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Darwinian Naturalism, Theism, and Biological Design

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Naturalists frequently suggest that the imperfection found in living things is clear evidence that organisms are the products of natural processes rather than the products of intelligent design. I challenge this "Imperfection Argument" by identifying and evaluating the presuppositions upon which it depends. Although the naturalist's argument is shown to be unsound, this does not vindicate the intelligent design position. I suggest that it is unlikely that the issue of biological design will serve the agendas of either naturalists or theists, and consequently that a healthy dose of humility concerning this issue is perhaps the true mark of wisdom.

Natural selection will not produce absolute perfection, nor do we always meet, as far as we can judge, with this high standard under nature...The wonder indeed is, on the theory of natural selection, that more cases of the want of absolute perfection have not been detected (Charles Darwin, *The Origin of Species*, Chapter VI).

The issue of "biological design" has long been at the center of the debate between naturalists and theists.² A traditional natural theological argument for the existence and attributes of a deity took the remarkable *design* evident in living things as its starting point.³ Such design was interpreted as unmistakable evidence for an intelligent, purposeful designer. It was argued that such design could *only* be explained by appeal to a divine designer. However, since Darwin's work in the mid-nineteenth century and subsequent work in this century, naturalists have been in a much stronger position to argue that natural processes alone are, in principle, adequate to account for the designed appearance of living things.⁴ They argue that it is no longer *necessary* to appeal to an intelligent designer to account for the apparent design of living things. At the very least, Darwin's theory shows how such design *could* come about through nonintelligent, nonpurposeful processes. That is, Darwin showed how such an explanation of biological design is *possibly* true. But, as theists will rightly point out, this, at most, shows that a theistic account of biological design is not *required*. It does not establish the stronger claim that a theistic account of biological design is *false*, much less that theism itself is false. Consequently, theists are free to agree that natural processes operating without foresight are adequate to explain biological design, but they may also insist that theism provides another explanation, equally rational and plausible.

At this point the debate seems to be at a standoff. Biological design can, in principle, be explained in either naturalistic or theistic terms. Pressing the issue, the naturalist can make a distinction between *good* and *poor* biological design. While acknowledging that instances of *good* biological design can be equally well explained in terms of both naturalism and theism, the naturalist notes that there are *other* cases of *poor* biological design that cannot be so easily accounted for on theistic principles. For example, the naturalist can point out that in addition to the stunning instances of marvelous adaptations that seem to perfectly fit organisms for their ways of life, there are also undeniable instances of very poorly designed biological systems, of what Richard Dawkins calls "botched jobs." These observations form the basis for a powerful criticism of theistic accounts of biological design, and, by implication, of theism itself.

Biological imperfections are unbecoming to a divine designer. A designer with complete knowledge and unlimited power would surely come up with something better than these manifestly inferior products. Since such imperfections pervade nature (and are much easier to detect once one has abandoned the view that, appearances aside, all biological structures *must* be perfect because they are God's handiwork), the belief that an intelligent designer is responsible for living things becomes progressively less plausible. At the same time, however, naturalists have a plausible explanation for why one finds instances of both extreme perfection of design *and* of what appear to be less than optimal designs from an engineering point of view. Because naturalism can explain both perfection and imperfection of biological design, but theism stumbles on the problem of biological imperfection, it appears that naturalism is poised to defeat theism as an explanation for the nature of living things. Living things provide no *positive* evidence for an intelligent designer, and a careful examination of living things actually provides evidence *against* the existence of an intelligent designer. In short, while biological imperfection constitutes a logical deduction from naturalist principles, it constitutes a remarkable *prima facie* defeater for theism.

My aim in this paper is to examine this argument more carefully. Is it really true that Darwinian naturalism provides a superior explanation of biological imperfection than theism? To answer this question one must address several logically prior questions: On what grounds can we assess claims about goodness of biological design? In what sense might biological systems be described as "perfect" or "imperfect?" How do naturalists go about explaining both perfection and imperfection of biological design? Are instances of biological imperfection really defeaters (*prima facie* or otherwise) for theism? Finally, at the end of the day, what implications (if any) follow from the fact of biological imperfection for the naturalist/theist debate?

