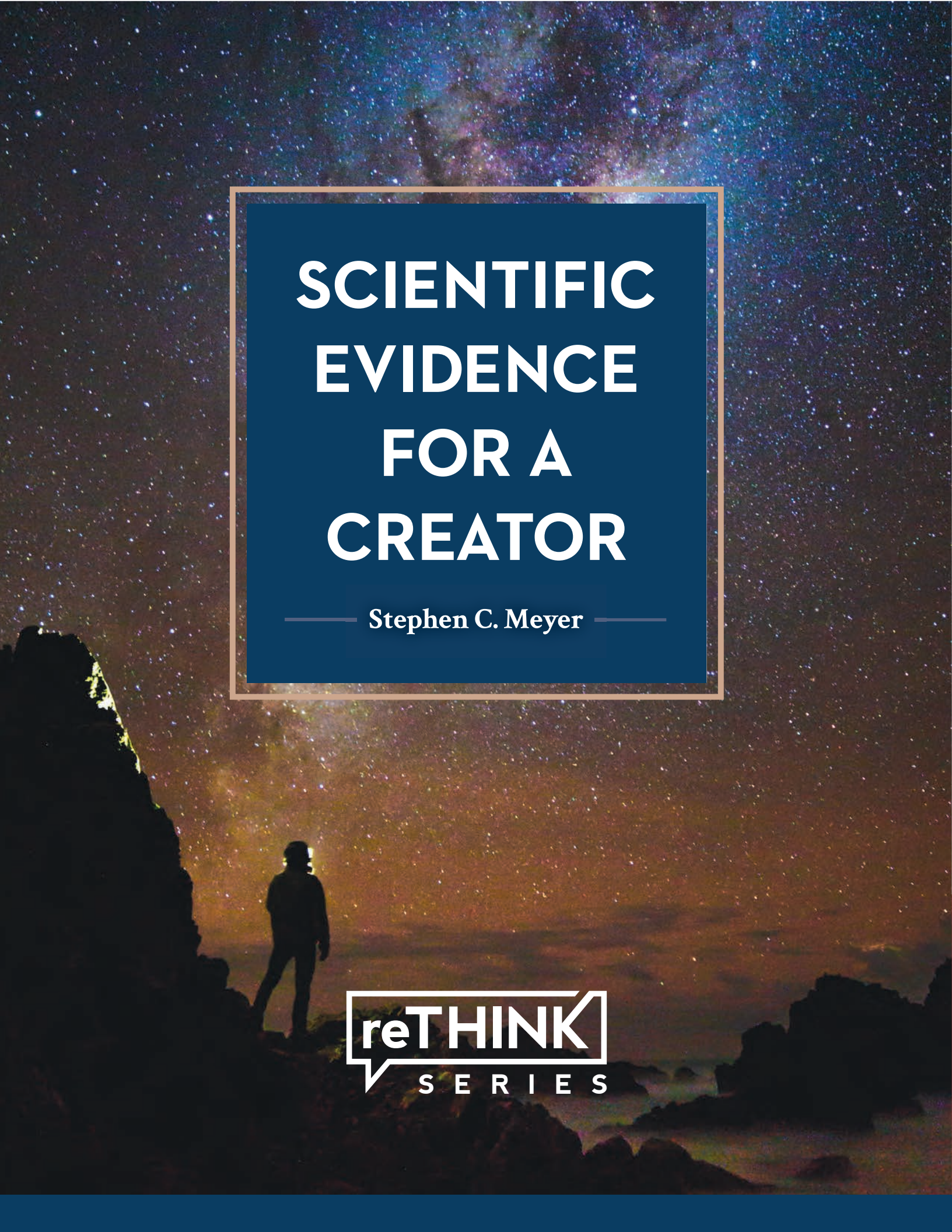


SCIENTIFIC EVIDENCE FOR A CREATOR

Stephen C. Meyer

reTHINK SERIES

INTRODUCTION

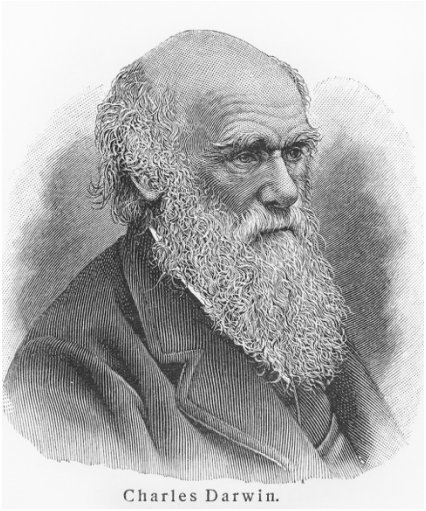
BIOLOGISTS HAVE LONG RECOGNIZED that many organized structures in living organisms—the elegant form and protective covering of the coiled nautilus; the interdependent parts of the vertebrate eye; the interlocking bones, muscles, and feathers of a bird wing—"give the appearance of having been designed for a purpose."[1]

