

THE COMPATIBILITY OF DARWINISM AND DESIGN

Peter van Inwagen

It is often said, both by Darwinians and anti-Darwinians, that Darwin's account of evolution is incompatible with the thesis that living organisms (or any of their features or any aspect whatsoever of the biological world) are products of intelligent design.¹

This thesis must be carefully distinguished from the following thesis: Darwin's account of evolution refutes the argument from design. I reject the former thesis and will argue against it in this essay. I have a great deal of sympathy with the latter, however, although my sympathy is tempered by two reservations. First, I do not think it is altogether clear what it means to "refute" an argument. Secondly, there is more than one design argument, and Darwin's account of evolution is more damaging to some of them than to others. I will concede, however, that the very existence of Darwin's account – whether or not it is true – renders all versions of the design argument considerably less cogent than they would have been if no one had ever thought of it.² Despite my concession, I do think that there are some versions of the design argument that are not too bad as philosophical arguments – it is, of course, a philosophical argument – go. But that, frankly, is not a very rigorous standard. (What would be an example of a really *good* philosophical argument that could set the standard against which the design argument could be measured?)

The first thesis, the topic of this essay, is an entirely different sort of thesis from the second. The difference between them is all the difference between the thesis that a particular argument for a certain conclusion lacks force and the thesis that that conclusion is false – all the difference between "We should not believe that Richard murdered the princes in the Tower simply because Shakespeare wrote a play in which he did" and "Richard did not murder the princes in the Tower."

For my part, I do not think that any of my beliefs about God, even my belief that living things are products of intelligent design, are based on the design argument – any more than I think that any of my beliefs about my wife are based on the analogical argument for the existence of other minds (which, in my view, is not too bad an argument – as philosophical argu-

ments go). As Newman says somewhere (I paraphrase from uncertain memory), "I do not believe in God because I look at nature and see design; rather, I look at nature and see design because I believe in God." For me, the design argument is an object of philosophical, not religious, interest. A definitive refutation of the argument would trouble me as a lover and child of God no more than a definitive refutation of the analogical argument for the existence of other minds would trouble me as a husband. If, however, the first thesis were established, I should have to admit that Darwin's account of evolution was fundamentally incompatible with beliefs that are a part of the fabric of my life. As a Christian, I should have to look at Darwin's account of evolution in more or less the way that a committed feminist would look at an allegedly scientific account of sexual dimorphism that entailed that women were, of biological necessity, intellectually inferior to men. This is perhaps obvious enough. As a Christian, I am committed to the thesis that the biological world is a product of intelligent design. I am not committed to any very specific thesis about this design, to any thesis about the exact nature of the connection between the mind of God and the structures of organisms. I am not committed to the thesis that God molded human beings out of the dust of the Earth. I am not committed to the thesis that organisms are designed by God in a way that is at all like the way in which machines are designed by a human engineer ("this will have to fit into that space, so the bit on the left will have to be just a little smaller"). Darwinism is no doubt incompatible with some of these very specific theses, theses about the exact nature of the connection between the mind of God and the structures of organisms. What I am committed to is the thesis that the terrestrial biosphere exists because it is God's will that it exist, and to the thesis that it has various of its large-scale features because it is God's will that there be a biosphere having those features. It is in this sense that I should be understood when I proceed to argue for the thesis that Darwin's account of evolution is compatible with the thesis that organisms – the components of the biosphere – are the product of intelligent design. I will call this thesis "compatibilism."³ Unlike many religious believers who have argued for compatibilism, I can claim that my arguments are disinterested, for I do not think that the Darwinian account of evolution is *true*. (I do not exactly think it is false, but I do find it highly implausible.) And most theists who have argued for compatibilism have been motivated to do so by a belief that the Darwinian account is true, or at least very likely to be true. But, from my point of view, not a lot hangs on the question whether compatibilism is right or wrong: after all, any theist must admit, as a simple matter of logic, that there are lots of false propositions that are incompatible with theism. One more would be no great thing.

