to refutation by any set of facts. Arguments or conclusions that are not Darwinian are automatically ruled out of bounds by the scientific establishment. Within the Darwinian fold, wild conjectures, surmises unsupported by facts, and arguments lacking in explanatory power are accepted as legitimate, so long as they permit a "naturalistic" explanation.

Johnson also had the temerity to point out that many of the "classic" examples of Darwinian evolution, including those often presented in textbooks, were either distorted or outright fakes. ID proponent Jonathan Wells later took up this theme in his book *Icons of Evolution*. (See also the article by Wells, "Survival of the Fakest," *TAS*, December 2000/January 2001.) Often the Darwinists knew of these falsifications, but managed to forgive themselves for the good of their mutual cause. Johnson and Wells didn't cut them any slack.

GETTY/MARIO TAMA

The Darwinists were outraged by Johnson, but there was worse to come. In 1996, Michael Behe (the Lehigh biochemistry professor) published a blockbuster called *Darwin's Black Box*. In that book, he explored the mind-boggling complexity of biochemical activities within the body and the cell. Some complex structures or processes, known as *cumulatively complex*, may continue to function if some part is taken away. An army, for example, is highly complex, but it can lose soldiers, vehicles, or even whole units, and still be able to perform its function of fighting, although progressively less well. But Behe demonstrated that the molecular machines existing inside cells, and other biological processes, are sometimes *irreducibly complex*. An irreducibly complex machine or process is one that has multiple parts, and will not function if any one of the fundamental parts is taken way. All of the parts must be there, all at once, for any function to occur.



Behe's most famous example is the bacterial flagellum described above. If you take away the driveshaft from the flagellar motor, you do not end up with a motor that functions less well. You have a motor that does not function at all. All of the essential parts must be there, all at once, for the motor to perform its function of propelling the bacterium through liquid.

Why is that important? Because that is precisely what Darwinian evolution cannot accomplish. Darwinian evolution is by definition "blind." It cannot plan ahead and create parts that might be useful to assemble a biological machine in the future. For the machine to be assembled, all or nearly all the parts must already be there and be performing a function. Why must they already be performing a function? Because if a part does not confer a real, present advantage for the organism's survival or reproduction, Darwinian natural selection will not preserve the gene responsible for that part. In fact, according to Darwinian theory, that gene will actually be selected *against*. An organism that expends resources on building a part that is useless handicaps itself compared to other organisms that are not wasting resources, and will tend to get outcompeted.

Darwin himself said that "if it could be demonstrated that any complex organ existed which could not possibly have been formed by numerous, successive, slight modifications, my theory would absolutely break down." But an irreducibly complex system cannot evolve in that way, according to Behe. By definition, if an irreducibly complex system were missing just one of its essential parts, it would not function. How or why, then, would blind, purposeless evolution have created the other parts that had no prior function, just waiting for the final part to fall into place? Answer: it wouldn't. Irreducibly complex systems, which do not function if any core part is missing, can only be created by an intelligent designer who plans ahead.

Behe describes several irreducibly complex biological structures or processes in addition to the bacterial flagellar motor. One that is especially astounding is the blood-clotting cascade, which requires about a dozen specialized proteins to be present, plus intermediate forms generated during the cascade. Activated by a cut, a complex chain reaction is set off in the blood, in which each protein activates others in a long sequence. If any of the dozen proteins is missing, the clotting process either will not occur or will grossly malfunction.

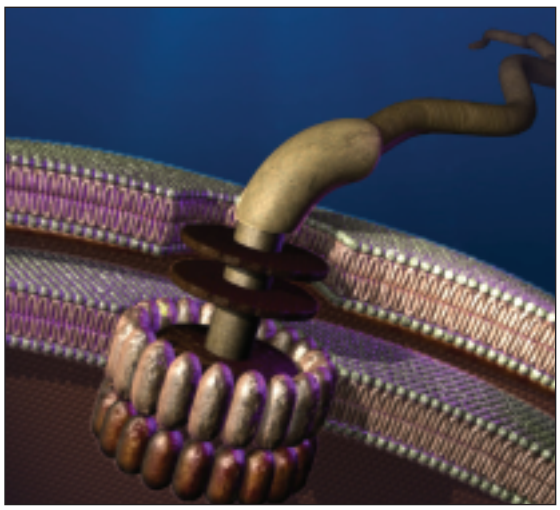
None of the cascade proteins serves any other function except controlling the formation of a blood clot. So it's not as if they were sitting around, performing some other function, and were "co-opted" into use for clotting blood. Because all of the proteins are necessary for the clotting process to function, they "would have to arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on," Behe observes. In other words, the cascade is exactly the sort of process that "could not possibly have been formed by numerous, successive, slight modifications"—Darwin's own description of what would cause his theory to collapse.