Before Darwin, biologists attributed the beauty, integrated complexity, and adaptation of organisms to their environments to a powerful designing intelligence. Consequently, they also thought the study of life rendered the activity of a designing intelligence *detectable* in the natural world.

Yet Darwin argued that this appearance of design could be more simply explained as

the product of a purely undirected mechanism—namely, natural selection and random variation.

Modern neo-Darwinists have similarly asserted that the undirected process of natural selection and random *mutation* produced the intricate designed-like structures in living systems. They affirm that natural selection can mimic the powers of a designing intelligence without itself being guided by an intelligent agent. Thus, living organisms may look designed, but on this view, that appearance is illusory and, consequently, the study of life does not render the activity of a designing intelligence detectable in the natural world.


Charles Darwin.

As Darwin himself insisted, "There seems to be no more design in the variability of organic beings and in the action of natural selection, than in the course in which the wind blows."[2] Or as the eminent evolutionary biologist Francisco Ayala has argued, Darwin accounted for "design without a designer" and showed "that the

directive organization of living beings can be explained as the result of a natural process, natural selection, without any need to resort to a Creator or other external agent."[3]

Interestingly, some contemporary physicists also now make similar arguments about the origin of what physicists call the "fine-tuning" of universe. Since the 1950s and 1960s, physicists have discovered that the laws and constants of physics and the initial conditions of the universe have been finely tuned to make life in the universe (and even basic chemistry) possible. To many physicists, this discovery has suggested the activity of a fine-tuner or super-intellect—i.e., an actual designing intelligence.

Yet other physicists now argue that the fine-tuning of the physical parameters of the universe manifests the appearance, but not the reality, of design. For example, physicist Lawrence Krauss has argued that cosmological fine-tuning does not provide evidence of intelligent design, but instead, "the illusion of intelligent design."

So did Darwin explain away all evidence of apparent design in life? Have contempo-

rary physicists explained away the evidence of design in the universe?

Proponents of the theory of intelligent design answer that question with an emphatic *no*. We argue that there are specific features of life and the universe that are best explained as the result of an *actual* designing intelligence as opposed to an undirected materialistic process (such as natural selection and random mutation) that merely mimics the powers of a designing intelligence.

Moreover, we argue that the superior explanatory power of the design hypothesis makes the activity of a designing intelligence in the history of life and the universe *scientifically detectable*. This commitment to the detectability of intelligent design not only distinguishes the theory of intelligent design from materialistic evolutionary accounts of the origin of life and the universe, but it also distinguishes the theory of intelligent design from the idea of theistic evolution. Indeed, though most versions of theistic evolution affirm the existence of God, they deny that God's designing activity is detectable in the natural world.

So the theory of intelligent design asserts that evidence of design is detectable in nature. But what evidence do proponents of the theory cite to justify this claim? Let's consider two classes of such evidence and a scientific method of design detection that can be used to detect intelligent design in nature.

THE ORIGIN OF LIFE AND THE INFORMATION ENIGMA

AS NOTED, DARWIN ATTEMPTED to explain the origin of new living forms starting from simpler preexisting forms of life. Nevertheless, his theory of evolution by natural selection did not attempt to explain the origin of life—the origin of the simplest living cell—in the first place. Yet there now is compelling evidence of intelligent design in

the inner recesses of even the simplest living one-celled organisms. Moreover, a key feature of living cells—one that Darwin knew nothing about—has made the intelligent design of life scientifically detectable.

In 1953, when Watson and Crick elucidated the structure of the DNA molecule, they made a startling discovery. The structure of DNA allows it to store information in the form of a four-character digital code. Strings of precisely sequenced chemicals called *nucleotide bases* store and transmit the assembly instructions—the information—for building the crucial protein molecules and machines the cell needs to survive.

