

# DARWIN'S DANGEROUS IDEA

*Evolution and the  
Meanings of Life*



DANIEL C.  
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*'A surpassingly  
brilliant book'*  
– Richard Dawkins

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## 1. IS NOTHING SACRED?

### CHAPTER ONE

# *Tell Me Why*

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We used to sing a lot when I was a child, around the campfire at summer camp, at school and Sunday school, or gathered around the piano at home. One of my favorite songs was "Tell Me Why." (For those whose personal memories don't already embrace this little treasure, the music is provided in the appendix. The simple melody and easy harmony line are surprisingly beautiful.)

Tell me why the stars do shine,  
Tell me why the ivy twines,  
Tell me why the sky's so blue.  
Then I will tell you just why I love you.

Because God made the stars to shine, Because  
God made the ivy twine, Because God made  
the sky so blue. Because God made you, that's  
why I love you.

This straightforward, sentimental declaration still brings a lump to my throat—so sweet, so innocent, so reassuring a vision of life!

And then along comes Darwin and spoils the picnic. Or does he? That is the topic of this book. From the moment of the publication of *Origin of Species* in 1859, Charles Darwin's fundamental idea has inspired intense reactions ranging from ferocious condemnation to ecstatic allegiance, sometimes tantamount to religious zeal. Darwin's theory has been abused and misrepresented by friend and foe alike. It has been misappropriated to lend scientific respectability to appalling political and social doctrines. It has been pilloried in caricature by opponents, some of whom would have it

compete in our children's schools with "creation science," a pathetic hodge-podge of pious pseudo-science.<sup>1</sup>

Almost no one is indifferent to Darwin, and no one should be. The Darwinian theory is a scientific theory, and a great one, but that is not all it is. The creationists who oppose it so bitterly are right about one thing: Darwin's dangerous idea cuts much deeper into the fabric of our most fundamental beliefs than many of its sophisticated apologists have yet admitted, even to themselves.

The sweet, simple vision of the song, taken literally, is one that most of us have outgrown, however fondly we may recall it. The kindly God who lovingly fashioned each and every one of us ( all creatures great and small) and sprinkled the sky with shining stars for our delight—*that* God is, like Santa Claus, a myth of childhood, not anything a sane, undeluded adult could literally believe in. *That* God must either be turned into a symbol for something less concrete or abandoned altogether.

Not all scientists and philosophers are atheists, and many who are believers declare that their idea of God can live in peaceful coexistence with, or even find support from, the Darwinian framework of ideas. Theirs is not an anthropomorphic Handicrafter God, but still a God worthy of worship in their eyes, capable of giving consolation and meaning to their lives. Others ground their highest concerns in entirely secular philosophies, views of the meaning of life that stave off despair without the aid of any concept of a Supreme Being—other than the Universe itself. Something *is* sacred to these thinkers, but they do not call it God; they call it, perhaps, Life, or Love, or Goodness, or Intelligence, or Beauty, or Humanity. What both groups share, in spite of the differences in their deepest creeds, is a conviction that life does have meaning, that goodness matters.

But can *any* version of this attitude of wonder and purpose be sustained in the face of Darwinism? From the outset, there have been those who thought they saw Darwin letting the worst possible cat out of the bag: nihilism. They thought that if Darwin was right, the implication would be that nothing could be sacred. To put it bluntly, nothing could have any point. Is this just an overreaction? What exactly are the implications of Darwin's idea—and, in any case, has it been scientifically proven or is it still "just a theory"?

Perhaps, you may think, we could make a useful division: there are the parts of Darwin's idea that really are established beyond any reasonable doubt, and then there are the speculative extensions of the scientifically

1. I will not devote any space in this book to cataloguing the deep flaws in creationism, or supporting my peremptory condemnation of it. I take that job to have been admirably done by Kitcher 1982, Futuyma 1983, Gilkey 1985, and others.

irresistible parts. Then—if we were lucky—perhaps the rock-solid scientific facts would have no stunning implications about religion, or human nature, or the meaning of life, while the parts of Darwin's idea that get people all upset could be put into quarantine as highly controversial extensions of, or mere interpretations of, the scientifically irresistible parts. That would be reassuring.

But alas, that is just about backwards. There are vigorous controversies swirling around in evolutionary theory, but those who feel threatened by Darwinism should not take heart from this fact. Most—if not quite all—of the controversies concern issues that are "just science"; no matter which side wins, the outcome will not undo the basic Darwinian idea. That idea, which is about as secure as any in science, really does have far-reaching implications for our vision of what the meaning of life is or could be.

