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Chapter 1

II DAWKINS

Richard Dawkins … states his claim: the enormous variety of the living world has been produced by natural selection winnowing some form of genetic variability unguided by the hand of God or any other person. Probably his most widely known declaration to that effect is to be found in *The Blind Watchmaker:*

> All appearances to the contrary, the only watchmaker in nature is the blind forces of physics, albeit deployed in a very special way. A true watchmaker has foresight: he designs his cogs and springs, and plans their interconnections, with a future purpose in his mind's eye. Natural selection, the blind, unconscious automatic process which Darwin discovered, and which we now know is the explanation for the existence and apparently purposeful form of all life, has no purpose in mind. It has no mind and no mind's eye. It does not plan for the future. It has no vision, no foresight, no sight at all. If it can be said to play the role of watchmaker in nature, it is the *blind* watchmaker. (p. 5)

The very subtitle of this book trumpets his theme: "Why the evidence of evolution reveals a universe without design." Now it is part of Christian and other theistic belief that God has created human beings, and created them in his own image. Obviously, if Dawkins's claim is true, this claim is false. The latter requires that God intended to create creatures of a certain kind—creatures in his image—and then acted in such a way as to see to it that they come into existence. This claim does not require that God *directly* created human beings, or that he didn't do it by way of an evolutionary process, or even that he was especially interested in creating precisely our species (or even you and me). But if he created human beings in his image, then at the least he intended that there be creatures of a certain sort, and acted in such a way as to guarantee that creatures of that sort came to be. Dawkins's claim—that the living world emerged by way of unguided natural selection—is clearly incompatible with this claim. We shall have to look into his reasons. Why does he think that natural selection is blind and unguided? Why does he think that *"the*

evidence of evolution reveals a universe without design"? How does the evidence of evolution reveal such a thing?

Well, what, exactly, does current evolutionary science claim? That's not entirely easy to say; you can't find an authoritative statement of it emblazoned on the walls of the National Academy of Science or anywhere else; there is considerable diversity of opinion as to what, precisely, are the essentials of contemporary evolutionary theory. Dawkins, for example, apparently thinks once life began, it was more or less inevitable that we would wind up with a living world very much like the one we see. Gould disagreed: he thought that if the tape were rewound and then let go forward again, chances are we'd get something wholly different. Writers also differ as to how *much* natural selection explains, how much must be explained in other ways, and how much is left unexplained.

For simplicity (and because we are thinking about Dawkins, an enthusiast for natural selection), let's stick with what above I called "Darwinism," the idea that the main or possibly even only mechanism driving the whole process of evolution is natural selection culling random genetic mutation. A Darwinist will think there is a *complete Darwinian history* for every contemporary species, and indeed for every contemporary organism. Start with the population of prokaryotes (e.g., bacteria and blue-green algae) to be found on earth some 3 billion years ago. There is in principle a complete history specifying which genetic mutations occurred with respect to each member of that population, which of these mutations were heritable and adaptive, and which then successfully spread through the population. This history would go on to specify (vagueness aside) when, as a result of this process, the first single-celled eukaryotes (creatures with a proper nucleus) appeared; it would then describe how, in this way, the first new species came to be, the first new genera, the first new phyla, and so on. It would proceed through the Cambrian explosion, specifying in complete detail which adaptive and heritable mutations arose at what times and in which creatures, and how they then spread through the population, eventually issuing in that remarkable eruption of life forms. Continuing over the eons, this history would trace in detail the development of all forms of life: the invertebrates, the various forms of vertebrate life including fish, reptiles, birds, and mammals; it would end with a description of all the contemporary forms of life.

This history, if written, would occupy an enormous library: call it the Library of Life. The claim is not, of course, that we are or ever will be in possession of that library. We don't have anything like detailed knowledge of any of the books it contains, or even of any chapters or passages in any of those books. The Darwinian claim is only that (1) there is such a history, (2) there is *good evidence* for current views as to the overall shape of the history, and (3) we have some informed guesses as to how, at a high level of abstraction, some of the transitions occurred: examples would be the sorts of guesses made by Dawkins as to the origin and development of the mammalian eye, or the common suggestion that the bones in the mammalian middle ear developed from the reptilian jawbone.