I am not going to devote any space in this chapter to explaining why I believe, or am strongly inclined to believe, that Darwin's account of

evolution is false.⁴ For the curious, however, I will present a quotation from a recent book by the biologist Brian Goodwin that sums up my own views nicely:

[D]espite the power of molecular genetics to reveal the hereditary essences of organisms, the large-scale aspects of evolution remain unexplained, including the origin of species. There is “no clear evidence...for the gradual emergence of any evolutionary novelty,” says Ernst Mayr, one of the most eminent of contemporary evolutionary biologists. New types of organisms simply appear on the evolutionary scene, persist for various periods of time, and then become extinct. So Darwin’s assumption that the tree of life is a consequence of the gradual accumulation of small hereditary differences seems to be without significant support. Some other process is responsible for the emergent properties of life, those distinctive features that separate one group of organisms from another – fishes and amphibians, worms and insects, horsetails and grasses. Clearly something is missing from biology. It appears that Darwin’s theory works for the small-scale aspects of evolution: it can explain the variations and the adaptations within 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 variations, 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.

(Goodwin 1994: viii–ix)

Let us now turn to the question that is our primary concern. Why is it held that the Darwinian account of evolution is incompatible with intelligent design?

I will first make what seems to me to be an important logical point (logical as opposed to scientific or metaphysical or epistemological – not as opposed to illogical). The word “incompatibility,” in its central, logical sense, names a relation that holds between *propositions* (or theses or statements or assertions or beliefs). If, therefore, Darwin’s account of evolution is incompatible with design, this must mean that some *proposition* (or some set of propositions) is incompatible with *the proposition that the biological world is a product of design*. But what proposition, or set of propositions, would that be? What proposition or set of propositions are phrases like “The Darwinian account of evolution” or “Darwin’s theory of evolution” or “Darwinism” names for? It is remarkably hard to find an explicit answer to

this question in the literature on evolution, or at least in the minuscule segment of it that I have read. I will make a proposal. If anyone thinks that my proposal misrepresents the propositional content of Darwinism, I would at least like to see some other equally specific suggestion. Unless some reasonably specific proposal is on the table, no investigation of what Darwin’s account of evolution is or is not compatible with can be usefully undertaken.

I begin with the word “evolution,” which I will understand as a name for a thesis rather than a phenomenon – the thesis that people commit themselves to when they say things like “I believe in evolution.” I will set out a series of propositions – four in all – that I mean to express the content of the proposition that evolution is real or that evolution has actually occurred. (Since I confine the scope of my remarks to our planet, some may prefer to call the thesis I shall lay out “the thesis of *terrestrial* evolution.”) When I have set out the four propositions that constitute this thesis, I will add one proposition to the list and I will claim that the resulting set of propositions comprises “The Darwinian account of evolution.” (Later, however, I will argue that this definition needs to be revised.)

Here are the first two of my propositions:

- (1) Any two living organisms, past or present, have a common ancestor.
- (2) There have been living organisms for a very long time, not just for a few thousand years but for *millions* of thousands of years (perhaps since a few hundreds of millions of years after the Earth’s surface was cool enough to support life).

These two propositions taken together make up a rather weak thesis. For one thing, it is weak because it says nothing about biological diversity. It could be true if the only organisms there had ever been were a particular sort of bacterium that had persisted unchanged for billions of years. It is also weak because it says almost nothing about causation – although “ancestor” is a causal concept. It is compatible, for example, with the statement that God has been responsible for a vast array of miraculous innovations in the history of life, and it is compatible with the statement that intelligent extraterrestrials have been dropping in on the Earth every 10 million years or so to perform prodigies of genetic engineering in aid of some mysterious agenda involving terrestrial life. To get a more interesting thesis to associate with the word “evolution,” let us add some propositions about diversity and causation:

- (3) Life exhibits (and has exhibited for a very long time now) enormous taxonomic diversity.
- (4) Only natural causes have been at work in the production of all this diversity.

And what does “natural” mean? Well, the word can be opposed both to “miraculous” or “supernatural” on the one hand, and to “artificial” on the other. Let us understand “natural” in this context as carrying both implications. The thesis of evolution implies that only the laws of physics (operating of course under an enormously complex set of boundary conditions) have been at work in the terrestrial biosphere during the course of the diversification of life. It also implies that the only extraterrestrial influences on terrestrial life have been things that are in no way the instruments of intelligence or purpose: light from the Sun, cosmic rays, falls of meteor dust, asteroid strikes, and the like.