In 1543, Copernicus proposed that the Earth was not the center of the universe but in fact revolved around the Sun. It took over a century for the idea to sink in, a gradual and actually rather painless transformation. (The religious reformer Philipp Melanchthon, a collaborator of Martin Luther, opined that "some Christian prince" should suppress this madman, but aside from a few such salvos, the world was not particularly shaken by Copernicus himself.) The Copernican Revolution did eventually have its own "shot heard round the world": Galileo's *Dialogue Concerning the Two Chief World Systems*, but it was not published until 1632, when the issue was no longer controversial among scientists. Galileo's projectile provoked an infamous response by the Roman Catholic Church, setting up a shock wave whose reverberations are only now dying out. But in spite of the drama of that epic confrontation, the idea that our planet is not the center of creation has sat rather lightly in people's minds. Every schoolchild today accepts this as the matter of fact it is, without tears or terror.

In due course, the Darwinian Revolution will come to occupy a similarly secure and untroubled place in the minds—and hearts—of every educated person on the globe, but today, more than a century after Darwin's death, we still have not come to terms with its mind-boggling implications. Unlike the Copernican Revolution, which did not engage widespread public attention until the scientific details had been largely sorted out, the Darwinian Revolution has had anxious lay spectators and cheerleaders taking sides from the outset, tugging at the sleeves of the participants and encouraging grandstanding. The scientists themselves have been moved by the same hopes and fears, so it is not surprising that the relatively narrow conflicts among theorists have often been not just blown up out of proportion by their adherents, but seriously distorted in the process. Everybody has seen, dimly, that a lot is at stake.

Moreover, although Darwin's own articulation of his theory was monumental, and its powers were immediately recognized by many of the scien-

tists and other thinkers of his day, there really were large gaps in his theory that have only recently begun to be properly filled in. The biggest gap looks almost comical in retrospect. In all his brilliant musings, Darwin never hit upon the central concept, without which the theory of evolution is hopeless: the concept of a *gene*. Darwin had no proper *unit* of heredity, and so his account of the process of natural selection was plagued with entirely reasonable doubts about whether it would work. Darwin supposed that offspring would always exhibit a sort of blend or average of their parents' features. Wouldn't such "blending inheritance" always simply average out all differences, turning everything into uniform gray? How could diversity survive such relentless averaging? Darwin recognized the seriousness of this challenge, and neither he nor his many ardent supporters succeeded in responding with a description of a convincing and well-documented mechanism of heredity that could combine traits of parents while maintaining an underlying and unchanged identity. The idea they needed was right at hand, uncovered ("formulated" would be too strong) by the monk Gregor Mendel and published in a relatively obscure Austrian journal in 1865, but, in the best-savored irony in the history of science, it lay there unnoticed until its importance was appreciated (at first dimly) around 1900. Its triumphant establishment at the heart of the "Modern Synthesis" (in effect, the synthesis of Mendel and Darwin) was eventually made secure in the 1940s, thanks to the work of Theodosius Dobzhansky, Julian Huxley, Ernst Mayr, and others. It has taken another half-century to iron out most of the wrinkles of that new fabric.

The fundamental core of contemporary Darwinism, the theory of DNA-based reproduction and evolution, is now beyond dispute among scientists. It demonstrates its power every day, contributing crucially to the explanation of planet-sized facts of geology and meteorology, through middle-sized facts of ecology and agronomy, down to the latest microscopic facts of genetic engineering. It unifies all of biology and the history of our planet into a single grand story. Like Gulliver tied down in Lilliput, it is unbudge-able, not because of some one or two huge chains of argument that might—hope against hope—have weak links in them, but because it is securely tied by hundreds of thousands of threads of evidence anchoring it to virtually every other area of human knowledge. New discoveries may conceivably lead to dramatic, even "revolutionary" *shifts* in the Darwinian theory, but the hope that it will be "refuted" by some shattering breakthrough is about as reasonable as the hope that we will return to a geocentric vision and discard Copernicus.

Still, the theory is embroiled in remarkably hot-tempered controversy, and one of the reasons for this incandescence is that these debates about scientific matters are usually distorted by fears that the "wrong" answer would have intolerable moral implications. So great are these fears that they

are carefully left unarticulated, displaced from attention by several layers of distracting rebuttal and counter-rebuttal. The disputants are forever changing the subject slightly, conveniently keeping the bogeys in the shadows. It is this misdirection that is mainly responsible for postponing the day when we can all live as comfortably with our new biological perspective as we do with the astronomical perspective Copernicus gave us.

Whenever Darwinism is the topic, the temperature rises, because more is at stake than just the empirical facts about how life on Earth evolved, or the correct logic of the theory that accounts for those facts. One of the precious things that is at stake is a vision of what it means to ask, and answer, the question "Why?" Darwin's new perspective turns several traditional assumptions upside down, undermining our standard ideas about what ought to count as satisfying answers to this ancient and inescapable question. Here science and philosophy get completely intertwined. Scientists sometimes deceive themselves into thinking that philosophical ideas are only, at best, decorations or parasitic commentaries on the hard, objective triumphs of science, and that they themselves are immune to the confusions that philosophers devote their lives to dissolving. But there is no such thing as philosophy-free science; there is only science whose philosophical baggage is taken on board without examination.