Francis Crick later developed this idea with his famous "sequence hypothesis," according to which the chemical constituents in DNA function like letters in a written language or symbols in a computer code. Just as letters of the English alphabet may convey a particular message depending on their arrangement, so too do certain sequences of chemical bases along the spine of a DNA molecule convey precise instructions for building proteins. The arrangement of the chemical

characters determines the function of the sequence as a whole. Thus, the DNA molecule has the same property of "sequence specificity" that characterizes codes and language.

Moreover, DNA sequences do not just possess information in the strictly mathematical sense described by pioneering information theorist Claude Shannon. Shannon related the amount of information in a sequence of symbols to the *im*probability of the sequence (and the reduction of uncertainty associated with it).

But DNA base sequences do not just exhibit a mathematically measurable degree of improbability. Instead, DNA contains information in the richer and more ordinary dictionary sense of alternative sequences or arrangements of characters that produce a specific effect. DNA base sequences convey instructions. They perform functions and produce specific effects. Thus, they not only possess "Shannon information," but also what has been called *specified* or *functional information.*

Like the precisely arranged zeros and ones in a computer program, the chemical bases in DNA convey instructions by virtue of their

specific arrangement—and in accord with an independent symbol convention known as the genetic code. Thus, biologist Richard Dawkins notes that "the machine code of the genes is uncannily computer-like."[4] Similarly, Bill Gates observes that "DNA is like a computer program, but far, far more advanced than any software we've ever created."[5] Biotechnologist Leroy Hood likewise describes the information in DNA as "digital code."[6]

After the early 1960s, further discoveries revealed that the digital information in DNA and RNA is only part of a complex information processing system—an advanced form of nanotechnology that both mirrors and exceeds our own in its complexity, design logic, and information-storage density.

Where did the information in the cell come from? And how did the cell's complex information processing system arise? These questions lie at the heart of contemporary origin-of-life research. Clearly, the informational features of the cell at least appear designed. And, as I show in extensive detail in my book *Signature in the Cell*, no theory of undirected chemical evolution explains the

origin of the information needed to build the first living cell.[7]

Why? There is simply too much information in the cell to be explained by chance alone. And attempts to explain the origin of information as the consequence of prebiotic natural selection acting on random changes inevitably presuppose precisely what needs explaining—namely, reams of preexisting genetic information. The information in DNA also defies explanation by reference to the laws of chemistry. Saying otherwise is like saying a newspaper headline might arise from the chemical attraction between ink and paper. Clearly something more is at work.

Yet the scientists who infer intelligent design do not do so merely because natural processes—chance, laws, or their combination—have failed to explain the origin of the information and information-processing systems in cells. Instead, we think intelligent design is detectable in living systems because we know from experience that systems possessing large amounts of such information invariably arise from intelligent causes. The information on a computer screen can be traced

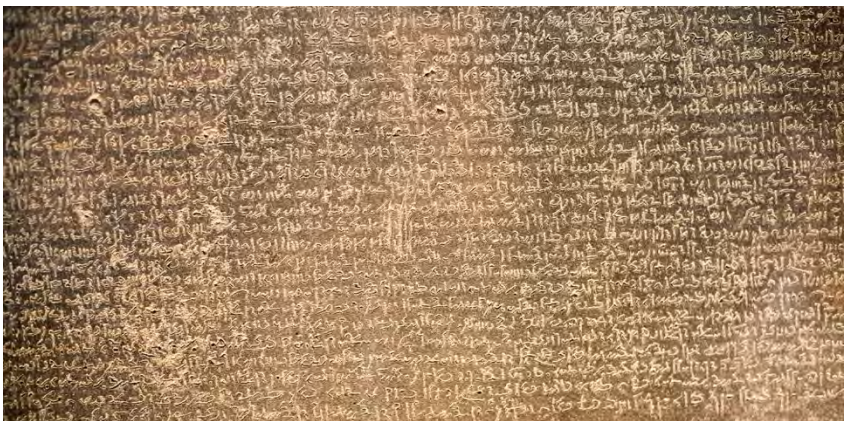
back to a user or programmer. The information in a newspaper ultimately came from a writer—from a mind. As the pioneering information theorist Henry Quastler observed, "creation of information is habitually associated with conscious activity."[8]

This connection between information and prior intelligence enables us to *detect* or infer intelligent activity even from unobservable sources in the distant past. Archeologists infer ancient scribes from hieroglyphic inscriptions. SETI's search for extraterrestrial intelligence presupposes that information embedded in electromagnetic signals from space would indicate an intelligent source. Radio astronomers have not found any such signal from distant star systems. But closer to home, molecular biologists have discovered information in the cell, suggesting—by the same logic that underwrites the SETI program and ordinary scientific reasoning about other informational artifacts—an intelligent source.