The Argument from Imperfection

The "Imperfection Argument" sketched above appears in the popular writings of biologists with remarkable regularity. Probably the most famous contemporary statement of the argument is Stephen Jay Gould's essay, "The Panda's Thumb."⁵ Gould argues that the "panda's thumb," which is an elongation of the radial sesamoid bone in the wrist, is a "funny solution" to the problem of stripping the bark from bamboo shoots. Thus, he claims that it clearly shows its origin via contingent, historically constrained, natural processes, rather than as the product of an intelligent designer. As Paul Nelson notes, this argument is a favorite of Gould's, appearing repeatedly in his writings.⁶ Gould makes the central point of such examples clear:

If God had designed a beautiful machine to reflect his wisdom and power, surely he would not have used a collection of parts generally fashioned for other purposes.... Odd arrangements and funny solutions are the proof of evolution -- paths that a sensible God would never tread but that a natural process, constrained by history, follows perforce.⁷

Despite the rhetorical power of this example, Gould's "panda's thumb" argument suffers from the fact that it is far from clear that the so-called panda's thumb is really such a "funny solution" as he supposes. There is good evidence that this structure suits the panda's mode of life admirably, and might better be thought of as a marvelous adaptation -- e.g., an instance of *good* biological design.⁸ To make the naturalist's argument against intelligent design as strong as possible, we need to focus on more clear-cut instances of biological imperfection.

Richard Dawkins provides the types of examples we need, namely, examples of "outright imperfections in...design."⁹ The first example concerns "flatfish" (e.g., halibut, sole, and plaice). These are bony fish that, instead of swimming in a "vertical" position like most bony fish, lie on their *side* on the ocean bottom and swim in this essentially horizontal position. The problem with this arrangement is that when a typical fish takes to lying on its side on the ocean bottom, one eye will always be staring down into the sand -- making the eye effectively useless. Flatfish have "compensated" for this weakness by undergoing a developmental process in which the lower eye moves around to the upper side of the fish. Juvenile flatfish start life swimming near the surface in the usual vertical position for bony fishes. But then a developmental process begins in which "the skull starts to grow in a strange, asymmetrical, twisted fashion, so that one eye, for instance the left, moves over the top of the head to end up on the other side. The young fish settles on the bottom, both its eyes looking upwards, a strange Picasso-like vision."¹⁰

The second example also concerns eyes -- in this case, vertebrate eyes. All vertebrate retinas are covered with "photocells" (rods and cones) leading to "wires" (nerves) which eventually converge in the optic nerve. The optic nerve carries signals to the visual processing centers in the brain. So far so good. But Dawkins then notes that:

Any engineer would naturally assume that the photocells would point toward the light, with their wires leading backwards towards the brain. He would laugh at any suggestion that the photocells might point away from the light, with their wires departing on the side *nearest* the light. Yet this is exactly what happens in all vertebrate retinas. Each photocell is, in effect, wired in backwards, with its wire sticking out on the side nearest the light. The wire has to travel over the surface of the retina, to a point where it dives through a hole in the retina (the so-called "blind spot") to join the optic nerve. This means that light, instead of being granted an unrestricted passage to the photocells, has to pass through a forest of connecting wires, presumably suffering at least some attenuation and distortion...¹¹

Dawkins mentions that the attenuation and distortion caused by the backwards wiring of the photocells may not be very great, "but, still, it is the *principle* of the thing that would offend any tidy-minded engineer!"¹²

I selected these two examples because each clearly involves design that is less than optimal from an engineering perspective, and because in each case, Dawkins wants to draw the conclusion that such poor design is difficult to explain on the assumption that living things have been designed by an intelligent designer. The contrast is clearly between creation by an intelligent designer and production by unintelligent natural processes. As Dawkins notes: "Evolution can sometimes be

more strongly supported by evidence of telling imperfections than by evidence of perfection."¹³ If Dawkins truly wants to explain "why the evidence of evolution reveals a universe without design" (the subtitle of his book, *The Blind Watchmaker*), then by "evolution" here, he must mean more than just descent with modification. Evolution has to mean descent with modification without any type of intelligent design or guidance involved in any way. According to Dawkins, the theist is faced with a serious problem if things like flatfish were designed by an intelligent designer. He notes:

The whole skull of a bony flatfish retains the twisted and distorted evidence of its origins. Its very imperfection is powerful testimony of its ancient history, a history of step-by-step change *rather than of deliberate design*. No sensible designer would have conceived such a monstrosity if given a free hand to create a flatfish on a clean drawing board.¹⁴

With these examples in mind, we can now state the Imperfection Argument more clearly as follows:

The Imperfection Argument

P1: For any property p of a biological entity, p is the product either of a wise and powerful designer, *or* of unintelligent, historically constrained, natural processes (e.g., natural selection).