Now there is nothing here, so far, to suggest that this whole process was unguided; it could have been superintended and orchestrated by God. For all the library says, God could have achieved the results he wanted by causing the right mutations to arise at the right times, letting natural selection do the rest. Another possibility: Thomas Huxley, Darwin's bulldog, was an agnostic (and in fact invented the term); nevertheless he suggested that God could have set things up initially so that the right mutations would be forthcoming at the right times, leading to the results he wanted. No doubt there are other ways in which he could have directed and orchestrated the process. Dawkins's claim, of course, is that there is no such intelligent agent guiding the process; *the evidence of evolution,"* he says, *"reveals a universe without design."* What makes him think this is true? How does he propose to argue for this claim?

Not, naturally enough, by specifying chapter and verse in relevant volumes of the library and showing or even arguing that the processes involved in those transitions were not in fact overseen or guided by such an agent; our powers are a bit slim for that. Instead, he tries to show that it is *possible* that unguided natural selection should have produced all these wonders; it *could be* that they have all come to be just by virtue of unguided natural selection. He does this, first, by attacking arguments for the conclusion that natural selection could *not* have done so. Or rather, he attacks certain kinds of such arguments, ignoring others. Among those he ignores, for example, is John Locke’s claim that “it is as impossible to conceive that ever pure incogitative Matter should produce a thinking intelligent Being, as that nothing should of itself produce Matter.” Many

have concurred with Locke, but Dawkins fails to so much as mention this kind of claim. Nor does he try to show either that there is no such person as God, or that, if there is, it is not possible that he should have somehow set up and directed the whole process. And why should he? After all, he's a biologist and not a philosopher.

Instead, Dawkins tries to refute some of the more specific and specifically biological arguments to the effect that unguided natural selection could not have produced certain of the wonders of the living world—the mammalian eye, for example, or the wing, or the bat's sonar. He argues that the objectors have not made their case. Here he sometimes stumbles; for example, he apparently confuses the question "What good is 5 percent of an eye?" with "What good is 5 percent vision?": "An ancient animal with 5 per cent of an eye," he says, "might indeed have used it for something other than sight, but it seems to me at least as likely that it used it for 5 per cent vision." But not just any old 5 percent of an eye will produce 5 percent vision; indeed there may not be *any* 5 percent of an eye that produces 5 percent vision.

Just for purposes of argument, let's concede that Dawkins succeeds in refuting each of these claims of impossibility. Clearly that doesn't entail that the impossibility claims are false; it shows only that certain arguments for them are not cogent. The question still remains: *is* it possible that unguided natural selection generate all the stunning marvels of the living world? Dawkins puts this question in the following tripartite fashion:

> (3) Is there a continuous series of Xs connecting the modern human eye to a state with no eye at all?
>
> (4) Considering each member of the series of hypothetical Xs connecting the human eye to no eye at all, is it plausible that every one of them was made available by random mutation of its predecessor?
>
> (5) Considering each member of the series of Xs connecting the human eye to no eye at all, is it plausible that every one of them worked sufficiently well that it assisted the survival and reproduction of the animals concerned? (pp. 78-9)

Compressing things a bit, we could put the question as follows. Imagine a three-dimensional space—"organic space," as we might call it—where each of the countably infinite points is a possible life form. Then the Big Question is:

> (BQ) Is there a path through organic space connecting, say, some ancient population of unicellular life with the human eye, where each point on the path could plausibly have come from a preceding point by way of a heritable random genetic mutation that was adaptively useful, and that could plausibly then have spread through the appropriate population by way of unguided natural selection?