DNA functions like a software program and contains specified information just as software does. We know from experience

that software comes from programmers. We know generally that specified information—whether inscribed in hieroglyphics, written in a book, or encoded in a radio signal—always arises from an intelligent source. So the discovery of such information in the DNA molecule provides strong grounds for inferring (or detecting) that intelligence played a role in the origin of DNA, even if we weren't there to observe the system coming into existence.

THE LOGIC OF DESIGN DETECTION



IN *THE DESIGN INFERENCE,* mathematician William Dembski explicates the logic of design detection. His work reinforces the conclusion that the specified information present in DNA points to a designing mind.

Dembski shows that rational agents often detect the prior activity of other designing minds by the character of the effects they leave behind.

Archaeologists assume that rational agents produced the inscriptions on the Rosetta Stone. Insurance fraud investigators detect certain "cheating patterns" that suggest intentional manipulation of circumstances rather than a natural disaster. Cryptographers distinguish between random signals and those carrying encoded messages, the latter indicating an intelligent source.

Recognizing the activity of intelligent agents constitutes a common and fully rational mode of inference.

More importantly, Dembski explicates criteria by which rational agents recognize or detect the effects of other rational agents and distinguish them from the effects of natural causes. He demonstrates that systems or sequences with the joint properties of "high complexity" (or small probability) and "specification" invariably result from intelligent causes, not from chance or physical-chemical laws.[9]

Dembski notes that complex sequences exhibit an irregular and improbable arrangement that defies expression by a simple rule or algorithm, whereas specification involves a match or correspondence between a physical system or sequence and an independently recognizable pattern or set of functional requirements.

By way of illustration, consider the following three sets of symbols:

1. nehya53nslbyw1`jejns7eopslanm46/J
2. TIME AND TIDE WAIT FOR NO MAN
3. ABABABABABABABABABABAB

The first two sequences are complex because both defy reduction to a simple rule. Each represents a highly irregular, aperiodic, improbable sequence. The third sequence is not complex, but is instead highly ordered and repetitive. Of the two complex sequences, only the second, however, exemplifies a set of independent functional requirements—i.e., it is *specified*.

English has many such functional requirements. For example, to convey meaning in

English, one must employ existing conventions of vocabulary (associations of symbol sequences with particular objects, concepts, or ideas) and existing conventions of syntax and grammar. When symbol arrangements "match" existing vocabulary and grammatical conventions (i.e., functional requirements), communication can occur.

Such arrangements exhibit "specification." The sequence "Time and tide waits for no man" clearly exhibits such a match, and thus performs a communication function.

Thus, of the three sequences, only the second manifests both necessary indicators of a designed system. The third sequence lacks complexity, though it does exhibit a simple periodic pattern, a specification of sorts. The first sequence is complex, but not specified. Only the second sequence exhibits *both* complexity and specification. Thus, according to Dembski's theory of design detection, only the second sequence implicates an intelligent cause—as our uniform experience affirms.

In my book *Signature in the Cell*, I show that Dembski's joint criteria of complexity and specification are equivalent to "func-

tional" or "specified information." I also show that the coding regions of DNA exemplify both high complexity and specification and, thus not surprisingly, also contain "specified information." Consequently, Dembski's scientific method of design detection reinforces the conclusion that the digital information in DNA indicates prior intelligent activity.

So, contrary to media reports, the theory of intelligent design is not based upon ignorance or gaps in our knowledge, but on scientific discoveries about DNA and on established scientific methods of reasoning in which our uniform experience of cause and effect guides our inferences about the kinds of causes that produce (or best explain) different types of events or sequences.

ANTHROPIC FINE-TUNING

EVIDENCE OF DESIGN IN LIVING cells is not the only such evidence in nature. Modern physics now reveals evidence of intelligent design in the very fabric of the universe. Since the 1950s and 1960s, physicists have recognized that the initial conditions and the laws and constants of physics are finely tuned, against all odds, to make life possible.