But what about the scientific literature? Surely all one need do is turn to the literature to find the detailed accounts of how the flagellar motor, the blood clotting cascade, and similar biological fea-

KRT/PETER KOHAMA

tures were gradually produced, step-by-step, by Darwinian evolution. Modern Darwinism is founded on those kinds of factual accounts. Right?

Wrong. Here's where Behe really showed that the emperor has no clothes. Behe the biochemist had the audacity to search the relevant scientific journals, books, and proceedings of meetings to find out what the Darwinists had really proven about the origin of complex biochemical systems. He first reviewed the articles in the *Journal of Molecular Evolution* (*JME*), which would be the leading candidate to publish this kind of work. The *JME* publishes about a thousand papers per decade. Behe's findings may shock laymen who have accepted the notion that Darwinism has proven how complex biochemical systems actually evolved. Let Behe speak: "*None* of the papers published in *JME* over the entire course of its life as a journal has ever proposed a detailed model by which a complex biochemical system might have been produced in a gradual, step-by-step Darwinian fashion."



He went on to examine other relevant scientific journals, proceedings of meetings, and books. The result was the same: "There has never been a meeting, or a book, or a paper on details of the evolution of complex biochemical systems." That's quite different from what most of us have been led to believe. Behe, recalling the "fierce resistance" he encountered after the publication of *Darwin's Black Box*, remarks that much of it came from "internet fans of Darwinism who claimed that, why, there were hundreds or thousands of research papers describing Darwinian evolution of irreducibly complex biochemical systems." Except that there aren't.

Well, this sent the Darwinians scrambling. Kenneth Miller, a biologist at Brown University who argues in favor of Darwinian evolution, made a splash when he announced (and he bolded the language in his article) that "**the bacterial flagellum is not irreducibly complex**." Miller cited a cellular structure known as the type III secretory system (TTSS) that allows certain bacteria to inject toxins through the cell walls of their hosts. This "nasty little device," in Miller's words, is a feature of several bacteria, including *Y. pestis*, the bacterium that is responsible for bubonic plague. According to research cited by Miller, the TTSS is made up of several proteins that are "homologous" to a set of proteins from the base of the flagellum. Miller argued that the injector pump is probably an "evolutionary precursor" to the flagellum, and it is fully functional although it has fewer parts. Therefore, "the claim of irreducible complexity has collapsed, and with it any 'evidence' that the flagellum was designed." The "flagellum has been unspun," Miller concluded.

But there was a little problem with Miller's declaration of victory. As it turns out, the bubonic plague bacterium *already has the full set of genes necessary to make a flagellum*. Rather than making a flagellum, *Y. pestis* uses only part of the genes that are present to manufacture that nasty little injector instead. As pointed out in a recent article by design theorist Stephen Meyer and microbiologist Scott Minnich (an expert on the flagellar system), the gene sequences suggest that "flagellar proteins arose first and those of the pump came later." If evolution was involved, the pump came from the motor, not the motor from the pump. Also, "the other thirty proteins in the flagellar motor (that are not present in the [pump]), are *unique to the motor and are not found in any other living system*." Undirected evolutionary processes do not produce 30 novel proteins, of just the needed kind, to laze around idly in the cell for millennia so that a pump could some day transform itself into a motor. In short, the proteins in the TTSS do not provide a "gradualist" Darwinian pathway to explain the step-by-step evolution of the irreducibly complex flagellar motor. Miller's spin has been unspun.

Thus, many scientists embracing naturalism find themselves in the seeming dilemma recently articulated by biochemist Franklin Harold: "We should reject, as a matter of principle, the substitution of intelligent design for the dialogue of chance and necessity [i.e., Darwinian evolution]; but we must concede that there are presently no detailed Darwinian accounts of the evolution of any biochemical system, only a variety of wishful speculations."

But why should scientists reject design as a matter of principle? And why should they do so when naturalistic explanations are lacking or deeply flawed, and the evidence of design is becoming more and more compelling?