The Darwinian Revolution is both a scientific and a philosophical revolution, and neither revolution could have occurred without the other. As we shall see, it was the philosophical prejudices of the scientists, more than their lack of scientific evidence, that prevented them from seeing how the theory could actually work, but those philosophical prejudices that had to be overthrown were too deeply entrenched to be dislodged by mere philosophical brilliance. It took an irresistible parade of hard-won scientific facts to force thinkers to take seriously the weird new outlook that Darwin proposed. Those who are still ill-acquainted with that beautiful procession can be forgiven their continued allegiance to the pre-Darwinian ideas. And the battle is not yet over; even among the scientists, there are pockets of resistance.

Let me lay my cards on the table. If I were to give an award for the single best idea anyone has ever had, I'd give it to Darwin, ahead of Newton and Einstein and everyone else. In a single stroke, the idea of evolution by natural selection unifies the realm of life, meaning, and purpose with the realm of space and time, cause and effect, mechanism and physical law. But it is not just a wonderful scientific idea. It is a dangerous idea. My admiration for Darwin's magnificent idea is unbounded, but I, too, cherish many of the ideas and ideals that it *seems* to challenge, and want to protect them. For instance, I want to protect the campfire song, and what is beautiful and true in it, for my little grandson and his friends, and for their children when they grow up. There are many more magnificent ideas that are also jeopardized,

it seems, by Darwin's idea, and they, too, may need protection. The only good way to do this—the only way that has a chance in the long run—is to cut through the smokescreens and look at the idea as unflinchingly, as dispassionately, as possible.

On this occasion, we are not going to settle for "There, there, it will all come out all right." Our examination will take a certain amount of nerve. Feelings may get hurt. Writers on evolution usually steer clear of this apparent clash between science and religion. Fools rush in, Alexander Pope said, where angels fear to tread. Do you want to follow me? Don't you really want to know what survives this confrontation? What if it turns out that the sweet vision—or a better one—survives intact, strengthened and deepened by the encounter? Wouldn't it be a shame to forgo the opportunity for a strengthened, renewed creed, settling instead for a fragile, sickbed faith that you mistakenly supposed must not be disturbed?

There is no future in a sacred myth. Why not? Because of our curiosity. Because, as the song reminds us, *we want to know why*. We may have outgrown the song's answer, but we will never outgrow the question. Whatever we hold precious, we cannot protect it from our curiosity, because being who we are, one of the things we deem precious is the truth. Our love of truth is surely a central element in the meaning we find in our lives. In any case, the idea that we might preserve meaning by kidding ourselves is a more pessimistic, more nihilistic idea than I for one can stomach. If that were the best that could be done, I would conclude that nothing mattered after all.

This book, then, is for those who agree that the only meaning of life worth caring about is one that can withstand our best efforts to examine it. Others are advised to close the book now and tiptoe away.

For those who stay, here is the plan. Part I of the book locates the Darwinian Revolution in the larger scheme of things, showing how it can transform the world-view of those who know its details. This first chapter sets out the background of philosophical ideas that dominated our thought before Darwin. Chapter 2 introduces Darwin's central idea in a somewhat new guise, as the idea of evolution as an *algorithmic process*, and clears up some common misunderstandings of it. Chapter 3 shows how this idea overturns the tradition encountered in chapter 1. Chapters 4 and 5 explore some of the striking—and unsettling—perspectives that the Darwinian way of thinking opens up.

Part II examines the challenges to Darwin's idea—to neo-Darwinism or the Modern Synthesis—that have arisen within biology itself, showing that contrary to what some of its opponents have declared, Darwin's idea survives these controversies not just intact but strengthened. Part III then shows what happens when the same thinking is extended to the species we care about most: *Homo sapiens*. Darwin himself fully recognized that this



was going to be the sticking point for many people, and he did what he could to break the news gently. More than a century later, there are still those who want to dig a moat separating us from most if not all of the dreadful implications they think they see in Darwinism. Part III shows that this is an error of both fact and strategy; not only does Darwin's dangerous idea apply to us directly and at many levels, but the proper application of Darwinian thinking to human issues—of mind, language, knowledge, and ethics, for instance—illuminates them in ways that have always eluded the traditional approaches, recasting ancient problems and pointing to their solution. Finally, we can assess the bargain we get when we trade in pre-Darwinian for Darwinian thinking, identifying both its uses and abuses, and showing how what really matters to us—and ought to matter to us—shines through, transformed but enhanced by its passage through the Darwinian Revolution.

## 2. WHAT, WHERE, WHEN, WHY—AND HOW?

Our curiosity about things takes different forms, as Aristotle noted at the dawn of human science. His pioneering effort to classify them still makes a lot of sense. He identified four basic questions we might want answered about anything, and called their answers the four *aitia*, a truly untranslatable Greek term traditionally but awkwardly translated the four "causes."