Even extremely slight alterations in the values of many independent factors—such as the expansion rate of the universe, the speed of light, the masses of quarks, and the precise strength of gravitational or electromagnetic attraction—would render life impossible.

Physicists refer to these factors as "anthropic coincidences," and to the fortunate

convergence of all these coincidences as the "fine-tuning of the universe."

Many physicists have noted that this fine-tuning strongly suggests design by a preexistent intelligence. Physicist Paul Davies has said that "the impression of design is overwhelming."[10] Fred Hoyle argued, "A commonsense interpretation of the facts suggests that a superintellect has monkeyed with physics, as well as chemistry and biology."[11] Many physicists now concur. They would argue that—in effect—these parameters appear finely tuned to make life possible because some*one* carefully fine-tuned them.

To explain the vast improbabilities associated with these fine-tuning parameters, some physicists, such as Lawrence Krauss and Leonard Susskind, have postulated not a fine-tuner or intelligent designer, but instead, the existence of a vast number of other parallel universes. This multiverse concept posits the existence of many other universes, each with different sets of physical parameters. In so doing, it attempts to show that a set of fine-tuning parameters necessary for life would—in all probability—inevitably arise somewhere

in some universe, since this multiplicity of new universes would vastly increase the number of opportunities for generating a life-friendly universe.

Multiverse advocates not only posit a great multiplicity of other universes, they also posit the existence of some universe-generating mechanism to explain where these other universes came from. It's important to understand why they must do this.

Most proponents think of the different universes that they postulate as causally isolated or disconnected from each other. Thus, they do not expect to have any direct observational evidence of universes other than our own.[12] Consequently, nothing that happens in one universe should have any effect on things that happen in another universe.

Nor would events in one universe affect the *probability* of events in another universe, including the probabilities of whatever events were responsible for setting the values of the fine-tuning parameters in another universe—such as ours. As science writer Clifford Longley explains the concept: "There could

have been millions and millions of different universes created each with different dial settings of the fundamental ratios and constants, so many in fact that the right set was bound to turn up by sheer chance."[13]

Yet if all the different universes were produced by the same underlying causal mechanism, then it would be possible to conceive of our universe as the winner of a cosmic lottery, where some winning universe with just the right laws, constants, and/or initial conditions, would eventually emerge. Postulating a "universe-generating machine" could conceivably render the probability of getting a universe with life-friendly conditions quite high, and, in the process, explain the fine-tuning as the result of a randomizing element—like the action of a giant slot machine or a roulette wheel turning out either life-conducive winners or life-unfriendly losers with each spin or pull on the handle.

But, as I explain in my new book *Return of the God Hypothesis*[14] in much more detail, advocates of these multiverse proposals have overlooked an obvious problem. The speculative cosmologies (such as inflationary cosmol-

ogy and string theory) they propose for generating alternative universes invariably invoke mechanisms that *themselves* require fine-tuning, thus begging the question as to the origin of that prior fine-tuning. Indeed, all the various materialistic explanations for the origin of the fine-tuning—i.e., the explanations that attempt to explain the fine-tuning without invoking intelligent design—invariably invoke prior unexplained fine-tuning.

Moreover, the fine-tuning of the universe exhibits precisely those features—extreme improbability and functional specification—that invariably trigger an awareness of, and justify an inference to, intelligent design.

[15] Because the multiverse theory cannot explain fine-tuning without invoking prior fine-tuning, and because the fine-tuning of a physical system to accomplish a recognizable or propitious end is exactly the kind of thing we know intelligent agents do, it follows that intelligent design stands as the best explanation for the fine-tuning of the universe. And that makes intelligent design detectable in *both* the physical parameters of the universe

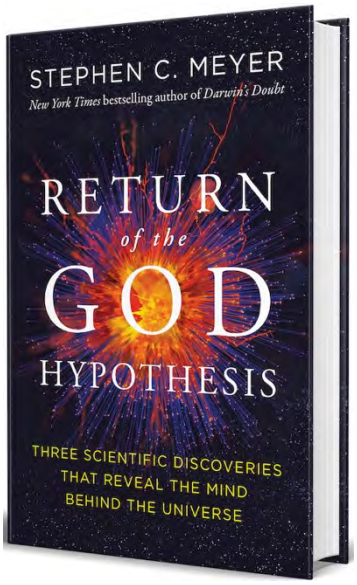
and the information-bearing properties of life.