P2: If p is the product of a wise and powerful designer, then p should be perfect.

P3: p is not perfect.

C: Therefore, p is not a product of a wise and powerful designer, but came about by unintelligent, historically constrained, natural processes.

The imperfection argument underlies the claims associated with the two examples described above. It is undeniable that such examples have great persuasive force. But our question here is whether we *ought* to be swayed by them. Is the Imperfection Argument sound? Should one accept its conclusion based on its premises? Are the premises themselves true?

The Imperfection Argument Examined

Mutually Exclusive Alternatives?

Consider the first premise. P1 assumes that creation by an intelligent designer and production by natural processes are mutually exclusive possibilities. Yet many theists will be happy to admit that living things may have at least some properties because of unintelligent, historically constrained, natural processes. That is, theists are free to suppose that God instituted the physical and biological laws that govern the evolutionary process, and then gave the actual working out of evolution relatively free reign. God would then be directly responsible for "setting up" the process of evolution, but only indirectly responsible for the specific products subsequently produced. As Loren Haarsma points out:

Proponents of evolutionism frequently argue that biological life could not have been intelligently designed because it shows many examples of "flawed design," such as the blind spot in the human eye. But surely this is just a divine example of the straw-man argument. It ignores the option that the Creator might design an entire evolutionary system and choose to work through natural processes and "chance" events to produce the desired results – even if certain details appear as minor flaws.¹⁵

Therefore, theists are free to argue that God chose to create the present biota of the earth through natural laws (progressive creation). They can argue that the Darwinian explanation of biological perfection and imperfection may be essentially correct, while rejecting the naturalist assumption that the entire process proceeds without the instigation of an intelligent designer. Creation through such "secondary causes" might even be considered more becoming to the divine wisdom – a view that Darwin drew attention to in the *Origin*.¹⁶ He states elsewhere in the *Origin* that "All corporeal endowments" may be *progressing* toward perfection without yet *being* perfect. Present biological imperfection is compatible with ultimate biological perfection.

[Theists] can argue that the Darwinian explanation of biological perfection and imperfection may be...correct, while rejecting the naturalist assumption that the entire process proceeds without the instigation of an intelligent designer.

Why, then, might someone suppose that there are mutually exclusive alternatives of the sort assumed in P1? We can, of course, revise P1 so that it *does* state mutually exclusive alternatives.

P1': For any property *p*, of a biological entity, *p* is either the *direct* product of a wise and powerful designer, *or* of unintelligent, historically constrained natural processes (e.g., natural selection), but not of both.

Reformulating P1 in this fashion *does* present mutually exclusive alternatives. However, this formulation cannot be used in an argument against theism, but only against the considerably more narrow position that asserts that living things were originally created in something like their present form. While some theists *do* hold this view, it is not identical with, nor a logical consequence of, theism as defined earlier. As it stands, therefore, P1 describes a false dichotomy, and consequently ought to be rejected.

What Should We Expect from a Divine Designer?

Consider the second premise. According to P2, if a given property of a biological entity is the product of a wise and powerful designer, then that property should be perfect. What *reasons* might be offered in support of this claim? In particular, what property or set of properties of God's nature entails that everything he creates must be perfect? P2 presupposes that a divine designer would only want to produce organisms that lack the kinds of imperfections identified above. But this assumption is open to question. Theists *already* believe that God created the world. None believes that every aspect of the world is perfect. Created things (it might be argued) are, in virtue of being created, necessarily limited and imperfect. The imperfection of

biological things would not then be a *distinct* problem requiring special explanation. Any argument that assumes that God, being perfect, could only create perfect entities, rests on the dubious idea that a perfect being could only *want* to create other perfect beings. There is, of course, no reason to assume this. It has the undesirable consequence of making God far more *limited* than the intelligent creatures, which theists believe he created. There is no obvious necessary connection between the perfection of a Creator and the perfection of that which he creates. While we might expect a good Creator to create at least some "good" creatures, nothing about the goodness of God entails that he should create *only* perfect creatures. P2 is thus entirely without support.