- (1) We may be curious about what something is made of, its matter or *material cause*.
- (2) We may be curious about the form (or structure or shape) that that matter takes, its *formal cause*.
- (3) We may be curious about its beginning, how it got started, or its *efficient cause*.
- (4) We may be curious about its *purpose or goal or end* (as in "Do the ends justify the means?" ), which Aristotle called its *telos*, sometimes translated in English, awkwardly, as "final cause."

It takes some pinching and shoving to make these four Aristotelian *aitia* line up as the answers to the standard English questions "what, where, when, and why." The fit is only fitfully good. Questions beginning with "why," however, do standardly ask for Aristotle's fourth "cause," the *telos* of a thing. Why this? we ask. What is it/or? As the French say, what is its *raison d'être*, or reason for being? For hundreds of years, these "why" questions have been recognized as problematic by philosophers and scientists, so distinct that the topic they raise deserves a name: teleology.

A *teleological* explanation is one that explains the existence or occurrence of something by citing a goal or purpose that is served by the thing. Artifacts are the most obvious cases; the goal or purpose of an artifact is the function it was designed to serve by its creator. There is no controversy about the *telos* of a hammer: it is for hammering in and pulling out nails. The *telos* of more complicated artifacts, such as camcorders or tow trucks or CT scanners, is if anything more obvious. But even in simple cases, a problem can be seen to loom in the background:

"Why are you sawing that board?"

"To make a door."

"And what is the door for?"

"To secure my house."

"And why do you want a secure house?"

"So I can sleep nights."

"And why do you want to sleep nights?" "Go run along and stop asking such silly questions."

This exchange reveals one of the troubles with teleology: where does it all stop? What *final* final cause can be cited to bring this hierarchy of reasons to a close? Aristotle had an answer: God, the Prime Mover, the *for-which* to end all *for-whiches*. The idea, which is taken up by the Christian, Jewish, and Islamic traditions, is that all *our* purposes are ultimately God's purposes. The idea is certainly natural and attractive. If we look at a pocket watch and wonder *why* it has a clear glass crystal on its face, the answer obviously harks back to the needs and desires of the users of watches, who want to tell time, by looking at the hands through the transparent, protective glass, and so forth. If it weren't for these facts about *us*, for whom the watch was created, there would be no explanation of the "why" of its crystal. If the universe was created by God, for God's purposes, then all the purposes we can find in it must ultimately be due to God's purposes. But what are God's purposes? That is something of a mystery.

One way of deflecting discomfort about that mystery is to switch the topic slightly. Instead of responding to the "why" question with a "because"-type answer (the sort of answer it seems to demand), people often substitute a "how" question for the "why" question, and attempt to answer it by telling a story about *how it came to be* that God created us and the rest of the universe, without dwelling overmuch on just why God might want to have done that. The "how" question does not get separate billing on Aristotle's list, but it was a popular question and answer long before Aristotle undertook his analysis. The answers to the biggest "how" questions are *cosmogonies*, stories about how the *cosmos*, the whole universe and all its denizens, came into existence. The book of Genesis is

a cosmogony, but there are many others. Cosmologists exploring the hypothesis of the Big Bang, and speculating about black holes and superstrings, are present-day creators of cosmogonies. Not all ancient cosmogonies follow the pattern of an artifact-maker. Some involve a "world egg" laid in "the Deep" by one mythic bird or another, and some involve seeds' being sown and tended. Human imagination has only a few resources to draw upon when faced with such a mind-boggling question. One early creation myth speaks of a "self-existent Lord" who, "with a thought, created the waters, and deposited in them a seed which became a golden egg, in which egg he himself is born as Brahma, the progenitor of the worlds" (Muir 1972, vol. IV, p. 26).

And what's the point of all this egg-laying or seed-sowing or world-building? Or, for that matter, what's the point of the Big Bang? Today's cosmologists, like many of their predecessors throughout history, tell a diverting story, but prefer to sidestep the "why" question of teleology. Does the universe exist for any reason? Do reasons play any intelligible role in explanations of the cosmos? Could something exist for a reason without its being *somebody's* reason? Or are reasons—Aristotle's type (4) causes—only appropriate in explanations of the works and deeds of people or other rational agents? If God is not a person, a rational agent, an Intelligent Artificer, what possible sense could the biggest "why" question make? And if the biggest "why" question doesn't make any sense, how could any smaller, more parochial, "why" questions make sense?