That's the question being asked by the intelligent design theorists. William Dembski, whom we met above (the bespectacled guy with the bookcase full of advanced diplomas), has developed powerful arguments based on mathematics and information theory to show that design can be detected scientifically. He also demonstrates that as a matter of principle blind necessity—that is, the laws of nature—cannot produce design of the kind life exhibits. Neither can that kind of design be produced by the interaction of chance and necessity—that is, by the Darwinian principle of random variation filtered through the laws of nature. Only intelligence can produce what Dembski refers to as "complex specified information," and life exhibits complex specified information (or "specified complexity") to an extraordinary degree.

It may seem strange, at first blush, to speak of life in terms of "information." A fascinating part of this debate is that the naturalists do not disagree with the ID theorists in the slightest on this fundamental point. Both sides agree that life exhibits specified complexity, and that information theory is a fruitful and even necessary tool in explaining how life may have developed. But the term "information" is used here in a specially defined way.

For information of that type to be present in an object, Dembski explains, three conditions must be satisfied. These are contingency, complexity, and specification.

Let's look at contingency first. In an ordinary sequence of letters typed on a computer keyboard, each "slot" in the sequence can contain any of the 26 letters of the alphabet, as well as numbers, punctuation marks, or other symbols. The symbol that can go in any one slot is therefore "contingent": it might be A, it might be B, and so forth. But suppose my computer keyboard had only one key, and all I could type was:

AAAAAAAAAAAAAAAAAAAAA

My computer would be incapable of producing contingency. This is rather like the operation of many physical laws in nature. A pattern may be produced, but multiple outcomes are not possible. When molecules arrange themselves in a repeating pattern to form a crystal, that is the necessary result of their physical properties. Different, "contingent" outcomes cannot occur (at least not if the conditions under which the molecules are brought together remain the same).

Now let's look at complexity. The sequence of 22 letters:

KAZDNHF OPZSJHQL ZXFNV

is complex in a certain sense, because that exact pattern is highly unlikely to be produced by chance. If my computer keyboard could type only capital letters and the space character, there would be 27 characters that could go in any "slot" of the sequence. The total number of unique sequences of characters that could be produced would be 27 multiplied by itself 22 times, or 27 to the 22nd power. That is a very large number. Expressed in powers of 10, it is more than 10 to the 31st power (10^{31}); that is, 10 with another 30 zeros behind it. To give an idea of the size of that number, fewer than 10^{18} seconds have elapsed since the universe began about 20 billion years ago. If we wrote a program to run on a supercomputer that would generate random strings 22 characters long, and our supercomputer could run through a trillion tries every second, the odds would still be against producing this exact sequence by chance in 20 billion years. The fact that it's very *improbable* to produce this precise sequence by chance is another way of saying, in information theory, that it is highly *complex*.

The third criterion is specification. Here's another 22-character sequence:

THE AMERICAN SPECTATOR

When we see this sequence, we conclude without a moment's hesitation that it has been produced by a

INDEX STOCK IMAGERY/HENDRYK KAISER

fine intelligence. Like the gibberish sequence of the same length, it is *complex* because it would take more than those trillion tries a second over the history of the universe to produce it by chance. It is also *specified* in relation to a pre-existing standard or function; in this case, the rules, spelling, and vocabulary of the English language.

We easily, and usually accurately, make inferences as to when purposeful design by an intelligent agent is at work. In New Hampshire, there was for centuries a rock formation called "The Old Man of the Mountain," that resembled a human face. (It was obliterated by a rockslide in 2003.) Most of us would recognize this formation as simply a chance occurrence rather than design. There are lots of rocks in the world, and humans tend to see patterns that resemble faces. But if we plucked a villager from a remote valley in Nepal, who had not the slightest knowledge of American history, and whisked him to South Dakota, he would instantly and correctly recognize Mount Rushmore as an instance of design by an intelligence.

KRT/LINDA DUVAL

Can complex specified information be produced by unintelligent natural causes? Dembski argues forcefully that it cannot. In every case in which we know the "causal story" underlying complex specified information (writing a sonnet, creating a computer program, or sculpting Mount Rushmore) we know that it has been produced by an intelligence. Citing the "Law of Conservation of Information," Dembski also shows that, apart from intelligence, the amount of information in a closed system can only stay the same or decrease. Natural causes can "shuffle around" information, but the total amount cannot increase without the activity of an intelligent agent.