THEISTIC IMPLICATIONS OF INTELLIGENT DESIGN

SO WHY IS A DISCUSSION OF THE the theory of intelligent design important in a discussion about science and faith? After all, proponents of intelligent design have often argued that the method of design detection outlined here does not necessarily make it possible to determine the identity of the intelligent agent responsible for any particular designed system or artifact—only that such a system or artifact was designed by an intelligent agent *of some kind*. In addition, proponents of intelligent design, such as myself, insist that the case for intelligent design is based upon scientific evidence and

upon established methods of scientific reasoning—not religious belief or authority.

All that is true. Nevertheless, as I've also argued, although the case for intelligent design depends upon scientific evidence and methods of reasoning, it may well have larger theistic implications. And, as I argue in my book *Return of the God Hypothesis*, the evidence for intelligent design in life and in the universe—when considered together—does point strongly to a transcendent designing intelligence—i.e., God—rather than an immanent designing agent within the cosmos itself.



Of course, some scientists, such as Francis Crick,[16] Fred Hoyle,[17] and even Richard Dawkins,[18] have postulated that an intelligence elsewhere *within* the cosmos might explain the origin of the first life on Earth.

Crick proposed this idea after candidly acknowledging the prohibitively long odds against life arising spontaneously here on Earth.[19] He consequently proposed that life

first arose by some undirected process of chemical evolution somewhere else in the universe and then continued to evolve, eventually producing an intelligent form of alien life. This immanent intelligence—an extraterrestrial agent rather than a transcendent God—designed and then "seeded" a simpler form of life on Earth. Hence, the term *panspermia* (from the Greek *pan*, "all," and *sperma*, "seed").

Though logically possible, I've never found this explanation for the origin of life or the origin of biological information satisfying. For one thing, any theory of the origin of life, whether purporting to explain the origin of the first life here on Earth or elsewhere in the cosmos, must account for the origin of the specified information necessary to configure matter into a self-replicating system—something that most biologists take as a *sine qua non* of a genuinely living organism. Yet those who propose panspermia have not explained, or even seriously grappled with, the problem of the origin of specified biological information.[20]

Simply asserting that life arose somewhere else out in the cosmos does not explain how the information necessary to build the first life, let alone the first intelligent life, could have arisen. It merely pushes the explanatory challenge farther back in time and out into space. Indeed, positing another form of preexisting life only presupposes the existence of the very thing that all theories of the origin of life must explain—the origin of specified biological information.

Beyond that, the panspermia hypothesis certainly does not explain the origin of the cosmological fine-tuning. Because the fine-tuning of the laws and constants of physics (and the initial conditions of the universe) date from the very origin of the universe itself, the designing intelligence responsible for the fine-tuning must have had the capability of setting the fine-tuning parameters and initial conditions from the moment of creation.

Yet, clearly, no intelligent being *within* the cosmos that arose after the beginning of the cosmos could be responsible for the fine-tuning of the laws and constants of physics that made its existence and evolution possible.

Such an intelligent agent "inside" the universe might reconfigure or move matter and energy around in accord with the laws of nature. Nevertheless, no such being subject to those laws could possibly change the constants of physics simply by changing the material *state* of the universe. Similarly, no intelligent being arising after the beginning of the universe could have set the initial conditions of the universe upon which its later evolution and existence would depend. It follows that an immanent intelligence (an extraterrestrial alien, for instance) fails to qualify as an adequate explanation for the origin of the cosmic fine-tuning.[21]

Instead, the fine-tuning of the universe as a whole is better explained by an intelligent agent that transcends the universe, one that has the attributes that religious believers typically associate with God. Indeed, because theism conceives of God as an intelligent agent having an existence independent of the material universe—either in a timeless eternal realm or in another realm of time independent of the time in our universe—theism can account for (1) the origin of the universe in

time (i.e., at a beginning), (2) the fine-tuning of the universe from the beginning of time, and (3) the origin of the specified information that arises after the beginning of time that is necessary to produce the first living organism.

Thus, deeper philosophical deliberation about the evidence of intelligent design in life and the universe may well lead to a theistic conclusion. And that suggests, as many authors of this book do, that science, properly understood, may well have faith-affirming implications.