One of Darwin's most fundamental contributions is showing us a new way to make sense of "why" questions. Like it or not, Darwin's idea offers one way—a clear, cogent, astonishingly versatile way—of dissolving these old conundrums. It takes some getting used to, and is often misapplied, even by its staunchest friends. Gradually exposing and clarifying this way of thinking is a central project of the present book. Darwinian thinking must be carefully distinguished from some oversimplified and all-too-popular impostors, and this will take us into some technicalities, but it is worth it. The prize is, for the first time, a stable system of explanation that does not go round and round in circles or spiral off in an infinite regress of mysteries. Some people would much prefer the infinite regress of mysteries, apparently, but in this day and age the cost is prohibitive: you have to get yourself deceived. You can either deceive yourself or let others do the dirty work, but there is no intellectually defensible way of rebuilding the mighty barriers to comprehension that Darwin smashed.

The first step to appreciating this aspect of Darwin's contribution is to see how the world looked before he inverted it. By looking through the eyes of two of his countrymen, John Locke and David Hume, we can get a clear vision of an alternative world-view—still very much with us in many quarters—that Darwin rendered obsolete.

## 3. LOCKE'S "PROOF" OF THE PRIMACY OF MIND

*John Locke invented common sense, and only Englishmen have had it ever since!*

—BERTRAND RUSSELL,<sup>2</sup>

John Locke, a contemporary of "the incomparable Mr. Newton," was one of the founding fathers of British Empiricism, and, as befits an Empiricist, he was not much given to deductive arguments of the rationalist sort, but one of his uncharacteristic forays into "proof deserves to be quoted in full, since it perfectly illustrates the blockade to imagination that was in place before the Darwinian Revolution. The argument may seem strange and stilted to modern minds, but bear with it—consider it a sign of how far we have come since then. Locke himself thought that he was just reminding people of something obvious! In this passage from his *Essay Concerning Human Understanding* (1690, IV, x, 10), Locke wanted to *prove* something that he thought all people knew in their hearts in any case: that "in the beginning" there was Mind. He began by asking himself what, if anything, was eternal:

If, then, there must be something eternal, let us see what sort of Being it must be. And to that it is very obvious to Reason, that it must necessarily be a cogitative Being. For it is as impossible to conceive that ever bare incogitative Matter should produce a thinking intelligent Being, as that nothing should of itself produce Matter....

Locke begins his proof by alluding to one of philosophy's most ancient and oft-used maxims, *Ex nihilo nihil fit*. nothing can come from nothing. Since this is to be a deductive argument, he must set his sights high: it is not just unlikely or implausible or hard to fathom but *impossible to conceive* that "bare incogitative Matter should produce a thinking intelligent Being." The argument proceeds by a series of mounting steps-.

2. Gilbert Ryle recounted this typical bit of Russellian hyperbole to me. In spite of Ryle's own distinguished career as Waynflete Professor of Philosophy at Oxford, he and Russell had seldom met, he told me, in large measure because Russell steered clear of academic philosophy after the Second World War. Once, however, Ryle found himself sharing a compartment with Russell on a tedious train journey, and, trying desperately to make conversation with his world-famous fellow traveler, Ryle asked him why he thought Locke, who was neither as original nor as good a writer as Berkeley, Hume, or Reid, had been so much more influential than they in the English-speaking philosophical world. This had been his reply, and the beginning of the only good conversation, Ryle said, that he ever had with Russell.

Let us suppose any parcel of Matter eternal, great or small, we shall find it, in itself, able to produce nothing \_\_\_\_ Matter then, by its own strength, cannot produce in itself so much as Motion: the Motion it has, must also be from Eternity, or else be produced, and added to Matter by some other Being more powerful than Matter \_\_\_\_ But let us suppose Motion eternal too: yet Matter, incogitative Matter and Motion, whatever changes it might produce of Figure and Bulk, could never produce Thought: Knowledge will still be as far beyond the power of Motion and Matter to produce, as Matter is beyond the power of nothing or nonentity to produce. And I appeal to everyone's own thoughts, whether he cannot as easily conceive Matter produced by nothing, as Thought produced by pure Matter, when before there was no such thing as Thought, or an intelligent Being existing. ...

It is interesting to note that Locke decides he may safely "appeal to everyone's own thoughts" to secure this "conclusion." He was sure that *his* "common sense" was truly *common* sense. Don't we see how obvious it is that whereas matter and motion could produce changes of "Figure and Bulk," they could *never* produce "Thought"? Wouldn't this rule out the prospect of robots—or at least robots that would claim to have genuine Thoughts among the motions in their material heads? Certainly in Locke's day—which was also Descartes's day—the very idea of Artificial Intelligence was so close to unthinkable that Locke could confidently expect unanimous endorsement of this appeal to his audience, an appeal that would risk hoots of derision today.<sup>3</sup> And as we shall see, the field of Artificial Intelligence is a quite direct descendant of Darwin's idea. Its birth, which was all but prophesied by Darwin himself, was attended by one of the first truly impressive demonstrations of the formal power of natural selection (Art Samuel's legendary checkers-playing program, which will be described in some detail later). And both evolution and AI inspire the same loathing in many people who should know better, as we shall see in later chapters. But back to Locke's conclusion:

So if we will suppose nothing first, or eternal: Matter can never begin to be: If we suppose bare Matter, without Motion, eternal: Motion can never begin to be: If we suppose only Matter and Motion first, or eternal: Thought can never begin to be. For it is impossible to conceive that Matter either with or without Motion could have originally in and from itself Sense,

3. Descartes's inability to think of Thought as Matter in Motion is discussed at length in my book *Consciousness Explained* (1991a). John Haugeland's aptly titled book, *Artificial Intelligence: The Very Idea* ( 1985 ), is a fine introduction to the philosophical paths that make this idea thinkable after all.