"Perfect Design"

Finally, we must consider the claim that a given property of a biological entity is not perfect (i.e., P3). Naturalists, like Dawkins, point out that instances of contraptions and contrivances – imperfections of design – are just what one would expect from the Blind Watchmaker, natural selection. The implication is that one would expect much better from a divine designer. But how much better? Just a little better? This seems arbitrary. For each little bit better designed an organism is, one could then ask why it was not just a bit better designed than *that*. The only non-arbitrary degree of goodness of design is perfection itself. Why think that this is even *possible*? Is the notion of a perfectly designed organism a coherent idea?

Proponents of the Imperfection Argument claim that imperfection among the properties of living things is a powerful argument against theism and in support of some type of naturalistic account of evolution.

"Perfect design" is simply the limit notion of *good* design. Examples of *good* biological design are a dime a dozen. Dawkins discusses bat sonar as an example of good design, and once one becomes familiar with the astounding details of this example, it is hard to think of a better example of well-designed functional complexity. There are, however, better examples of biological *perfection*, i.e., cases where it is difficult to imagine a *superior* solution to a particular problem. The best examples come from cases of mimicry in which one species (typically harmless) mimics another (typically poisonous or toxic). Examples of protective mimicry include the (tasty) Viceroy butterfly that mimics the (toxic) Monarch butterfly, nonvenomous snakes that mimic in their coloration highly venomous snakes, and (nonstinging) flies that closely resemble honeybees. Other examples come from protective camouflage, for example, stick insects and leaf insects that closely resemble the foliage they live on, larva of swallowtail butterflies that resemble bird droppings, etc.¹⁷ In each case, there is a "model" and a "mimic." To the extent that the mimic is indistinguishable to predators from the model, to that extent the mimic is "perfect." In these cases, we seem to have a clear-cut – and even operationally useful – notion of biological perfection. While such organisms are presumably less than perfect in other respects, in the limited domain of mimicry, such organisms could not be improved upon.

When we consider whole organisms, however, things are very much different. What sorts of characteristics would a perfect organism have? Using standard measures of adaptedness, we would have to say that a perfect organism is one that lives forever, converts all of its energy consumption into reproductive activities, produces viable offspring at an infinite rate, moves through the environment with zero friction, is impervious to enemies or predators, can hear all frequencies of sound waves, see all wavelengths of electromagnetic radiation, etc. The idea of such an organism existing is, of course, absurd. It is not even a *possible* organism. As Maynard Smith notes, in thinking about the perfection of biological systems, it becomes clear that specifying the range of possible phenotypes becomes crucial.¹⁸ The problem here is that we have no way of knowing what this range is. Moreover, it is not clear that the concept of a "perfect organism" is compatible with biodiversity. Perhaps, at most, *one* truly perfect phenotype is possible. In this case, biological perfection could only be achieved at the expense of the wide variety of kinds of life forms that we do find.¹⁹ Local perfection could be achieved only at the expense of global perfection. The crucial point here is that we are in no position to know whether such global considerations are relevant or not. Consequently, we are in no position to conclude that it is unbecoming of a divine designer to design less than perfect organisms.

Naturalism and Biological Imperfection

Naturalist Explanations of Biological Imperfection

The analysis of the Imperfection Argument above suggests that it is wanting in several important respects. There is also a second, related issue concerning this argument that we have not yet examined. Proponents of the Imperfection Argument claim that imperfection among the properties of living things is a powerful argument *against* theism and *in support of* some type of naturalistic account of evolution. The claims of Gould and Dawkins given earlier only make sense if some type of naturalistic account of evolution provides a more adequate account of biological design than is available on theistic grounds.

Consider again the case of the flatfish, which was supposed to be a *prima facie* defeater for theism. The naturalist can explain this imperfection, at least in principle. According to Dawkins, when the free-swimming, vertically oriented ancestors of flatfish originally took to bottom dwelling, it was better off lying on its side than balancing precariously on its knife edge of a belly. Would-be intermediates between these ancestors and present-day flatfish that attempted this balancing act did worse in the short term than their more stable, bottom-hugging (side-lying) rivals. Dawkins speculates that in genetic hyperspace there is a smooth trajectory connecting these free-swimming, ancestral bony fish to contemporary flatfish lying on their sides with twisted skulls. On the other hand, there was no smooth trajectory connecting these ancestors to (possible but unactualized) bony fish flattened horizontally.

