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# The Miracle of Evolution

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There are two fundamentally different battles raging in the current debates about evolution. The first pits nearly the entire scientific community against creationists, who believe that they are upholding the veracity of Scripture by denying that evolution happened at all.

The second battle concerns not *the fact* of evolution but the standard neo-Darwinian *explanation* of it, and the issues at stake are primarily philosophical and scientific. Leading the charge in this second fight is the Intelligent Design movement. Its main thesis holds that natural mechanisms are insufficient to account for all the complexity seen in the biological world. The Intelligent Design theorists therefore argue that the existence of an intelligent designer can be scientifically demonstrated. Sometimes they say that such a demonstration already exists; at other times, they demand merely that the "design hypothesis" be placed alongside neo-Darwinism as an alternative scientific theory deserving of further research, grant funding, and space in textbooks.

Unfortunately, the two debates get mixed up. In part, this is due to the apparent determination of some defenders of neo-Darwinism to be unfair to their opponents. It is often said, for example, that the Intelligent Design movement is, in spite of much evidence to the contrary, simply a re-tooling or repackaging of "creation science." Meanwhile, there is a widespread suspicion that the movement masks "creationists": people using the movement as a Trojan horse to advance their agenda. And there are facts that give color to the suspicion. Some Intelligent Design writing

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(such as Phillip Johnson's) places great emphasis on gaps in the fossil record and other stock arguments against common descent. And when Pope John Paul II spoke of evolution as "more than a hypothesis" in 1996, some supporters of the Intelligent Design movement at first sought to explain it as a translation error. That reaction suggested discomfort with the entire idea of common descent, since the pope had neither endorsed any particular mechanism of evolution nor approved any of the metaphysical errors commonly committed in the name of neo-Darwinism—indeed he warned against them.

The second debate could have been avoided had there been more good will and intellectual humility on the part of scientists. We would all be better off if more scientists simply admitted that there are things we don't understand about the hows and whys of evolution. What we have seen instead is an intolerance of any questioning on this subject that is totally inconsistent with a true scientific spirit.

Moreover, the scientific community has sat by while certain scientists and philosophers, claiming the authority of science, have waged war against religion using the neo-Darwinian account of evolution as a metaphysical weapon. There have been three main prongs of this offensive. The first is the promotion of an extreme form of naturalism and reductionism, sometimes called "scientism." According to this philosophy (a hang-over from positivism, and widespread among scientists), all objectively meaningful questions can be reduced to scientific ones, and only natural explanations are rational.

The second prong is an attack on the idea of design in nature: Biologists like Richard Dawkins and philosophers like Daniel Dennett claim Darwinian evolution has explained how complex biological struc-

tures arise from unconscious physical processes and thus destroyed the Argument from Design for the existence of God, conquered the last bastion of teleology and final causation in science, and showed that the universe and life are without ultimate purpose.

The third prong is an assault on the religious conception of man. In the words of the late Stephen Jay Gould, man has been "dethroned." There is no "ontological discontinuity" (as the late pope called it) between man and the lower animals. We are simply the products of an evolutionary process, and therefore moral concepts based on religion or Natural Law must give way to "evolutionary ethics" and sociobiology. All three elements in this anti-religious agenda have not only been promoted in popular science writing and documentaries, but have seeped into high-school biology textbooks and even, on occasion, technical journals.

Of course, none of these attacks on religion has any scientific status. None is a proposition within any actual scientific theory. The proper—and ultimately most effective—response is (as I have written before) to distinguish sharply the actual hypotheses of legitimate science from the philosophical errors often mistakenly thought to follow from them. We must draw as clear a line as possible between science and philosophy—not to elevate science above philosophy, but to restore science to its proper "metaphysically modest" role, to use the fine phrase Cardinal Schonborn employed in *FIRST THINGS* last month, replying to criticisms I had made of his earlier writing on evolution.

This metaphysical modesty means not allowing philosophical systems to masquerade as science. In the case of neo-Darwinism, we must start with what it really asserts *as science*, stripping away all the philosophical meanings that such people as Dawkins, Dennett, Futuyma, Watson, and Crick claim to find in it—as, indeed, do some religious people, who on that account feel compelled to reject it. Indeed, there are people who read these meanings into modern science as a whole, as Cardinal Schonborn appears to do when he refers at one point to the "reductive claims of modern science (which is to say positivism)."

In itself, neo-Darwinism is merely a theory of how biological structure forms. Consider a simple example from the less-contentious field of physics. If we saw ten balls rolling around on a pool table, we wouldn't expect them to come to rest in an exactly triangular array. That would require their motions to be precisely correlated in a highly improbable way. Thus, when we do see a triangular array of pool balls, we reasonably conclude they were arranged by hand. By contrast,

molecules in a sufficiently cooled liquid form themselves into precise arrays called crystals. And we know it is *not* necessary for molecules to move in a special way for this crystallization to occur. (Indeed, one can simulate crystallization on a computer, with the initial movements of the molecules being chosen by a randomizing procedure.)