I think it is useful to regard these four propositions as together constituting the thesis of evolution. (Should there be something here suggestive of the notion of “progress,” or, at any rate, of increasing complexity? Anyone who thinks so may add a clause to the effect that, in the very long run, the complexity of both the biosphere and of the most complex organisms in the biosphere tends to increase. I should not object to the addition. This seems to be a part of what a lot of people mean by “evolution,” and it seems to be true.)

Now I will turn to “Darwin’s account of evolution” or “Darwin’s theory of evolution” or “Darwinism.” I take Darwinism to be an identification of the “natural causes” referred to in the last of the four propositions. I take Darwinism to be a specification of a mechanism, a single mechanism, which explains taxonomic diversification. This mechanism is the operation of natural selection on random small heritable variations that come about in the course of reproduction. Although I shall later have something to say about the word “random,” I am not going to try to give an exposition of what lies behind the slogan “the operation of natural selection on random small heritable variations.” I know that there is considerable diversity of opinion among those who describe themselves as Darwinians as to how the reality behind the slogan should be spelled out in detail, but I do not think that these disagreements have much to do with what I want to say. At any rate, I take it that we all have some idea of what these words mean. Even the slogan is too cumbersome for frequent repetition, so I’ll call the mechanism simply “natural selection.” Darwinism, then, is the thesis of evolution plus the further thesis that the sole mechanism behind the enormous taxonomic diversity displayed by terrestrial life – behind the existence of all of those vastly different phyla and orders and classes – is natural selection. (I am aware that Darwin was probably not a Darwinian in this sense – at least not always and consistently – and I am aware that he sometimes opposed natural selection to sexual selection. As to the former point, I am trying to capture at least something close to the most usual sense the word “Darwinism” has in current debates. As to the latter point, unless I am mistaken, most people today use the term “natural selection” in such a way that what Darwin called sexual selection is a special case of natural selection.)

Now, why is this proposition – “Darwinism” or “Darwin’s account of evolution” – supposed to be inconsistent with the proposition that the biological world is a product of design? One might well ask why, if unaided natural selection really is capable of producing the ordered diversity we see in the terrestrial biosphere today, a God – or any intelligent being capable of working on such a scale – who wanted such ordered diversity should not have used this very elegant mechanism. If I myself doubt whether God did use this mechanism, it is only because I doubt whether unaided natural selection could do the job. I think that other mechanisms would be required and that He therefore cannot have used natural selection alone. But if unaided natural selection would work – well, why shouldn’t God use something that would work? And if God (or any intelligent being) did establish an environment in which this mechanism could operate, and if its operations in due course produced a biosphere having certain features, and if God foresaw and intended the existence of a biosphere having these features – then why would it not be correct to say that these features were products of intelligent design?

I think that these are excellent questions, questions that have never been properly answered – that have never in fact been properly addressed. It seems to be a widespread opinion that there is something about natural selection that unfits it for use as a divine instrument. I have never been able to see this. When I was an agnostic, I was a Darwinian. When I became a Christian – a very old-fashioned, orthodox one – I was a Darwinian still. And although I have experienced many intellectual difficulties with my faith, my belief in Darwinism never caused me the least intellectual discomfort. (My doubts about Darwinism began only when I discovered that the “smoothness” of the fossil record that I had always believed in was not there.) I should add, in this connection, that I do not regard the difficulties that I believe Darwinism faces – the difficulties summarized in my quotation from Brian Goodwin – as constituting any sort of evidence for theism. I think that the truth or falsity of Darwinism has no more to do with the truth or falsity of theism than does, say, the hypothesis of continental drift. But many people do not see things this way. I could quote both Darwinians and anti-Darwinians, both atheists and theists, to this effect. Here is a famous quotation from Monod that will do as well as any. Speaking of the events that have been identified as the sources of mutations, he says:

We call these events accidental; we say that they are random occurrences. And since they constitute the *only* possible source of modifications in the genetic text, itself the *sole* repository of the organism’s hereditary structure, it necessarily follows that chance alone is at the source of every innovation, of all creation in the biosphere. Pure chance, absolutely free but blind, at the very root of

the stupendous edifice of evolution: this central concept of modern biology... is today the *sole* conceivable hypothesis, the only one that squares with observed and tested fact.