Perception, and Knowledge, as is evident from hence, that then Sense, Perception, and Knowledge must be a property eternally inseparable from Matter and every particle of it.

So, if Locke is right, Mind must come first—or at least tied for first. It could not come into existence at some later date, as an effect of some confluence of more modest, mindless phenomena. This purports to be an entirely secular, logical—one might almost say mathematical—vindication of a central aspect of Judeo-Christian ( and also Islamic ) cosmogony: in the beginning was something with Mind—"a cogitative Being," as Locke says. The traditional idea that God is a rational, thinking agent, a Designer and Builder of the world, is here given the highest stamp of scientific approval: like a mathematical theorem, its denial is supposedly impossible to conceive.

And so it seemed to many brilliant and skeptical thinkers before Darwin. Almost a hundred years after Locke, another great British Empiricist, David Hume, confronted the issue again, in one of the masterpieces of Western philosophy, his *Dialogues Concerning Natural Religion* (1779).

#### 4. HUME'S CLOSE ENCOUNTER

Natural religion, in Hume's day, meant a religion that was supported by the natural sciences, as opposed to a "revealed" religion, which would depend on revelation—on mystical experience or some other uncheckable source of conviction. If your only grounds for your religious belief is "God told me so in a dream," your religion is not natural religion. The distinction would not have made much sense before the dawn of modern science in the seventeenth century, when science created a new, and competitive, standard of evidence for all belief. It opened up the question:

Can you give us any *scientific* grounds for your religious beliefs?

Many religious thinkers, appreciating that the prestige of scientific thought was—other things being equal—a worthy aspiration, took up the challenge. It is hard to see why anybody would want to shun scientific confirmation of one's creed, if it were there to be had. The overwhelming favorite among purportedly scientific arguments for religious conclusions, then and now, was one version or another of the Argument from Design: among the effects we can objectively observe in the world, there are many that are not (cannot be, for various reasons ) mere accidents; they must have been designed to be as they are, and there cannot be design without a Designer; therefore, a Designer, God, must exist (or have existed), as the source of all these wonderful effects.

Such an argument can be seen as an attempt at an alternate route to Locke's conclusion, a route that will take us through somewhat more empirical detail instead of relying so bluntly and directly on what is deemed inconceivable. The actual features of the observed designs may be analyzed, for instance, to secure the grounds for our appreciation of the wisdom of the Designer, and our conviction that mere chance could not be responsible for these marvels.

In Hume's *Dialogues*, three fictional characters pursue the debate with consummate wit and vigor. Cleanthes defends the Argument from Design, and gives it one of its most eloquent expressions.<sup>4</sup> Here is his opening statement of it:

Look round the world. Contemplate the whole and every part of it: You will find it to be nothing but one great machine, subdivided into an infinite number of lesser machines, which again admit of subdivisions to a degree beyond what human senses and faculties can trace and explain. All these various machines, and even their most minute parts, are adjusted to each other with an accuracy which ravishes into admiration all men who have ever contemplated them. The curious adapting of means to ends, throughout all nature, resembles, exactly, though it much exceeds, the productions of human contrivance—of human design, thought, wisdom, and intelligence. Since therefore the effects resemble each other, we are led to infer, by all the rules of analogy, that the causes also resemble, and that the Author of Nature is somewhat similar to the mind of man, though possessed of much larger faculties, proportioned to the grandeur of the work which he has executed. By this argument *a posteriori*, and by this argument alone, do we prove at once the existence of a Deity and his similarity to human mind and intelligence. [Pt. II]

Philo, a skeptical challenger to Cleanthes, elaborates the argument, setting it up for demolition. Anticipating Paley's famous example, Philo notes: "Throw several pieces of steel together, without shape or form; they will never arrange themselves so as to compose a watch."<sup>5</sup> He goes on: "Stone, and mortar, and wood, without an architect, never erect a house. But the

4. William Paley carried the Argument from Design into much greater biological detail in his 1803 book, *Natural Theology*, adding many ingenious flourishes. Paley's influential version was the actual inspiration and target of Darwin's rebuttal, but Hume's Cleanthes catches all of the argument's logical and rhetorical force.