Turning to his other example of biological imperfection, Dawkins admits that he doesn't know the exact explanation for why the vertebrate eye is structured as it is. But he is willing to bet that it had something to do with the trajectory through genetic hyperspace that would have to be traversed in order to turn the retina the right way around, once it had *already* started in the wrong direction. The idea is that some primitive ancestor to contemporary vertebrates acquired a light-sensitive photocell, and the "wires" from it just happened to be coming out the wrong side. But

because this proved more advantageous than not having a functioning photocell at all, it provided some survival advantage for its possessor. Once this advantage was in place, any step backwards, for example, toward no functioning photocell at all, would have been selected against. So the process continued to build on its initial advantageous, but deeply flawed, beginning, eventually resulting in the highly useful, but functionally ill-conceived, vertebrate eyes of today. Initial contingency coupled with selective pressures drove the process of eye-building further along the path to contemporary vertebrate eyes. With each step along the way, it became progressively more difficult to go back and rewire the eyes in the functionally superior way. Selection can continue to improve the vertebrate eye in the future, but it is unlikely to undertake a fundamental overhaul of its basic design features, flawed though they are.

Assessing the Naturalist's Explanation of Biological Imperfection

One problem with Dawkins' argument concerning flatfish in terms of trajectories through genetic hyperspace is that he admits that there are *some* bony fish that *have* evolved flatness in a symmetrical, skate-like way. So, for at least *some* ancestral bony fish, there was an open trajectory from the ancestral, vertically-flattened structure to the contemporary, horizontally-flattened structure. Dawkins offers the suggestion that perhaps the ancestors of these latter fish "were already slightly flattened for some other reason."²⁰ Yes, perhaps. But if symmetrical flattening was possible for some bony fish, why wasn't it possible (or if it was possible, why wasn't it actualized) for others? Given the "probably costly distortions involved in having two eyes on one side," presumably selection would have favored the symmetrical over the asymmetrical design.²¹ The only way to explain why the best design was realized in the one case but not in the other is to appeal to the contingency of initial conditions and the irreversible nature of selection-driven evolution once it has gotten underway. In other words, the explanation is entirely conjectural.

The Darwinian naturalist can only appeal to unknown, but possible, contingent events to explain why certain coordinates in design space have been occupied, while others remain vacant.

A similar type of problem attends the other example of biological imperfection Dawkins discusses. If some invertebrate eyes are wired the right way, then it is not clear why vertebrate eyes couldn't be wired the right way too. Granted that initial contingent events started things in the wrong direction, why couldn't these useful, but flawed, designs have been usurped by creatures with even more useful, properly designed eyes? A keystone of Dawkins' argument is that every slight improvement in any biological structure is enough to make it visible to selection, and hence selected. All it would have taken for properly-wired, vertebrate eyes to be the norm now would be for there to have been a few properly wired prototypes around when the actual vertebrate ancestors got their start. This does not seem *a priori* impossible. Yet Dawkins has to suppose that there were no well-designed competitors around, or if there were, that for some reason they did not usurp their poorly-designed cousins. Ultimately, therefore, the

Darwinian naturalist can only appeal to unknown, but possible, *contingent events* to explain why certain coordinates in design space have been occupied, while others remain vacant.