(Monod 1971: 112–13)

He goes on to make it clear that he understands chance in Aristotle's sense, as arising from the coincidence of independent lines of causation. (Thus, it is due to chance that Shakespeare and Cervantes died on the same day, as it would not be if they had killed each other in a duel. In this sense, chance can exist even in a fully deterministic world.) He identifies the source of this chance with imperfections in the fundamental mechanisms of molecular invariance in living organisms. He mentions only the causes of mutations, but he might have mentioned other sorts of events that are of evolutionary significance and can with equal plausibility be ascribed to chance: the flood that happened to destroy a certain herd of ruminants, the raising by geological forces of a land bridge that enabled representatives of certain species to move into a new environment, the intersection of the trajectories of the Earth and a certain comet, and so on.

I do not quite see how it is that the hypothesis that all such events are due to chance is the only conceivable hypothesis. (Is the hypothesis that the motions of the air and water molecules in the sky over Dunkirk in late May and early June 1940 were due entirely to chance the only *conceivable* hypothesis?) But let us suppose that this hypothesis is at any rate *true*. Does it follow that the general features of the biosphere are products of chance? It does not. To suppose that it did would be to commit what logicians call the fallacy of composition. It would be as if one reasoned that because a cow is entirely composed of quarks and electrons, and quarks and electrons are non-living and invisible, a cow must therefore be non-living and invisible.

There is a marvelous device for calculating the areas surrounded by irregular closed curves. It is an electronic realization of what is sometimes called the dartboard technique. To simplify somewhat: you draw the curve on a screen; then the device selects points on the screen at random, and looks at each point to see whether it falls inside or outside the curve; as the number of points chosen increases, the ratio of the chosen points that fall inside the curve to the total number of points chosen tends to the ratio of the area enclosed by the curve to the area of the screen. For a large class of curves, including all that you could draw by hand, and probably all that would be of practical interest to scientists or engineers, the convergence of ratios is quite rapid. Because of this, such devices are useful and have been built.

Now the properties of each point that is chosen – its co-ordinates – are products of chance in just Monod's sense. But the whole assemblage of points chosen in the course of solving a given area problem has an important property that is not due to chance: its capacity to represent the area of a curve that had been drawn before any of the points were chosen. Indeed,

since the device was built by purposive beings, there can be no objection to saying that the whole assemblage of points has the *purpose* of representing the area of that curve – despite the fact that the co-ordinates of each individual point have no purpose whatsoever. It is also true that the fact that each point has co-ordinates that are due to chance is not due to chance and has a purpose: its purpose is the elimination of bias, to insure that the probability of a given point's falling inside the curve depends on the proportion of the screen enclosed by the curve and on nothing else.

Suppose that every mutation that has ever occurred is, as Monod says, due to chance. Suppose, in fact, that every individual event of any kind that is a part of the causal history of the biosphere is due to chance. It does not follow that every aspect of the biosphere is due to chance. And if none of these individual events has a purpose, it does not follow that the biosphere has no purpose. To make either inference is to commit the fallacy of composition.

Now this reasoning shows at most that the thesis that some features of the biosphere are not due to chance (and likewise the stronger thesis that they have a purpose) is logically consistent with Darwinism. It could still be that the conditional probability of the thesis that there are features of the biosphere that are not due to chance is very low, even negligible, on the hypothesis of Darwinism. But the reasoning does show that if someone wants to construct an *argument* for the conclusion that Darwinism is in any sense incompatible with the thesis that some features of the biosphere are not products of chance, he will have to employ some premise in addition to "Darwinism implies that all events of evolutionary significance are due to chance." (And, as I have implied, I do not find that premise itself indisputable.)

How might an advocate of the thesis that Darwinism is incompatible with design respond to these points? One way might be to argue that the features of the biosphere are in a very important respect unlike the features of an assemblage of points produced by our area-measuring device. Each time we draw a curve on the screen of the area-measurer and turn the thing on, it is for all practical purposes determined, foreordained, that the assemblage of points it produces will have the property of representing the area enclosed by the curve. But, it might be argued, the properties of the biosphere are not like that. There used to be a popular thesis called Biochemical Predestination, according to which they *were* like that. According to Biochemical Predestination, you just take a lifeless planet that satisfies certain conditions (conditions the Earth satisfied before there was any life on it, and which are undemanding enough that it would be reasonable to suppose that a pretty fair number of planets in a given galaxy satisfied them) and in due course you will "automatically" have life, eukaryotic life, multicellular life, sexually dimorphic life, highly differentiated life, and, finally, intelligent life – the whole *Star Trek* scenario. Biochemical Predestination does not seem to be very popular among the practitioners of