5. Gjertsen points out that two millennia earlier, Cicero used the same example for the same purpose: "When you see a sundial or a water-clock, you see that it tells the time by design and not by chance. How then can you imagine that the universe as a whole is devoid of purpose and intelligence, when it embraces everything, including these artifacts themselves and their artificers?" (Gjertsen 1989, p. 199).

ideas in a human mind, we see, by an unknown, inexplicable economy, arrange themselves so as to form the plan of a watch or house. Experience, therefore, proves, that there is an original principle of order in mind, not in matter" (Pt. II).

Note that the Argument from Design depends on an inductive inference: where there's smoke, there's fire; and where there's design, there's mind. But this is a dubious inference, Philo observes: human intelligence is

no more than one of the springs and principles of the universe, as well as heat or cold, attraction or repulsion, and a hundred others, which fall under daily observation\_\_\_ But can a conclusion, with any propriety, be transferred from parts to the whole?... From observing the growth of a hair, can we learn any thing concerning the generation of a man?... What peculiar privilege has this little agitation of the brain which we call thought, that we must thus make it the model of the whole universe?... Admirable conclusion! Stone, wood, brick, iron, brass have not, at this time, in this minute globe of earth, an order or arrangement without human art and contrivance: Therefore the universe could not originally attain its order and arrangement, without something similar to human art. [Pt. II.]

Besides, Philo observes, if we put mind as the first cause, with its "unknown, inexplicable economy," this only postpones the problem:

We are still obliged to mount higher, in order to find the cause of this cause, which you had assigned as satisfactory and conclusive\_\_\_ How therefore shall we satisfy ourselves concerning the cause of that Being, whom you suppose the Author of nature, or, according to your system of anthropomorphism, the ideal world, into which you trace the material? Have we not the same reason to trace that ideal world into another ideal world, or new intelligent principle? But if we stop, and go no farther; why go so far? Why not stop at the material world? How can we satisfy ourselves without going on *in infinitum*? And after all, what satisfaction is there in that infinite progression? [Pt. IV.]

Cleanthes has no satisfactory responses to these rhetorical questions, and there is worse to come. Cleanthes insists that God's mind is *like the human*—and agrees when Philo adds "the liker the better." But, then, Philo presses on, is God's mind perfect, "free from every error, mistake, or incoherence in his undertakings" (Pt. V)? There is a rival hypothesis to rule out:

And what surprise must we entertain, when we find him a stupid mechanic, who imitated others, and copied an art, which, through a long succession of ages, after multiplied trials, mistakes, corrections, deliberations, and controversies, had been gradually improving? Many worlds might have



been botched and bungled, throughout an eternity, ere this system was struck out: Much labour lost: Many fruitless trials made: And a slow, but continued improvement carried on during infinite ages of world-making. (Pt. V.)

When Philo presents this fanciful alternative, with its breathtaking anticipations of Darwin's insight, he doesn't take it seriously except as a debating foil to Cleanthes' vision of an all-wise Artificer. Hume uses it only to make a point about what he saw as the limitations on our knowledge: "In such subjects, who can determine, where the truth; nay, who can conjecture where the probability, lies; amidst a great number of hypotheses which may be proposed, and a still greater number which may be imagined" (Pt. V). Imagination runs riot, and, exploiting that fecundity, Philo ties Cleanthes up in knots, devising weird and comical variations on Cleanthes' own hypotheses, defying Cleanthes to show why his own version should be preferred. "Why may not several Deities combine in contriving and framing a world?... And why not become a perfect anthropomorphite? Why not assert the Deity or Deities to be corporeal, and to have eyes, a nose, mouth, ears, etc.?" (Pt. V). At one point, Philo anticipates the Gaia hypothesis: the universe

bears a great resemblance to an animal or organized body, and seems actuated with a like principle of life and motion. A continual circulation of matter in it produces no disorder\_\_\_\_The world, therefore, I infer, is an animal, and the Deity is the SOUL of the world, actuating it and actuated by it. [Pt. VI.]

Or perhaps isn't the world really more like a vegetable than an animal?

In like manner as a tree sheds its seed into the neighboring fields, and produces other trees; so the great vegetable, the world, or this planetary system, produces within itself certain seeds, which, being scattered into the surrounding chaos, vegetate into new worlds. A comet, for instance, is the seed of a world.... [Pt. VII.]

One more wild possibility for good measure:

The Brahmins assert, that the world arose from an infinite spider, who spun this whole complicated mass from his bowels, and annihilates afterwards the whole or any part of it, by absorbing it again, and resolving it into his own essence. Here is a species of cosmogony, which appears to us ridiculous; because a spider is a little contemptible animal, whose operation we are never likely to take for a model of the whole universe. But still here is

a new species of analogy, even in our globe. And were there a planet wholly inhabited by spiders (which is very possible), this inference would there appear as natural and irrefragable as that which in our planet ascribes the origin of all things to design and intelligence, as explained by Cleanthes. Why an orderly system may not be spun from the belly as well as from the brain, it will be difficult for him to give a satisfactory reason. [Pt. VII.]