Another instructive case is the formation of the solar system, which scientists believe condensed from a cloud of gas and dust. The solar system exhibits a high degree of regularity: For example, the planets all orbit the Sun in very nearly in the same plane and in the same direction. Did the particles in the original cloud have to be moving in a special, highly correlated way to end up with such an orderly result? No. One can show that a swirling cloud of gravitating particles will tend, as it radiates its heat, to form a flat, rotating disk and ultimately a planetary system.

These examples seem to suggest that the orderliness we observe in nature—which since ancient times has been seen as evidence for a cosmic designer—can arise spontaneously from mere chaos. That conclusion, however, is superficial. A careful analysis of all such examples from physics reveals that the orderly structures found in *things* (such as the solar system or crystals) are manifestations of a more profound and impressive orderliness at the level of fundamental *laws*. For example, the three marvelous patterns of planetary motion discovered by Kepler were later explained by Newton using his laws of motion and gravity. Far from explaining away the orderliness Kepler discovered, Newton showed that the Keplerian patterns were an outcropping of a much grander, more pervasive, and more beautiful order.

That is how all scientific explanation works: Order at one level is explained as a consequence of greater order at a deeper level. The world looks not less orderly now than it did to the ancients. Rather, the deeper physicists have penetrated into the inner workings of the world, the more they have uncovered mathematical harmony of a richness, subtlety, intricacy, and profundity that can only be called sublime.

Moreover, even though physics provides us with naturalistic accounts of the formation of stars, planets, and solar systems based on impersonal laws and blind chance (in the narrow sense that the motions of the primordial gas and dust particles could be statistically random), nonetheless human reason can discern both Providence and purposeful design in their formation. For if there is to be life in the universe, it certainly helps that there exist planets as a habitat for it and stars like the Sun to provide energy for it, and that the planets can orbit the stars in a stable

way. And all of these things depend on numerous features of the laws of physics being just as they are.

To give just two examples: If the force of gravity did not depend on distance as the inverse square, but as some other power, then planets would not be able to orbit stars at all. And if the laws of nuclear physics did not have certain precisely "tuned" features, stars like the Sun would not burn in the slow and steady way they do, which gives life time to evolve. The Argument from Design has been enormously strengthened by discoveries in physics and cosmology, whatever bruises it is supposed to have taken from Darwin.

In biology we see structure of a different type. The structure of crystals or the solar system is based on mathematical rules, while no formula tells us how an animal is put together. Rather, *organic* structure is characterized by complexity and functional interdependence of parts. Neo-Darwinism proposes a natural mechanism for producing complex organic structure. The claim is that this mechanism works even if the genetic mutations that fuel it are statistically random. While the kinds of structure are different in physics and biology, the concept of "randomness" is the same in both.

Cardinal Schonborn asserts that "the randomness of neo-Darwinian biology is nothing like" that in other branches of science, where there is a "deeply mathematical and precise conceptual structure." But starting with Gregor Mendel, a great deal of precise mathematical analysis using statistical concepts *has* been done in biology and forms part of the foundations of neo-Darwinism. It is no argument against the putative randomness of genetic variations to say, as Cardinal Schonborn does, that they were of "exactly the sort" needed to bring about plants and animals. That begs the question, by assuming that a special sort is needed to make plants or animals. Just as no special sort of molecular motion is needed to make crystals, but random ones will do, so also it may be that natural selection can work with genetic mutations that are statistically random.

The question for science is whether the neo-Darwinian account of evolution is sufficient to explain all instances of biological complexity. Many scientists are supremely confident that it is—which is strange, given that so little is known about the steps by which some complex structures actually evolved.

With almost equal assurance, Intelligent Design theorists maintain the opposite opinion. They argue that there are certain biological structures that can arise neither in a single big step, which would be prohibitively improbable, nor by a series of little steps, since these structures are "irreducibly complex." ("Irre-

ducible" here means that every element of the structure must be in place for it to function at all. Michael Behe uses the analogy of a mousetrap, which can't catch any mice until all the parts are there.) The trouble is that appearances of irreducibility can be deceptive. A free-standing Roman arch may look irreducible in the Behean sense, since the removal of any one brick will cause it to collapse. Nonetheless, it *can* be constructed in a series of little steps by building a wall, one brick at a time, and then knocking a hole in it. A seemingly impossible feat can look simple once we learn the trick. And we simply don't know all of nature's tricks, a lesson that both neo-Darwinians and Intelligent Design enthusiasts should take to heart.

The neo-Darwinian mechanism is one of trial and error, and we know that trial and error can achieve impressive results if enough trials are allowed—or, in Intelligent Design theorist William Dembski's terminology, if there are enough "probabilistic resources." The question of the adequacy of neo-Darwinism, then, is ultimately one of numbers—which means that it can be resolved only by detailed calculations, not by aprioristic arguments or philosophical reflection however deep. And, unlike the case of crystals or planetary systems, nobody can do those calculations at present, because not enough is known about evolutionary history. Nor can theology resolve it, since God could certainly create, if He wished, a universe in which the "probabilistic resources" were large enough for Darwinism to work. Whether we live in such a universe is an empirical question.