A couple of comments on (BQ). First, the human eye is just a stand-in for life forms generally; the question is not merely whether the human eye could have developed in this way, but whether *all* the current life forms could have. Second, we must start with an *actual* (not merely possible) population of unicellular life, a population that did in fact exist: the claim is that human beings (and hence the human eye) could have developed via unguided natural selection from some population of unicellular organisms that actually existed. Third, the other life forms on the path—the ones "between" the population of unicellular organisms and human beings—must be possible, but need not be actually existent. (That is, they need not be actually instantiated or exemplified; it's enough if they are possibly instantiated.) Dawkins is really asking - whether it is *plausible* that the human eye develop in this way, starting from some population of unicellular organisms. Of course if in fact the eye *did* develop in this way, there would have to be such a path connecting life forms that had existent instantiations. Fourth, the points on the path will have to be temporally indexed, with the temporal distance between a pair of points on the path being sufficient for the relevant mutation to spread through the population in question. That means that the time elapsed from that initial population of unicellular organisms to the appearance of the eye imposes a constraint on the number of points the path in question can contain and the temporal distance between them; the number of points the path contains and the temporal distance between them can be large but is not unlimited.

Finally, and crucially, what is the force of "could plausibly" in "each point along the path is such that it *could plausibly* have come from a preceding point on the path by way of a heritable random genetic mutation?" We're not talking broadly logical possibility, of course; we're

not asking whether there is a possible world in which this development takes place. That would be much too weak; to use a Dawkinsian example, there are possible worlds in which the bronze statues in the park (constituted just as they presently are) wave goodbye when you leave. We are instead talking about something like *biological* possibility, and, as Dawkins thinks of biological possibility, it is to be explained in terms of *probability.* A given point on a path could plausibly have come from a preceding point by way of genetic mutation just if it is not too improbable that it do so. It might be possible in the broadly logical sense that a sufficiently complex single mutation take us all the way from a paradigm reptile to a paradigm mammal—possible, but far too unlikely. So the mutations must be reasonably probable, not too improbable, with respect to the previous point. Not too improbable, of course, apart from any special divine aid or special divine action. The mutation in question would have to occur and be caused in the usual way—by way of cosmic radiation, or x-ray, or chemical agent or whatever—but not by way of special divine action. How much improbability is too much? Here one can answer only in the vaguest terms. Dawkins suggests, sensibly enough, that the improbability would have to be much less than that of that statue waving at us as we leave the park.

How does Dawkins answer (BQ), or rather, his tripartite version of it? (3), you recall, was the question "Is there a continuous series of Xs connecting the modern human eye to a state with no eye at all?" His reply: "It seems to me clear that the answer has to be yes, provided only that we allow ourselves a *sufficiently* large series of Xs. No doubt he's right about (3); surely there is such a relevant series. We can see this as follows: consider a particular human eye—one of Dawkins's, for example; assign a number to each cell contained in that eye (as with certain kinds of build-it-yourself toy kits); let the first member of the series be a creature that has cell number 1, the second be one that contains cells number 2 and number 1; the third contain cell number 3 plus cells number 1 and 2, and so on. This won't quite work; for this eye to function, there will also have to be an appropriate brain or part of a brain to which it is connected by an optic nerve. But you get the idea: clearly there is such a series. Of course that by itself doesn't show much; if it's to be relevant, the length of the series will have to be constrained by the time available, and each step in the series will have to be such that it can arise by way of genetic mutation from a previous step. Furthermore (and crucially), each mutation will have to be fitness-

conferring (or at least not unduly costly in terms of fitness), so that it's not too improbable that they be preserved by natural selection. This is where his answers to (4) and (5) come in.

Dawkins's answer to (4), (Considering each member of the series of hypothetical Xs connecting the human eye to no eye at all, is it plausible that every one of them was made available by random mutation of its predecessor?): "My feeling is that, provided the difference between neighboring intermediates in our series leading to the eye is *sufficiently small,* the necessary mutations are almost bound to be forthcoming." Finally question (5): Considering each member of the series of Xs connecting the human eye to no eye at all, is it plausible that every one of them worked sufficiently well that it assisted the survival and reproduction of the animals concerned? As Dawkins notes, some people claim that the obvious answer is "no"; he argues that they are mistaken. These people point to a particular structure or organ and claim that there isn't a Darwinian series for that structure or organ; Dawkins makes suggestions as to how such a series might in fact go.

