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## The Design of Evolution

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Catholic theology has never really had a quarrel with the idea that the present species of plants and animals are the result of a long process of evolution—or with the idea that this process has unfolded according to natural laws. As the 1909 *Catholic Encyclopedia* put it, these ideas seem to be “in perfect agreement with the Christian conception of the universe.”

Catholic theologians were more hesitant with respect to the origin of the human race, but even here, the old encyclopedia admitted, evolution of the human body is “*per se* not improbable” and a version of it had “been propounded by St. Augustine.” The crucial doctrinal point was that the human soul, being spiritual, could not be the result of any merely material process: biological evolution any more than sexual reproduction. The soul must be conferred on each person by a special creative act of God. And so the Church is required to reject atheistic and materialistic philosophies of evolution, which deny the existence of a Creator or His providential governance of the world. As long as evolutionary theory confined itself to properly biological questions, however, it was considered benign.

This was the view that was taught to generations of children in Catholic schools. The first formal statement on evolution by the magisterium did not come until the encyclical letter *Humani Generis* of Pope Pius XII in 1950. The only point that the pontiff asserted as definitely dogmatic was that the human soul was not the product of evolution. As for the human body, Pius noted, its evolution from those of lower animals could be investigated as a scientific hypothesis, so long as no conclusions were made rashly.

This is how things stood for another half century. Then, in 1996, in a letter to the Pontifical Academy of Sciences, Pope John Paul II acknowledged that

the theory of evolution is now recognized as “more than a hypothesis,” thanks to impressive and converging evidence coming from a variety of fields. He reiterated what he called the “essential point” made by Pius XII, namely that “if the human body takes its origin from preexistent living matter, [nevertheless] the spiritual soul is immediately created by God.”

Some commentators in the scientific and popular press took this statement to mean the Church had once rejected evolution and was now at last throwing in the towel. The truth is that Pius XII, though cautious, was clearly willing to let the scientific chips fall where they might; and John Paul II was simply noting the obvious fact that a lot of chips had since fallen. Nevertheless, John Paul’s statement was a welcome reminder of the Church’s real attitude toward empirical science. It was followed in 2004 by a lengthy document from the International Theological Commission (headed by Cardinal Ratzinger) entitled *Communion and Stewardship: Human Persons Created in the Image of God*. This important document contained, along with much else, a lucid and careful analysis of evolution and its relation to Catholic teaching.

So why did Christoph Schönborn, the cardinal archbishop of Vienna, lash out this summer at neo-Darwinism? In an opinion piece for the *New York Times* on July 7, he reacted indignantly to the suggestion that “the Catholic Church has no problem with the notion of ‘evolution’ as used by mainstream biologists—that is, synonymous with neo-Darwinism.” Brushing off the 1996 statement of John Paul II as “vague and unimportant,” he cited other evidence (including statements by the late pope, sentences from *Communion and Stewardship* and the *Catechism of the Catholic Church*, and a line from the new Pope Benedict XVI’s installation

homily) to make the case that neo-Darwinism is in fact incompatible with Catholic teaching.



In the United States, the harsh questions and mocking comments came fast and furious. Could it really be that the modern Church is condemning a scientific theory? How much doctrinal weight does Schönborn's article have? (After all, if a letter by a pope addressed to scientists can be called "unimportant," how important can a letter by a cardinal to the readers of a newspaper be?) Why did he write it? (It appears that it was done at the urging and with the assistance of his friend Mark Ryland, a philanthropist and ardent champion of the anti-Darwinian Intelligent Design movement.) And what, precisely, was the cardinal saying?

The Church in recent centuries has avoided taking sides in intramural scientific disputes—which means the form as well as the content of the cardinal's article came as a shock. The issues it treats, having chiefly to do with the relation of chance and randomness to divine providence, are extremely subtle and cannot be dealt with adequately in the space of a newspaper column. It was nearly inevitable, therefore, that distinctions would get lost, terms would be ill-defined, and issues would be conflated.

By saying that "neo-Darwinism" is "synonymous" with "evolution" as used by mainstream biologists," Schönborn indicates that he means the term as commonly understood among scientists. As so understood, neo-Darwinism is based on the idea that the mainspring of evolution is natural selection acting on random genetic variation. Elsewhere in his article, however, the cardinal gives another definition: "evolution in the neo-Darwinian sense [is] an unguided, unplanned process of random variation and natural selection." This is the central misstep of Cardinal Schönborn's article. He has slipped into the definition of a *scientific* theory, neo-Darwinism, the words "unplanned" and "unguided," which are fraught with *theological* meaning.

The line he quotes from *Communion and Stewardship* may seem to support him: "An unguided evolutionary process—one that falls outside the bounds of divine providence—simply cannot exist." And, since it is a fundamental Christian doctrine that God's providential plan extends to all events in the universe, nothing that

happens can be "unplanned" as far as God is concerned.