The Intelligent Design movement's "design hypothesis" is not a scientific one if we understand natural science to have its traditional, "metaphysically modest" goal of understanding the "natural order" of the world. This isn't to deny that events happen which go beyond the natural order. It is only to say that they lie outside the purview of natural science. For instance, while scientific evidence might lead us to conclude that a cancer cure at Lourdes is miraculous, that is not an advance in oncology. And if empirical evidence shows that a person turned water into wine, that is not a new "water-wine effect" in chemistry.

Perhaps to maintain the natural-scientific character of their "design hypothesis," such Intelligent Design writers as Behe and Dembski suggest that, as far as their arguments go, the intelligent designer might even be a race of space aliens. But since such beings would doubtless be as biologically complex as we, the only way to avoid an infinite regress of space aliens is to say that the "design hypothesis" involves an agent who is outside the natural order. The Intelligent Design move-

ment is absolutely right to insist that biology textbooks be honest and admit that, for all we know, natural mechanisms may not be enough to explain evolution. There exist legitimate reasons, however, to resist the idea that the "design hypothesis" is an alternative scientific theory. God is not a scientific theory.

Let us suppose that the scientific claims of neo-Darwinism are correct. What baleful philosophical implications would this have? Absolutely none, as far as I can see. Some people are concerned about "naturalism." But if one is happy with natural explanations of the formation of stars and planetary systems, why not of plants and animals? All natural explanations obviously presuppose a natural order that is lawful, and that order or lawfulness points to a God as the architect of it. As many authors have convincingly argued—including Henderson in *Fitness of the Environment* (1913), Barrow and Tipler in *The Cosmological Anthropic Principle* (1986), and Demon in *Nature's Destiny* (1998)—the evolution of life by natural processes requires that the laws of nature be very special indeed, and in many ways. Why, then, is it philosophically important to maintain that the molecular motions or genetic mutations had to be special as well?

Some say Darwinism undercuts the Argument from Design. They are wrong. It may be "a design-defeating hypothesis," as Cardinal Schonborn says, but only in the sense that it defeats *some* design arguments, not all. And some design arguments deserve to be defeated. For example, Newton believed that the mutual gravitation of the planets would cause their orbits to wobble increasingly, like a top that is running down, and that God had to intervene periodically to readjust them. But Laplace showed by a famous calculation that the solar system is self-stabilizing. It would be wonderful if there were convenient scientific proofs of God's activity in nature of the kind proposed by Newton and the Intelligent Design movement. But God doesn't always sign His work. Human reason, unaided by faith, can indeed see convincing evidence of design, Providence, and purpose in nature, but that does not make valid every purported scientific demonstration that God has acted in this specific place or that. And it is deplorable that God's title of "Intelligent Designer" is now widely seen as depending on

highly disputable claims about the mechanics of evolution.

And what happens to morality and natural-law ethics if neo-Darwinism is right? Nothing, if we recognize that man is not *merely* a product of evolution. Man is not reducible to matter, not only as Scripture and tradition attest, but also as human reason can discern by reflecting upon its own powers. Therefore any attempt to account for man and morality in purely biological terms must be a caricature. Perhaps our "ontological discontinuity" with the rest of nature can be thought of in this way: We are like three-dimensional beings in a two-dimensional world. Thus, a biological account of man, like the projection of a solid figure onto a flat screen, gets some things right while distorting others. And yet, if we recognize it as a projection, we will not be misled.

An old scholastic axiom holds that grace perfects nature without destroying it. In a somewhat analogous way, we can say that the spiritual in man builds upon the biological but is not reducible to it. Evolutionary biology might well be able to explain the capacity of some animals to sacrifice lesser goods for greater ones (say, their own comfort for their offsprings' lives). But while man does this too, he is able to do it on an ontologically higher plane, since he can choose not only goods that are known by instinct or sensation but ones that are known through reason, and he can choose them freely. We may see in the biological realm, then, adumbrations of, and indeed the groundwork for, spiritual things, without succumbing to a merely naturalistic view of man.

If biology remains only biology, it is not to be feared. Much of the fear that does exist is rooted in the notion that God is in competition with nature, so that the more we attribute to one the less we can attribute to the other. That is false. The greater the powers and potentialities in nature, the more magnificent must be nature's far-sighted Author, that God whose "ways are unsearchable" and who "reaches from end to end ordering all things mightily." Richard Dawkins famously called the universe "a blind watchmaker." If it is, it is miracle enough for anyone; for it is incomparably greater to design a watchmaker than a watch. We need not pit evolution against design, if we recognize that evolution is part of God's design. ED