There are two basic ways in which Dawkins's argument is weak. First, returning to BQ, there is surely no *guarantee* that there is a not-too-improbable path through organic space from some early population of unicellular organisms to human beings, or, for that matter, to fruit flies. It might be, as Michael Behe claims, that some structures simply can't be reached by way of small steps (each advantageous or not too disadvantageous) from preceding life forms. Among his proposed examples: the bacterial cilium, the cascade of electrical activity that occurs when a light sensitive spot is hit by a photon, blood clotting, the mammalian immune system, and the complicated molecular machines to be found in any living cell. Many have rejected Behe's specific arguments here; still, perhaps he's right. (I consider some of Behe's arguments in chapter 7.) Perhaps no matter how small you make the steps, there are life forms that can't be reached from previous forms, except at the cost of astronomical, prohibitive improbability. How could we tell that this isn't so? True, Dawkins says that his feeling is that indeed it isn't so; but how much confidence can we put in feelings and guesses?

So the first weakness in Dawkins's argument is that the premises, his answers to questions (4) and (5) above, are controversial, unsupported,

and pretty much guesswork. There is no attempt at the sort of serious calculation that would surely be required for a genuine answer. No doubt such a calculation and hence an answer to those questions is at present far beyond our knowledge and powers; no doubt it would be unreasonable to require such a calculation; still, the fact remains we don't have a serious answer.

But Dawkins's answers to (4) and (5) are correct; the argument is still in trouble. Recall that his answer to question (3) is yes, "provided only that we allow ourselves a *sufficiently large* series"; his answer to (4): "My feeling is that, provided the difference between neighboring intermediates in our series leading to the eye is *sufficiently small*..." But even if he is right about the answers to (3) and (4), it doesn't follow that the whole path is plausibly possible in his sense—that is, it doesn't follow that the path is not astronomically improbable. That is because of the temporal constraint imposed. Suppose there have been multicellular organisms for, say, a billion years. This means that the series can't be arbitrarily long and the distance between the points arbitrarily small.

Dawkins's argument, therefore, is pretty weak. But what about the truth of his conclusion? Is there a Darwinian series for the eye, and for the other forms of life? Is Dawkins right? How can we tell? How could we determine a thing like that? Michael Behe is by no means the only biologist who thinks it's at best extremely unlikely that there is such a series; for example, according to the biologist Brian Goodwin,

> It appears that Darwin's theory works for the small-scale aspects of evolution: it can explain the variations and the adaptations with species that produce fine-tuning of varieties to different habitats. The large-scale differences of form between types of organism that are the foundation of biological classification systems seem to require another principle than natural selection operating on small variation, some process that gives rise to distinctly different forms of organism. This is the problem of emergent order in evolution, the origins of novel structures in organisms, which has always been one of the primary foci of attention in biology. (*How the Leopard Changed its Spots*, Princeton U. P., 1994, p. ix)

Others, like Dawkins, think there is such a series.

On this point there is likely to be a difference between theists and nontheists. For the nontheist, undirected evolution is the only game in town, and natural selection seems to be the most plausible mechanism to drive that process. Here is this stunningly intricate world with its enormous diversity and apparent design; from the perspective of naturalism or nontheism, the only way it could have happened is by way of unguided Darwinian evolution; hence it *must* have happened that way; hence there *must* be such a Darwinian series for each current life form. The theist, on the other hand, has a little more freedom here: maybe there is such a series and maybe there isn't; God has created the living world and could have done it in any number of different ways; there doesn't *have* to be any such series. In this way the theist is freer to follow the evidence where it leads.

But the main point here lies in another direction. Dawkins claims that the living world came to be by way of unguided evolution: "the Evidence of Evolution," he says, "Reveals a Universe Without Design." What he actually argues, however, is that there is a Darwinian series for contemporary life forms. As we have seen, this argument is inconclusive; but even if it were air-tight it wouldn't show, of course, that the living world, let alone the entire universe, is without design. At best it would show, given a couple of assumptions, that it is not astronomically improbable that the living world was produced by unguided evolution and hence without design.