Cleanthes resists these onslaughts gamely, but Philo shows fatal flaws in every version of the argument that Cleanthes can devise. At the very end of the *Dialogues*, however, Philo surprises us by agreeing with Cleanthes:

... die legitimate conclusion is that... if we are not contented with calling the first and supreme cause a *God* or *Deity*, but desire to vary the expression, what can we call him but *Mind* or *Thought* to which he is justly supposed to bear a considerable resemblance? [Pt. XII.]

Philo is surely Hume's mouthpiece in the *Dialogues*. Why did Hume cave in? Out of fear of reprisal from the establishment? No. Hume knew he had shown that the Argument from Design was an irreparably flawed bridge between science and religion, and he arranged to have *his Dialogues* published after his death in 1776 precisely in order to save himself from persecution. He caved in because *he just couldn't imagine* any other explanation of the origin of the manifest design in nature. Hume could not see how the "curious adapting of means to ends, throughout all nature" could be due to chance—and if not chance, what?

What could possibly account for this high-quality design if not an intelligent God? Philo is one of the most ingenious and resourceful competitors in any philosophical debate, real or imaginary, and he makes some wonderful stabs in the dark, hunting for an alternative. In Part VIII, he dreams up some speculations that come tantalizingly close to scooping Darwin (and some more recent Darwinian elaborations) by nearly a century.

Instead of supposing matter infinite, as Epicurus did, let us suppose it finite. A finite number of particles is only susceptible of finite transpositions: And it must happen, in an eternal duration, that every possible order or position must be tried an infinite number of times\_\_\_ Is there a system, an order, an economy of things, by which matter can preserve that perpetual agitation, which seems essential to it, and yet maintain a constancy in the forms, which it produces? There certainly is such an economy: For this is actually the case with the present world. The continual motion of matter, therefore, in less than infinite transpositions, must produce this economy or order; and by its very nature, that order, when once established, supports itself, for many ages, if not to eternity. But wherever matter is so poised, arranged, and adjusted as to continue in perpetual motion, and yet pre-

serve a constancy in the forms, its situation must, of necessity, have all the same appearance of art and contrivance which we observe at present \_\_\_\_ A defect in any of these particulars destroys the form; and the matter, of which it is composed, is again set loose, and is thrown into irregular motions and fermentations, till it unite itself to some other regular form \_\_\_\_

Suppose ... that matter were thrown into any position, by a blind, unguided force; it is evident that this first position must in all probability be the most confused and most disorderly imaginable, without any resemblance to those works of human contrivance, which, along with a symmetry of parts, discover an adjustment of means to ends and a tendency to self-preservation \_\_\_\_ Suppose, that the actuating force, whatever it be, still continues in matter \_\_\_\_ Thus the universe goes on for many ages in a continued succession of chaos and disorder. But is it not possible that it may settle at last... ? May we not hope for such a position, or rather be assured of it, from the eternal revolutions of unguided matter, and may not this account for all the appearing wisdom and contrivance which is in the universe?

Hmm, it seems that something like this might work... but Hume couldn't quite take Philo's daring foray seriously. His final verdict: "A total suspense of judgment is here our only reasonable resource" (Pt. VIII). A few years before him, Denis Diderot had also written some speculations that tantalizingly foreshadowed Darwin: "I can maintain to you ... that monsters annihilated one another in succession; that all the defective combinations of matter have disappeared, and that there have only survived those in which the organization did not involve any important contradiction, and which could subsist by themselves and perpetuate themselves" (Diderot 1749). Cute ideas about evolution had been floating around for millennia, but, like most philosophical ideas, although they did seem to offer a solution of sorts to the problem at hand, they didn't promise to go any farther, to open up new investigations or generate surprising predictions that could be tested, or explain any facts they weren't expressly designed to explain. The evolution revolution had to wait until Charles Darwin saw how to weave an evolutionary hypothesis into an explanatory fabric composed of literally thousands of hard-won and often surprising facts about nature. Darwin neither invented the wonderful idea out of whole cloth all by himself, nor understood it in its entirety even when he had formulated it. But he did such a monumental job of clarifying the idea, and tying it down so it would never again float away, that he deserves the credit if anyone does. The next chapter reviews his basic accomplishment.

CHAPTER 1: *Before Darwin, a "Mind-first" view of the universe reigned unchallenged; an intelligent God was seen as the ultimate source of all Design, the ultimate answer to any chain of "Why?" questions. Even David*

*Hume, who deftly exposed the insoluble problems with this vision, and had glimpses of the Darwinian alternative, could not see how to take it seriously.*

CHAPTER 2: *Darwin, setting out to answer a relatively modest question about the origin of species, described a process he called natural selection, a mindless, purposeless, mechanical process. This turns out to be the seed of an answer to a much grander question: how does Design come into existence?*