the life sciences these days, although belief in it seems to be common among physicists and astronomers, and nearly universal among university undergraduates, who believe that Vulcans and Klingons await us among the stars with the same unreflective assurance that attended the belief of their twenty-times-great grandparents that elves and trolls awaited them in the woods. But if Biochemical Predestination is not true, if the main features of the biosphere did not fall into place automatically, but are rather due to remote chances that just happened to come off, then how can it be that these features are due to the purposes of a divine being – or any intelligent being? In short, the failure of Biochemical Predestination shows that, since the evolutionary process has no determinate “output,” it is not the kind of thing that could be anyone’s instrument.⁵ It can no more be used for that purpose than a flamingo can be used as a croquet mallet.

This is an interesting and important argument. It deserves a more careful formulation. I offer the following.

It seems plausible to suppose that if any features of the biosphere are products of intelligent design, then some very *particular* features of the biosphere are products of intelligent design: this one if no other: the existence of rational beings like ourselves, creatures made “in God’s image and in His likeness.” If natural selection cannot be used (even by an omnipotent and omniscient being) as an instrument to produce living things with “special” characteristics like rationality (or binocular vision or opposable thumbs or pentadactyl limbs; but let us use rationality as our primary example), then it is unreasonable to suppose that any intelligence has been using it as its (sole) instrument in imparting features to the biosphere.

Advocates of the argument we are considering hold that natural selection is indeed unusable for this purpose, owing to the radical contingency of its output. The concept of radical contingency may be explained as follows. Consider the Earth as it was at some very early stage after the emergence of life – when, say, there was only a single type of organism, some bacterium-like prokaryote. Let us say that we are considering the Earth as it was at a time called “ t_0 .” Consider all the physically possible sets of subsequent trajectories of the particles whose precise arrangement at t_0 constituted this “initial state.” (We suppose a given set of diachronic boundary conditions, that is, a given, predetermined “schedule” of extraterrestrial “inputs” into terrestrial conditions: sunlight, meteors, and so on.) A complete set of these particle trajectories may be called a history. Consider a space each of whose points is a history. Postulate a numerical measure, a measure of proportion, defined on this space. The idea behind this measure is that it should allow a sufficiently knowledgeable being – a being of the epistemological order of Laplace’s Intelligence – to make judgments like this: in 70 percent of the space of histories, the Earth has feature F at $t_0 + 1$ billion years. If we suppose that each history is exactly as probable as any other, and if the space of histories satisfies a few unexciting formal conditions, our measure

is a probability measure, and the above judgment may be read as, “Given the way things were at t_0 , the probability that the Earth would have feature F at $t_0 + 1$ billion years was 70 percent.”⁶

The thesis that rationality is radically contingent is this: the set of histories that contain rational beings comprises only a small proportion of the total space; that is, the probability of rational beings was small, given the way the Earth was at t_0 . The thesis that opposable thumbs or pentadactyl limbs are radically contingent is, of course, to be explained in the same way. The rather more vague general thesis of “radical contingency *simpliciter*” is that the existence of all, or at least most, of the specific features of living organisms are radically contingent. (“Gouldian contingency” may be defined as the thesis that the existence of every phylum that exists today is radically contingent.)

Now a moment’s thought will show that there is an annoying technical difficulty that must be faced by anyone who thinks that the existence of rationality, or anything else, is radically contingent. If the physical world is strictly deterministic, there is only one history, and, therefore, in a strictly deterministic world, nothing is radically contingent. (If the world is strictly deterministic, God, or the Laplacian Intelligence, could have produced *every* feature of the present biosphere simply by seeing to it that the world was as it in fact was at any time in the past – after all, the world of the remote past did in fact manage to “turn into” the present world and, if strict determinism is true, it could not have turned into a world having any features but those of the present world.) There are various ways this technical problem might be solved. To discuss them, however, would take us away from our discussion of radical contingency and Darwinism. Let us, therefore, simply assume that there is enough indeterminacy in the world (rooted in quantum indeterminacy, perhaps) that the proponent of the radical contingency of the special characteristics of the biological world need not attend to this problem.