But the argument form:

p is not astronomically improbable
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therefore, p

is a bit unprepossessing. I announce to my wife, "I'm getting a $50,000 raise for next year!" Naturally she asks me why I think so. "Because the arguments against its being astronomically improbable fail! For all we know, it's not astronomically improbable!" (Well, maybe it *is* pretty improbable, but you get the idea.) If he's successful, what Dawkins really shows is that the arguments against there being a Darwinian series are not conclusive. What he shows, if he's successful, is that *for all we know* there is such a series, so that for all we know it's possible that the living world came to be in this fashion. We could put it like this: what he

shows, at best, is that it's epistemically possible that it's biologically possible that life came to be without design. But that's a little short of what he claims to show.

It is perhaps worth noting and stressing the difference between claim and performance here. Dawkins claims that he will show that the entire living world came to be without design; what he actually argues is only that this is possible and we don't know that it is astronomically improbable; for all we know it's not astronomically improbable. But mere possibility claims are not impressive. To put to better use an example proposed by Bertrand Russell and mentioned by Dawkins in his book *The God Delusion*, it's possible that there is a china teapot orbiting the sun between Earth and Mars, out of reach of our telescopes; this ought not to dispose us favorably to the thought that indeed there is a china teapot orbiting the sun between Earth and Mars. But the same goes for the claim that a certain state of affairs is not astronomically improbable. Perhaps it isn't; but that, so far, gives us no reason whatever to endorse it, and in fact doesn't so much as make it sensible to endorse that claim.

Have I perhaps misinterpreted Dawkins? Some with whom I have discussed his argument have thought that he couldn't possibly have intended an argument as weak as the one I've attributed to him; he must have additional premises in mind. Perhaps they are right; of course it is difficult to consider an argument when one is obliged to guess at its premises. Still, what might be other possibilities? What might Dawkins be thinking? Yehuda Gellman and Dennis Monokroussos have suggested (in personal communication) that perhaps Dawkins intends an argument connected with his claim, made in *The Blind Watchmaker*, that an attempt to explain the stunning variety of life by a hypothesis involving design is misguided in that any being able to create life would itself have to be too complex:

> Organized complexity is the thing that we are having difficulty in explaining. Once we are allowed simply to *postulate* organized complexity, if only the organized complexity of the DNA/protein replicating machine, it is relatively easy to invoke it as a generator of yet more organized complexity.... But of course any God capable of intelligently designing something as complex as the DNA/protein machine must have been at least as complex and organized as that machine itself... To explain the origin of the DNA/protein machine by

> invoking a supernatural Designer is to explain precisely nothing, for it leaves unexplained the origin of the Designer. (p. 140)

Design doesn't *explain* organized complexity (says Dawkins); it *presupposes* it, because the designer would have to be as complex as what it creates (designs). Perhaps, therefore, Dawkins means to argue along the following lines: there are really just two explanations of life: unguided Darwinism and an explanation, guided Darwinism, perhaps, that involves design. But the latter is really no explanation at all. Therefore the only candidate is the former.

Here there are two problems. First, this argument doesn't depend on the facts of biology; it is substantially independent of the latter. Is it likely that Dawkins would be offering an argument of that sort? If so, why would he claim that it is "the Evidence of Evolution" that "Reveals a World Without Design"?

Set that problem aside for the moment; there is another and deeper problem with this argument. Suppose we land on an alien planet orbiting a distant star and discover some machine-like objects that look and work just like a 1941 Allis Chalmers tractor; our leader says "there must be intelligent beings on this planet—look at those tractors." A sophomore philosophy student on the expedition objects: "Hey, hold on a minute! You have explained nothing at all! Any intelligent life that designed those tractors would have to be at least as complex as they are!" No doubt we'd tell him a little learning is a dangerous thing and advise him to take the next rocket ship home and enroll in another philosophy course or two. For of course it is perfectly sensible, in that context, to explain the existence of those tractors in terms of intelligent life, even though (as we can concede for present purposes) that intelligent life would have to be at least as complex as the tractors. The point is we aren't trying to give an *ultimate* explanation of organized complexity, and we aren't trying to explain organized complexity *in general;* we are only trying to explain one particular manifestation of it (those tractors). And (unless you are trying to give an ultimate explanation of organized complexity) it is perfectly proper to explain one manifestation of organized complexity in terms of another. Hence it is not the case, contra Dawkins, that an explanation in terms of divine design is a nonstarter. Such an explanation doesn't constitute an ultimate explanation of organized complexity (if

God is complex, nothing could constitute such an explanation); but it is none the worse for that.