But *Communion and Stewardship* also explicitly warns that the word "random" as used by biologists, chemists, physicists, and mathematicians in their technical work does not have the same meaning as the words "unguided" and "unplanned" as used in doctrinal statements of the Church. In common speech, "random" is often used to mean "uncaused," "meaningless," "inexplicable," or "pointless." And there is no question that some biologists, when they explain evolution to the public or to hapless students, do argue from the "randomness" of genetic mutations to the philosophical conclusion that the history of life is "unguided" and "unplanned." Some do this because of an anti-religious animus, while others are simply careless.

When scientists are actually doing science, however, they do not use the words "unguided" and "unplanned." The Institute for Scientific Information's well-known *Science Citation Index* reveals that only 48 papers exist in the scientific literature with the word "unguided" in the title, most having to do with missiles. Only 467 have the word "unplanned," almost all referring to pregnancies or medical procedures. By contrast there are 52,633 papers with "random" in the title, from all fields of scientific research. The word "random" is a basic technical term in most branches of science. It is used to discuss the motions of molecules in a gas, the fluctuations of quantum fields, noise in electronic devices, and the statistical errors in a data set, to give but a few examples. So if the word "random" necessarily entails the idea that some events are "unguided" in the sense of falling "outside of the bounds of divine providence," we should have to condemn as incompatible with Christian faith a great deal of modern physics, chemistry, geology, and astronomy, as well as biology.

This is absurd, of course. The word "random" as used in science does not mean uncaused, unplanned, or inexplicable; it means uncorrelated. My children like to observe the license plates of the cars that pass us on the highway, to see which states they are from. The sequence of states exhibits a degree of randomness: a car from Kentucky, then New Jersey, then Florida, and so on—because the cars are uncorrelated: Knowing where one car comes from tells us nothing about where the next one comes from. And yet, each car comes to that place at that time for a reason. Each trip is planned, each guided by some map and

schedule. Each driver's trip fits into the story of his life in some intelligible way, though the story of these drivers' lives are not usually closely correlated with the other drivers' lives.

Or consider this analogy. Prose, unlike a sonnet, has lines with final syllables that do not rhyme. The sequence those syllables form will therefore exhibit randomness. But this does not mean a prose work is "unguided" or "unplanned." True enough, the writer did not select the words with an eye to rhyming them, imposing on them that particular kind of correlation. But the words are still chosen. So God, though he planned His work with infinite care, may not have chosen to impose certain kinds of correlations on certain kinds of events, and the motions of the different molecules in a gas, for example, may exhibit no statistically verifiable correlation.



We should distinguish between what we may call "statistical randomness," which implies nothing about whether a process was planned or guided, and "randomness" in other senses. Statistical randomness, based on the lack of correlation among things or events, can be exploited to understand and explain phenomena through the use of probability theory. We may wish to determine, for example, whether the incidence of cancer in a certain county is consistent with statistical expectations, or whether there is some as-yet-unknown causal factor at work. By looking at the actuarial statistics, the age profile, and so on, one can compute the expected number of deaths due to cancer and see whether there is a statistically significant deviation from it. Implicit in all such computations are assumptions about randomness. Entire subfields in science (such as "statistical mechanics") are based on these methods: The properties of gases, liquids, and solids, for instance, can be understood and accurately calculated by methods that make assumptions about the randomness of molecular and atomic motions.

The promoters of the anti-Darwinian Intelligent Design movement usually admit that the ideas of statistical randomness, probability, and chance can be part of legitimate explanation of phenomena. They argue instead that to be able to make a scientific inference of "design" in some set of data one must first exclude other explanations, including "chance." The members of the International Theological Commission were clearly referring to

the Intelligent Design movement when they wrote in *Communion and Stewardship*: "A growing body of scientific critics of neo-Darwinism point to evidence of design (e.g., biological structures that exhibit specified complexity) that, in their view, cannot be explained in terms of a purely contingent process and that neo-Darwinians have ignored or misinterpreted. The nub of this currently lively disagreement involves scientific observation and generalization concerning whether the available data support inferences of design or chance, and cannot be settled by theology."

If an "inference of chance" as part of the explanation of a phenomenon cannot be ruled out on theological grounds, then the competing claims of neo-Darwinians and their Intelligent Design critics about biological complexity cannot be settled by theology. To their credit, many of the best writers in the Intelligent Design movement, including William Dembski and Michael Behe, also insist the issue is one to be settled scientifically.