Let the argument continue. If rationality is radically contingent, then the processes of the natural world cannot be anyone’s instrument for producing rationality. Of course, this does not show that *natural selection* could not be anyone’s instrument for producing rationality – not unless the thesis that rationality is a product of natural selection entails or somehow requires that the genesis of rationality be a matter of radical contingency. I am not sure how one would argue for this conclusion. We have seen that it does not follow logically from the premise that all the individual events that collectively compose the course of evolution are due to chance. It may be, however, that it does follow from this thesis in conjunction with some set of true statements about the conditions under which natural selection has actually operated. If a set of statements having this feature could actually be produced, and if they were known to be true, it would be pedantic to insist that it had not been demonstrated that Darwin’s account of evolution *per se*

was incompatible with design, but only the conjunction of Darwin's account of evolution with certain other statements – statements that were known to be true. Let us, in order to give the proponents of the incompatibility of Darwinism and design as strong a case as possible, assume that Darwinism commits its adherents to the thesis that certain features of the world, features that it is reasonable to suppose have been conferred on the world by God if *any* features have been conferred on the world by God (the existence of rational beings, for example), are radically contingent.

If we do suppose this, some of us may find the world a bit suspicious. If the existence of rational beings is of a very low order of probability, given that all the features of the biosphere are due to natural selection, and there in fact are rational beings, doesn't that provide some reason to doubt whether all the features of the biosphere are due to natural selection? "Of course not. Given the general thesis of radical contingency, whatever reasonably specific features chance happens to endow the biosphere with will be radically contingent. That the world of living things exhibits many features that are radically contingent is therefore not itself a matter of radical contingency. There is no more reason for you to be astonished by the existence of rational beings than there is for you to be astonished by your own existence – which is, in almost anyone's view, radically contingent." Such exchanges as this are very tricky. Those who think that the existence of rational beings is evidence for the falsity of natural selection will reply by arguing that the existence of rational living organisms (unlike the existence of any particular rational living organism, such as you or me) is highly probable on the hypothesis that the world has been created by God, and, therefore, that the fact that there are such beings favors this hypothesis over any hypothesis on which their probability is low. There are, of course, ways of replying to this reply, and there are ways of replying to the replies to the reply – and so on, for all practical purposes, *ad infinitum*. I do not propose to enter into the ins and outs of a debate on this topic (it would be similar to debates about whether the "fine-tuning for life" that the cosmos apparently exhibits requires an explanation). I will only observe that the contention that the existence of rational beings counts against any theory according to which their existence is extremely improbable has sufficient plausibility that it deserves to be discussed seriously and at length.

As to whether or not this is correct, however, haven't I conceded that Darwinism is incompatible with design if Darwinism commits its adherents to the thesis that certain features of the world that a designer would want are radically contingent? And doesn't Darwinism carry this commitment – if not evidently, then at least for all anyone knows? The point is well taken. If you define Darwinism as I have and if you assume that Darwinism, so defined, entails the radical contingency of some features of the world such that God (or any designer) would create a world only if He, or it, could ensure that it had those features...then you have got a thesis that is incom-

patible with design. (And I will concede that "radical contingency" either is a consequence of Darwinism or could for all anyone know be a consequence of Darwinism.)

There is, however, more to be said. It is time to re-examine our statement of Darwinism. Most compatibilists, or so I would judge, think that the biosphere has assumed its present form owing to God's guidance of a (generally speaking) Darwinian world. This thesis is not compatible with our statement of Darwinism, owing to the fourth clause in our statement of the thesis of evolution:

- (4) Only natural causes have been at work in the production of all this diversity.

If you think about it, however, this would seem to be a metaphysical thesis. And, one may well ask, what business has a scientific theory making pronouncements on metaphysical matters? Let us grant that a theory that postulates supernatural causes is *ipso facto* not a scientific theory. Let us grant that it is an essential part of the methodology of natural science always to search for purely natural causes – and always to assume that our failure so far to find an explanation in terms of natural causes of any event reflects only the limits of our present theoretical knowledge and experimental technique. Some would dispute these assumptions, but let us grant them for the sake of the argument; let us grant them to see what follows (or, more importantly, does not follow) from them. What does not follow is that it is proper for a scientific theory to include, to have as a part of its propositional content, the thesis that the phenomena of which it treats never have supernatural causes. That may be true, but if it is true, establishing it would require some sort of argument. I do not know how the argument would go. Newton's laws of motion and his law of universal gravitation tell us (at least to a good approximation in many circumstances) how massive bodies move when the only forces that are acting on them are gravitational. But they no more contain within themselves the statement "Supernatural agencies never affect the motions of massive bodies" than they contain within themselves the statement "Electromagnetic forces never affect the motions of massive bodies." The obvious position to take on this question, it seems to me, is that the laws of nature have no more to say about the operation of supernatural agencies in the physical world than the laws of gravitational mechanics have to say about the operations of electromagnetic forces. This obvious thesis could be wrong, but I will accept it till someone shows me why I should not.