Perfection, Imperfection, and Contingency

When we combine reflections on the two examples of biological imperfection Dawkins gives, the problems I have been noting become more acute. Just as we can compare "flawed" vertebrate eyes with the well-designed eyes of some invertebrates, so too we can compare the "flawed" morphological design of flatfish both with the superior morphological design of normal (vertically oriented) bony fish and with the horizontally flattened, but symmetrical, cartilaginous rays. If some shark-like ancestors could become flattened horizontally and remain symmetrical, why couldn't the bony ancestors of flatfish have accomplished the same thing? Granted, there may be differences between vertebrates and invertebrates on the one hand, and bony fish and cartilaginous fish on the other, but it is still not clear why these differences could not be breached. In the case of the vertebrate eye, Dawkins tells us that once the eye was wired the "wrong" way, it became impossible (or at least extremely difficult) for natural selection to reorient the photocells in the right direction. On the other hand, in the case of the flatfish, there is an obvious biological imperfection (one eye staring down into the sand, and therefore effectively useless) that is "corrected" by juvenile flatfish undergoing a developmental process that moves the sandward-looking eye around to the top surface of the fish. If this developmental process is possible (which, being actual, it is), then why couldn't the same sort of process work for the photocells of the vertebrate eye? Both involve simply rotating and reorienting a structure, not dismantling it and starting over. In the occurrence of the photocells, one could imagine a smooth trajectory through design space in which the photocells, instead of facing directly backwards, face a bit to the side. Since the nerves would now occlude less of their light-oriented surface, there would be a slight (but perhaps significant) improvement in visual power. Another 10% rotation would produce additional improvements, etc., until the photocells were all facing in exactly the right direction (i.e., toward incoming photons). No saltations are required and no radical restructuring of the design of the eye is necessary, only a gradual, incremental reorientation of photocells in the direction of greater efficiency. Again, if such a process has occurred in flatfish with respect to the entire eye (and with corresponding changes in the skull), why not in the photocells of these very same eyes?

Darwinian naturalists acknowledge both the extreme perfection of some organic structures and the obvious imperfection of others, and explain both in terms of natural selection operating on initial contingency.

There thus seems to be a curious tension at the center of Darwinian naturalism. On the one hand, Darwinian naturalists are fond of stressing the power of natural selection to produce the extreme adaptedness and the virtual perfection of the structural and functional properties of living things. Unlike their natural theologian forbears, however, they wish to insist that such perfection come about without assistance from any kind of divine mind orchestrating this process. According to

the Darwinian naturalist, the entirely opportunistic process of natural selection has the power to shape organisms to an almost unimaginable degree of perfection. On the other hand, one of the commonest and most persuasive arguments used by Darwinian naturalists against the hypothesis of special creation or divine control of the evolutionary process starts from recognition of the all-too-common instances of imperfection to be found in the living world, instances which suggest a more haphazard evolution of organic structures, one unbecoming the technical skills possessed by an intelligent divine designer. Consequently, Darwinian naturalists acknowledge both the extreme perfection of some organic structures and the obvious imperfection of others, and explain both in terms of natural selection operating on initial contingency. Is this a consistent position?

Conclusions: Theism and Naturalism as Explanations of Biological Design

As far as I can see, there is no *inconsistency* in the naturalist's explanation of perfection and imperfection in biological design. It is true that such explanations are frequently "speculative," but if we are only concerned with the issue of consistency, showing that something is *possible* is sufficient. Worries arise when one considers *justification* for the largely *post hoc* nature of naturalistic explanations of particular instances of good and poor biological design. It is far easier to explain instances of each in terms of postulated initial conditions and constraints than it is to identify the particular conditions and constraints operating in specific cases. Indeed, it may be impossible to do this in most cases.

Theists may be eager to exploit this weakness of naturalism, but here I believe that they should tread carefully. It is true that the Darwinian naturalist is forced to resort to speculative explanations for biological design, but it should not be thought that this fact in any way elevates the theistic position to a point above that of the naturalist.²² Both must ultimately concede that there are *limits* to our present ability to account for some of the most striking features of the natural world. While the Darwinian naturalist can give a theoretically sophisticated and empirically rich account of why certain aspects of the world are the way they are, the theist can either (1) accept the Darwinian explanation, but insist that the naturalistic metaphysics often presupposed by Darwinians are mistaken, or (2) reject Darwinian explanations in favor of some type of direct creation model. In either case, the theist, no less than the naturalist, is forced to resort to speculative hypotheses about why things are the way they are. Whereas the naturalist must appeal to contingency and historical constraints, the theist must appeal to God's voluntary actions. Since both theists and naturalists eventually come face-to-face with untrespassable epistemic limits, they may be closer to one another on the issue of explaining biological design than it at first appears.

[Naturalists and theists] must ultimately concede that there are limits to our present ability to account for some of the most striking features of the natural world.