We cannot settle the issue of the role of "chance" in evolution theologically, because God is omnipotent and can therefore produce effects in different ways. Suppose a man wants to see a particular poker hand dealt. If he deals from a single shuffled deck, his chance of seeing a royal straight flush is 1 in 649,740. So he might decide to stack the deck, introducing the right correlations into the deck before dealing. Alternatively, he might decide to deal a hand from each of a billion shuffled decks. In that case the desired hand will turn up almost infallibly. (The chances it will not are infinitesimal: 10 to the -669 power.) In which way did God make life? Was the molecular deck "stacked" or "shuffled"?

This poker analogy is weak, of course. We don't know the order of a shuffled deck—that's one reason we shuffle it. But God knows all the details of the universe from all eternity. He knows what's in the cards. The scientist and the poker player do not look at things from God's point of view, however, and so they talk about "probabilities."

People have used the words "random," "probability," "chance," for millennia without anyone imagining that it must always imply a denial of divine providence. "I returned and saw under the sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favor to men of skill, but time and *chance* happeneth to them all," as Ecclesiastes notes. Or, to

make the point in dry technical terms, there is not a perfect correlation between being strong and winning or between having bread and being wise.



Why is there statistical randomness and lack of correlation in our world? It is because events do not march in lockstep, according to some simple formula, but are part of a vastly complex web of contingency. The notion of contingency is important in Catholic theology, and it is intimately connected to what in ordinary speech would be called "chance."

*Communion and Stewardship* settles this point. "Many neo-Darwinian scientists, as well as some of their critics, have concluded that if evolution is a radically contingent materialistic process driven by natural selection and random genetic variation, then there can be no place in it for divine providential causality," the document observes. "But it is important to note that, according to the Catholic understanding of divine causality, true contingency in the created order is not incompatible with a purposeful divine providence. Divine causality and created causality radically differ in kind and not only in degree. Thus, even the outcome of a purely contingent natural process can nonetheless fall within God's providential plan. According to St. Thomas Aquinas: 'The effect of divine providence is not only that things should happen somehow, but that they should happen either by necessity or by contingency. Therefore, whatsoever divine providence ordains to happen infallibly and of necessity, happens infallibly and of necessity; and that happens from contingency, which the divine providence conceives to happen from contingency.' In the Catholic perspective, neo-Darwinians who adduce random genetic variation and natural selection as evidence that the process of evolution is absolutely unguided are straying beyond what can be demonstrated by science."

It is not neo-Darwinists as such that are being criticized here, but only the invalid inference drawn by "many" of them (along with "some of their critics") that the putative "randomness" of genetic variation necessarily implies an "absolutely unguided" process. It is clearly the intention of this passage to distinguish sharply the actual hypotheses of legitimate science from the philosophical errors often mistakenly thought to follow from them.

In his article, Schönborn cites the *Catechism of the Catholic Church*: "We believe that God created the world according to His wisdom. It is not the product of any necessity whatever, nor of blind fate or chance." And yet, it is one thing to say that the whole world is a product of chance and the existence of the universe a fluke, and quite another to say that within the universe there is statistical randomness. The cardinal also quotes the following passage from an address of the late pope: "To all these indications of the existence of God the Creator, some oppose the power of chance or of the proper mechanisms of matter. To speak of chance for a universe which presents such a complex organization in its elements and marvelous finality in its life would be equivalent to giving up the search for an explanation of the world as it appears to us." Indeed. But to employ arguments in science based on statistical randomness and probability is not necessarily to "oppose" the idea of chance to the existence of God the Creator.

Even within the neo-Darwinian framework, there are many ways that one could see evidence of that "finality" (the directedness of the universe and life) to which John Paul II refers. The possibility of an evolutionary process that could produce the marvelously intricate forms we see presupposes the existence of a universe whose structure, matter, processes, and laws are of a special character. This is the lesson of the many "anthropic coincidences" that have been identified by physicists and chemists. It is also quite likely, as suggested by the eminent neo-Darwinian biologist Simon Conway Morris, that certain evolutionary endpoints (or "solutions") are built into the rules of physics and chemistry, so that the "random variations" keep ending up at the same destinations, somewhat as meandering rivers always find the sea. In his book *Life's Solution*, Morris adduces much impressive evidence of such evolutionary tropisms. And, of course, we must never forget that each of us has spiritual powers of intellect, rationality, and freedom that cannot be accounted for by mere biology, whether as conceived by neo-Darwinians or their Intelligent Design critics.

I personally am not at all sure that the neo-Darwinian framework is a sufficient one for biology. But if it turns out to be so, it would in no way invalidate what Pope Benedict has said: "We are not some casual and meaningless product of evolution. Each of us is the result of a thought of God. Each of us is willed, each of us is loved, each of us is necessary." In his *New York Times* article,

Cardinal Schönborn understandably wanted to counter those neo-Darwinian advocates who claim that the theory of evolution precludes a Creator's providential guidance of creation. Regrettably, he ended up giving credibility to their claim and obscuring the clear teaching of the Church that no

truth of science can contradict the truth of revelation.

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