A second point: Dawkins argues that “the main thing we want to explain” is “organized complexity.” He goes on to say that “the one thing that makes evolution such a neat theory is that it explains how organized complexity can arise out of primeval simplicity,” and he faults theism for being unable to explain organized complexity. Now first, in biology we are attempting to describe and explain terrestrial life, not organized complexity generally. And second: *mind* would be an outstanding example of organized complexity, according to Dawkins. …

In *The God Delusion* he argues that the existence of God is monumentally improbable—about as probable as the assembly of a flight-worthy Boeing 747 by a hurricane roaring through a junkyard. Now it is not monumentally improbable, he says, that life should have developed by way of unguided Darwinism. In fact the probability that the stunning complexity of life came to be in that fashion is greater than the probability that there is such a person as God. An explanation involving divine design, therefore, is less probable than the explanation in terms of unguided Darwinism; therefore we should prefer unguided Darwinism to an explanation involving design; but these two are the only viable candidates here; therefore by an inference to the best explanation, we should accept unguided Darwinism. …

And why think the existence of such a person as God is unlikely in the first place? Dawkins is presumably speaking here of some kind of objective probability, not epistemic probability. Statistical probability hardly seems relevant; presumably, therefore, he's thinking of something like logical probability, something like the proportion of logical space occupied by the possible worlds in which there is such a person as God; his idea is that the more complex something is, the smaller that proportion is. ("God, or any intelligent, decision-taking calculating agent, is complex, which is another way of saying improbable.") - But the first thing to note is that according to Dawkins's own definition of complexity, God is *not* complex. According to his definition something is *complex* if it has parts that are "arranged in a way that is unlikely to have arisen by chance alone." Here he's clearly thinking of *material* objects. Setting aside the excesses of mereological universalism, however, one thinks that *immaterial* objects, e.g., numbers, don't have

parts. But of course God isn't a material object; strictly speaking, therefore, God has no parts. God is a spirit, an immaterial spiritual being; hence God has no parts at all. A *fortiori* God doesn't have parts arranged in ways unlikely to have arisen by chance. Therefore, given the definition of complexity Dawkins himself proposes, God is not complex.

God has no parts; but isn't God in *some* sense complex? Much ink has been spilled on this topic; but suppose, for the moment, we concede for purposes of argument that God *is* complex. Perhaps we think the more a being knows, the more complex it is; God, being omniscient, would then be highly complex. Perhaps so. But then why does Dawkins just assume that any such being would have to be such that its logical probability was small? Given *materialism* and the idea that the ultimate objects in our universe are the elementary particles of physics, perhaps a being that knew a great deal would be improbable—how could those particles get arranged in such a way as to constitute a being with all that knowledge? But of course we aren't *given* materialism.

So why think God would have to be improbable? According to classical theism, God is of course a being with knowledge—the maximal degree of knowledge—but is also a *necessary* being; it is not so much as possible that there should be no such person as God: God exists in every possible world. If God is a necessary being, if he exists in all possible worlds, then the (objective) probability that he exists, naturally enough, is 1, and the probability that he does not exist is 0. On the classical conception, God is a being who has maximal knowledge, but is also maximally probable. Dawkins doesn't so much as mention this classical conception; he altogether fails to notice that he owes us an argument for the conclusion that this conception is impossible, or anyhow mistaken, so that there is no necessary being with the attributes of God. This version of his argument, therefore, fares no better than the others.

The conclusion to be drawn, I think, is that Dawkins gives us no reason whatever to think that current biological science is in conflict with Christian belief. …