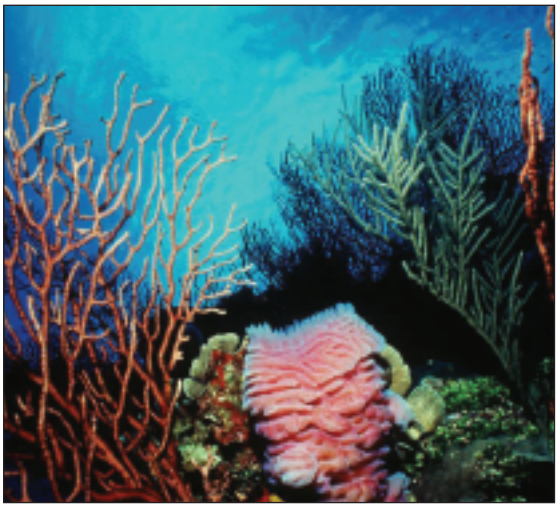
As a matter of both theory and experience, therefore, specified complexity does not come into existence unless it is designed by an intelligence. And, where it exists, specified complexity can be identified either in a rough and ready way (Mount Rushmore) or by more rigorous, probabilistic means. In employing improbability to detect design, Dembski has formulated what he calls the "universal probability bound." This is a number beyond which, under any circumstances, the probability of an event occurring is so small that we can say it was not the result of chance, but of design. He calculates this number by multiplying the number of elementary particles in the known universe (10^{80}) by the maximum number of alterations in the quantum states of matter per second (10^{45}) by the number of seconds between creation and when the universe undergoes heat death or collapses back on itself (10^{25}). The universal probability bound thus equals 10^{150}, and represents all of the possible events that can ever occur in the history of the universe. If an event is less likely than 1 in 10^{150}, therefore, we are quite justified in saying it did not result from chance but from design. Invoking billions of years of evolution to explain improbable occurrences does not help Darwinism if the odds exceed the universal probability bound.

Why should we care how specified complexity comes about, or how it can be detected? Because all life contains an enormous amount of complex specified information. The DNA in genes and chromosomes that makes up the blueprint for life is basically computer code. The information is contained in long sequences of nucleotide bases. There are four potential bases for any "slot" in the sequence, often abbreviated by the letters A, C, G, and T to represent their chemical names. The sequence of those bases specifies what proteins will be produced, and how a plant or animal will be produced.

Like computer code or language, the sequencing of those four bases is *contingent*—the nucleotides don't bond with the nucleotides next to them in a necessary, repeating sequence. DNA sequences are also *complex*. In the human genome (that is, in the DNA present in each of our cells) there are about three billion such slots. The amount of information in the DNA of every human cell is greater than the information in all of the volumes of the *Encyclopedia Britannica*. Most importantly, DNA sequences in living things are *specified* in relation to a function:

building a human, animal, or plant that can, at minimum, survive and reproduce.

How could this vast amount of complex specified information come about without intelligence? The problem for Darwinian theory is particularly acute with respect to the origins of life. But even after life gets underway, random variation and natural selection can't conceivably generate the magnitude of information necessary, the ID theorists argue.



To take just one example, a well-known (and unsolved) problem for Darwinism is the Cambrian Explosion. As noted by Stephen Meyer in the book *Debating Design*, this event might be better called the Cambrian Information Explosion. For the first three billion years of life on Earth, only single-celled organisms such as bacteria and blue-green algae existed. Then, approximately 570 million years ago, the first multi-cellular organisms, such as sponges, began to appear in the fossil record. About 40 million years later, an astonishing explosion of life took place. Within a narrow window of about 5 million years, "at least nineteen and perhaps as many as 35 phyla (of 40 total phyla) made their first appearance on Earth...." Meyer reminds us that "phyla constitute the highest categories in the animal kingdom, with each phylum exhibiting unique architecture, blueprint, or structural body plan." These high order, basic body plans include "mollusks (squids and shellfish), arthropods (crustaceans, insects, and trilobites), and chordates, the phylum to which all vertebrates belong."

These new, fundamental body plans appeared all at once, and without the expected Darwinian intermediate forms. The amount of new biological information necessary to create these abruptly emerging body plans is staggering. Meyer states that sponges such as those that existed right before the Cambrian explosion probably required about five basic cell types. More complex animals like the arthropods would have required 50 basic cell types. These in turn are dependent on new and different proteins. Citing recent research, he notes that the more complex kinds of single cell organisms might require about a million DNA base pairs to manufacture the necessary proteins. But a complex, multicellular organism such as an arthropod would require "orders of magnitude" more coding instructions. The modern fruit fly is an arthropod, and it has about 120 million base pairs. The odds that this quantity of information could be generated by random variation filtered through natural selection quickly surpass the "universal probability bound." It's not going to happen. Not even once, in the entire universe, in its whole history.