Do the best meteorological theories (those that are embodied in computer programs for predicting the weather) have as a part of their content that no supernatural agency ever affects the weather? Is someone who believes that God had a special hand in the way the weather was at Dunkirk in the position of rejecting the best meteorological theories? I do not see why I should

think so. And I do not see why anyone who thinks that God had a hand in the way evolution went can properly be said – just in virtue of having that very general belief, and not some much more specific belief (as it may be: a belief that each species is a special creation) – to reject any theory of evolution that could properly be called scientific.

Still, it might be argued that the Darwinian account of evolution is a special case. It says that every event of evolutionary significance is due to chance; and if an event is chosen, if it is deliberately brought about by a rational agent in order to serve that agent's ends, then that event is *not* due to chance.

There is certainly a sense of "chance" in which this is true. But the word is a tricky one with many senses. Consider the closely related word "random" (I in fact used "random" and not "chance" in my statement of Darwinism). In one sense of the word, a sequence of things – numbers, say – each of which is individually and deliberately chosen by a rational being, is not "random." Nevertheless, if the members of some odd sect claimed to have in their possession a book of mystically significant numbers, numbers chosen by God, you could not refute their belief by applying statistical tests to show that the book (despite its fancy calligraphy and illuminated capitals) was in fact a table of random numbers, for there is no inconsistency in saying both that a sequence of numbers satisfies all the statistical tests necessary for it to be pronounced "random" and that it was chosen by God for some purpose. Like its near relation "random," the word "chance" has more than one sense, and some of its senses are compatible with "deliberately chosen." If Darwinism is to be a scientific theory, a theory that treats only of the natural world, and if it is to incorporate the concept of chance, that concept must be understood in a way that can be spelled out entirely by reference to the natural world.

Is there such a sense? Of course there is. It can be found in any textbook discussion of Darwinian theory. Its statement is a commonplace of Darwinism. Let us consider mutations, the most important class of events to which Darwinists apply the word "chance." It is of the essence of Darwinism to insist that mutations do not occur in response to changes in the environmental perils or opportunities that confront individuals or species. There is – Darwinians insist – simply no correlation whatsoever between the "usefulness" to a particular species of a possible mutation and the likelihood that it will occur. Suppose, for example, that a certain species of toad is slowly dying out, owing to some gradual environmental change. Suppose that three possible mutations in the genome of that species are equally likely from the point of view of molecular biology. Suppose that one of the mutations, if it became established, would enable the species to cope with its changing environment, one would have no significant effect at all, and one would be lethal. If Darwinism is correct, then these facts about the "usefulness" of the three mutations have no effect whatsoever on the probability of any of the three mutations turning up in some toad of the coming

generation. The probability of each is a matter of biochemistry and, apart from the fact that radiation or chemical mutagens in the environment can cause mutations, is independent of the toads' environment – is independent of the species' needs with respect to coping with or exploiting the features of its environment. This thesis entails that, in a perfectly good sense of the word, mutations are due to chance: the Aristotelian sense that I mentioned earlier in connection with Monod. That is to say: Changes in an organism's DNA (as opposed to the transmission of such changes to the organism's descendants) and the features of the organism's environment that are relevant to its success in having descendants are causally independent of each other.

It is, however, consistent with the thesis that all mutations (and, more generally, all events of evolutionary significance) are due to chance in this Aristotelian sense that God has been guiding evolution – by deliberately causing certain mutations (and other events of evolutionary significance). If God has been doing this, it does not follow that the history of terrestrial life would reveal anything inconsistent with the Darwinian thesis that all mutations are due to chance. Suppose that God has in fact been guiding evolution in this way. Suppose also that there is a record of all the uncounted billions of mutations that have ever occurred. Is there any reason to suppose that a statistical analysis of all these mutations and the circumstances under which they occurred (perhaps Laplace's Intelligence could be pressed into service to perform the analysis) would have to uncover some significant correlation between the potential usefulness to species of various mutations and the likelihood of their occurrence?