ABOUT THE AUTHOR

Stephen C. Meyer is Director of the Center for Science and Culture at Discovery Institute. A former geophysicist and college professor, Dr. Meyer received his PhD in the history and philosophy of science from the University of Cambridge. His books include *Return of the God Hypothesis: Three Scientific Discoveries that Reveal the Mind Behind the Universe* (HarperOne 2021); the *New York Times* best seller *Darwin's Doubt: The Explosive Origin of Animal Life and the Case for Intelligent Design* (HarperOne, 2013); and *Signature in the Cell: DNA and the Evidence for Intelligent Design* (HarperOne, 2009), which was named a Book of the Year by the *Times (of London) Literary Supplement.* Meyer's many other publications include the peer-reviewed volume *Darwinism, Design and Public Education* (co-editor, Michigan State University Press, 2004) and the

innovative textbook *Explore Evolution* (co-editor, Hill House Publishers, 2007).

Meyer served as a geophysicist with the Atlantic Richfield Company (ARCO) from 1981-1985 and as a faculty member in philosophy at Whitworth College from 1990-2002. Meyer has published editorials in national newspapers such as *The Wall Street Journal, USA Today, The National Post (of Canada), The Daily Telegraph (of London),* and *The Los Angeles Times.* He has appeared on national television programs such as *The Jim Lehrer News Hour, NBC Nightly News, ABC Nightly News, CBS Sunday Morning, Nightline, Fox News Live, Paula Zahn Now (CNN), Good Morning America,* and the *Tavis Smiley Show* on PBS. He has also been featured in two *New York Times* front-page stories and has garnered attention in other top national and international media.

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[10] Paul Davies, *The Cosmic Blueprint* (New York: Simon & Schuster, 1988), 203.

[11] Fred Hoyle, "The Universe: Past and Present Reflections," *Annual Review of Astronomy and Astrophysics* 20 (1982), 16.

[12] A few physicists have proposed that if our bubble universe bumped into another bubble universe, it would leave detectable patterns in the cosmic microwave background radiation (CMBR). See Joshua Sokol, "A Brush with a Universe Next Door," *New Scientist* 228 (October 31, 2015), 8-9. Roger Penrose has made a similar claim for his conformal cyclic cosmology (CCC) model, in which the universe goes through infinitely many cycles, with the future time-like infinity of each earlier iteration being identified with the big bang singularity of the next. For a popular account, see Roger Penrose, *Cycles of Time: An Extraordinary New View of the Universe* (New York: Alfred A. Knopf, 2011). He argues that observed "hot spots" in the CMBR represent evidence of interaction between the different modes of the universe in its collapsing and expanding phases. Specifically, he sees hot spots in the CMBR as evidence of the collapse of black holes prior to the beginning of our universe in its present expansion phase. See Roger Penrose, "On the Gravitization of Quantum Mechanics 2: Conformal Cyclic Cosmology," *Foundations of Physics* 44 (2014), 873-890. Even so, his model does not, strictly speaking, represent a multiverse model, since the universes exist in succession, not in parallel.

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[14] Stephen C. Meyer, *Return of the God Hypothesis: Compelling Scientific Evidence for the Existence of God* (San Francisco, CA: HarperOne, 2021).

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[17] Sir Fred Hoyle and N.C. Wickramasinghe, *Evolution from Space: A Theory of Cosmic Creationism* (New York: Touchstone), 35-50.

[18] See Richard Dawkins quoted in *Expelled: No Intelligence Allowed* (Premise Media, 2008).

[19] Crick, *Life Itself*, 88.

[20] See Elliott Sober, "Intelligent design theory and the supernatural —The 'god or extraterrestrials' reply," *Faith and Philosophy* 24 (2007), 72-82. Sober, a philosophical naturalist who rejects the case for intelligent design, argues that *if* one does accept the argument for intelligent design in biology (from irreducible complexity), it makes more sense to affirm a supernatural designer than an extraterrestrial one. He argues that the "minimalist case" for intelligent design, when supplemented with a few additional and plausible premises (such as, for example, "the universe is finite"), leads logically to the conclusion that a transcendent intelligent designer must exist.

[21] In *Return of the God Hypothesis*, I also argue that theism provides a better explanation than deism, pantheism, panenthesim, and pansychism for the key facts that we have about biological and cosmological origins.