But it did happen. The preceding paragraph of this article also happened, even though the odds of it being produced by chance also far exceed the universal probability bound. That's because it's not difficult for an intelligence to produce complex specified information that would otherwise be vanishingly improbable. That's also why the ID theorists contend that only an intelligence could possibly produce the vast and detailed information base that is required for life in all its amazing complexity and variety.

This is not an "argument from ignorance" or for a "God of the gaps." The ID theorists are not saying "We don't know how something occurred, therefore God must have done it." Rather, it is an "inference to the best explanation." Naturalistic explanations have turned out to be wholly insufficient, in principle and in practice, to explain the specified complexity that characterizes life at the cellular and molecular level. We know that intelligent agents can generate complex specified information. As a matter of both experience and theory, it appears that complex specified information can *only* be generated by intelligence. So when we find living organisms that exhibit specified complexity, the best explanation is that the information was produced by an intelligent agent, and that the organism was, in fact, designed.

How has the scientific establishment reacted to the ID challenge? Variously. Some scientists have reconsidered their views, and become sympathetic to intelligent

INDEX STOCK IMAGERY/MIKE MESGLESKI

design. Others have engaged the ID theorists in debate, ranging in character from cordial to caustic.

Richard Dawkins refuses to debate Dembski, and a couple of years ago published an unfinished letter to the late Stephen Jay Gould, the renowned evolutionist from Harvard. In that letter, Dawkins proposed that they not debate "latter day creationists" who only want to share a platform with a "real scientist" (such as, presumably, himself). Dawkins is a true believer in the Darwinian faith, who characterizes his role as "Advocate for Disinterested Truth." He refers to religion as a "virus of the mind," and explicitly affirms that he is both "contemptuous" and "hostile" towards it. According to Dawkins, "It is absolutely safe to say that, if you meet somebody who claims not to believe in evolution, that person is ignorant, stupid or insane (or wicked, but I'd rather not consider that)."

It is plain to see that there is more than a disagreement over scientific techniques or reasoning here. Dawkins' commitment to materialism and atheism is a philosophical position, not a scientific one. Those who challenge materialism's creation story must be anathematized. Unfortunately, the American Association for the Advancement of Science has taken a similar position. In a board resolution adopted in 2002, that organization charges the "so-called" ID movement with, among other things, claiming "that contemporary evolutionary theory is incapable of explaining the origin of the diversity of living organisms." In other words, ID proponents are charged not merely with being wrong, but with committing heresy against "contemporary evolutionary theory."

Richard M. von Sternberg holds two Ph.D.s in the area of evolutionary biology, and is not himself an advocate of intelligent design. When serving as the managing editor of the *Proceedings of the Biological Society of Washington*, he allowed a scholarly paper by the Discovery Institute's Stephen Meyer to be published in that journal. Although he had followed standard peer review procedures, the full brunt of the Darwinian establishment's wrath was brought down on him. You can read his account at www.rsternberg.net. Dembski summarizes the strident reaction to ID by parts of the scientific community (and presents strategies for handling it) in "Dealing with the Backlash against Intelligent Design," available at www.designinference.com.

The controversy has for several years been spilling into the public schools. The ID proponents do not contend that their theory ought to be taught in the public schools. All they claim is that students should be made aware that there is a controversy here. But the supporters of Darwinism are adamant. Only the Darwinian orthodoxy can be taught, and no theory critical of it can even be mentioned.

All of this suggests that what is at stake here are two competing philosophical visions: one that automatically rules out the possibility of God (and therefore a designer) as a matter of principle, and one that affirms God, or is at least willing to entertain the possibility of a designer. That division, to a great extent, underlies the "culture wars" and much else in our public life.

It is precisely because intelligent design relies upon scientific methods and evidence that it is regarded by the materialists as so extraordinarily dangerous. It threatens to allow religion to escape from the ghetto assigned to it by the dominant 19th- and 20th-century materialism. It actually claims to be true, on the same level that all science claims to be true.

If intelligent design makes good its claims, it might change the definition of science. It might change the assumptions on which we conduct our public discourse and education. It might change conceptions about whether there is an objective moral order. It might help open minds that would otherwise be closed.

It might *be* true, and be able to prove it.

Dan Peterson *is a writer and attorney designed to live in Northern Virginia. The views expressed are solely his own.*

INDEX STOCK IMAGERY/BARRY LEVY