If there is such a reason, I don't see it. If the course of Darwinian evolution would indeed have to be radically contingent, then a theist who accepts Darwinism (and who accepts the thesis that radical contingency is a consequence of Darwinism) might speculate that God has directed it down the path it has in fact taken by a judicious choice of mutations (and of climatic changes and of events of many other types). And the atheistic Darwinian will have to admit that nothing in the history of life, no possible paleontological discovery, could be inconsistent with, or even cast doubt on, this thesis. After all, the atheistic Darwinian thinks that the actual course of evolutionary history *was* produced by a sequence of events that was due to chance in the Aristotelian sense. Therefore, he must admit that if God chose the actual course of evolutionary history, God chose – produced, created – a course of events that was due to chance in the Aristotelian sense. And this is something that an omnipotent and omniscient being would find no more difficulty in doing than He would in creating a table of random numbers.

It does seem as if there are a lot of people who, even if they are willing to admit that God *could* have done this, think it's at least very unlikely that God – if He existed – *would* have done anything of the sort. Presumably they think that if the biological world were the creation of an infinite being, a

being whose power and knowledge were absolutely without limit, the biological world would look very different. (I'm not talking about the existence of suffering, which is an entirely different problem, and quite unrelated to Darwinism.) But how, then, would it look? When I actually talk to people who think this and ask them this question, I do not generally get answers – or I get ones that I (frankly) regard as simple-minded. I think an answer is in order, and one that is the product of a little thought and at least some familiarity with theology. Anyone who thinks that the history of terrestrial life is inconsistent with its being the vehicle by which God's purposes have unfolded in time really should have something to say about how the history of life *would* look if it were the vehicle of God's unfolding purposes.

Notes

- 1 That is, of *non-human* intelligent design. Obviously, a few of the features of a few species are – very recent – products of human intelligent design.
- 2 It is arguable that Aquinas's Fifth Way depends on the premise that if an object always or for the most part acts in such a way as to produce some "useful" end, then intelligence *must* have been in some way among the causes of that object's action. I think it should be evident that the very existence of Darwin's account of evolution shows that this premise is false. (But do I not, as a theist, believe that it is a necessary truth that intelligence is in some way among the causes of *everything*? Yes. A more careful statement of my thesis would be this: Darwin has shown that it is false that Aquinas's premise is a *conceptual* truth, a proposition that can be seen to be true by anyone who understands the concepts it involves. If I am right in thinking that the Fifth Way depends on this premise, Darwin may be said to have "refuted" the Fifth Way in a very straightforward sense of the word. But not all versions of the design argument depend on this premise.)
- 3 This is Phillip Johnson's use of the term. I do not know whether he originated it. It should perhaps be noted that the term "compatibilism" has a standard and quite unrelated meaning in philosophy: it is used as a name for the thesis that free will is compatible with determinism.
- 4 My reasons are presented in the following two essays: "Genesis and evolution" (Stump 1993: 93–127, reprinted in van Inwagen 1995); and "Doubts about Darwinism" (Buell and Hearn 1994: 177–91).
- 5 Curiously enough, Biochemical Predestination was said by those who believed in it to show that the evolutionary process was not anyone's instrument.
- 6 If the number of histories is finite, each should have probability $1/N$, where N is the number of histories; if the number of histories is infinite, each should have probability 0 (or, if infinitesimal probabilities are allowed, each should have the same infinitesimal probability).

References

- Buell, J. and Hearn, V. (eds) (1994) *Darwinism: Science or Philosophy?*, Richardson, Texas: Foundation for Thought and Ethics.
- Goodwin, B. (1994) *How the Leopard Changed its Spots: The Evolution of Complexity*, New York: Charles Scribner's Sons.

- Monod, J. (1971) *Chance and Necessity: An Essay on the Natural Philosophy of Modern Biology*, trans. Austryn Wainhouse, New York: Vintage Books.
- Stump, E. (ed) (1993) *Reasoned Faith*, Ithaca, New York: Cornell University Press.
- van Inwagen, P. (1995) *God, Knowledge, and Mystery: Essays in Philosophical Theology*, Ithaca: Cornell University Press.