In summary, while there is no *inconsistency* in the Darwinian naturalist explanation of biological design that can be exploited by theists, at the same time, the naturalist argument that imperfection of biological design refutes the theistic viewpoint is seen to be unsound. It therefore seems unlikely that the naturalism/theism debate will be resolved on the battlefield of biology. Darwinism did mark the end of the superior epistemic position occupied by theism *vis-à-vis* naturalism. As Dawkins remarks, before Darwin it was impossible to be an intellectually fulfilled atheist. Even Hume, who in other respects seems to have had little use for God, found it necessary in his *Dialogues Concerning Natural Religion* to admit that something akin to Mind is responsible for the order of the world.²³ Before Darwin, it was very difficult to believe that the order of nature could have arisen through purely natural processes. After Darwin, this became much more credible. It became a rational cognitive option. So Darwinism did have some effect on what it was and is rational to believe. In effect what Darwinism did was to level the playing field. Naturalism and theism became two almost evenly matched players on the intellectual field. It is hard to see how either could now displace the other. Both are logically compatible with the empirical evidence we have at our disposal, and with any evidence we are likely to encounter through additional scientific investigation.²⁴ There is, of course, a natural human tendency to take sides and seek intellectual closure. Sometimes such closure can be attained honestly; at other times, it cannot. A frank confession of our uncertainty here may be the mark of wisdom.

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Notes

¹This article is a revised version of a paper presented at a conference on "Naturalism, Theism, and the Scientific Enterprise," University of Texas at Austin, February 20-23, 1997. I thank the participants in this conference, and my colleague James Hanink, for helpful comments on an earlier draft of this paper. I also thank Rob Koons for organizing this splendid conference.

²By "theism" I mean the position that affirms that there is an all-powerful, wholly good, and all-knowing Person who is distinct from the natural world. "Naturalism" (or "Ontological Naturalism," as distinct from "Methodological Naturalism") is the position that holds that the natural world comprises the whole of reality (and thus excludes the sort of Being affirmed by theism). By "design" I mean the manifest functional complexity of living things, without meaning to beg the question about whether such "design" is the product of an intelligent designer or unintelligent, unconscious natural processes. Although naturalists may wish to talk of "apparent design" to avoid attributing intentionality to the source or cause of functional complexity, for simplicity I will continue to speak of "design" in the sense defined above.

³This tradition perhaps reached its zenith in William Paley's *Natural Theology* (London: Rivington, 1802).

⁴That natural processes *are* in fact (and not just in principle) adequate to explain functional biological complexity has not, of course, been universally accepted. For recent dissenting views, see J. P. Moreland (ed.), *The Creation Hypothesis: Scientific Evidence of an Intelligent Designer* (Downers Grove, IL: IVP, 1994), and Michael J. Behe, *Darwin's Black Box: The Biochemical Challenge to Evolution* (New York: Free Press, 1996).

⁵Stephen Jay Gould, *The Panda's Thumb: Reflections in Natural History* (New York: Norton, 1980).

⁶Paul A. Nelson, "The Role of Theology in Current Evolutionary Reasoning," *Biology & Philosophy* 11(1996): 493-517. Nelson provides an insightful discussion of the pervasiveness of theological considerations in contemporary evolutionary reasoning. Although I encountered his paper only after this one was substantially complete, his paper helped me to bring some issues in this paper into clearer focus.

⁷Gould, *The Panda's Thumb*, 20-21.

⁸See G. Schaller, H. Jinchu, P. Wenshi, and S. Jing, *The Giant Pandas of Wolong* (Chicago: University of Chicago Press, 1986).

⁹Richard Dawkins, *The Blind Watchmaker: Why the Evidence of Evolution Reveals a World Without Design* (New York: Norton, 1986), 91.

¹⁰*Ibid.*, 92.

¹¹*Ibid.*, 93.

¹²*Ibid.*

¹³*Ibid.*, 91.

¹⁴*Ibid.*, 92; emphasis added.

¹⁵Loren Haarsma, "Why Believe in a Creator?" *World & I*, 11 (1996): 337.

¹⁶See the quotations by William Whewell and Joseph Butler that appear opposite the title page of the *Origin of Species*.

¹⁷For examples, see Denis Owen, *Camouflage and Mimicry* (Chicago: University of Chicago Press, 1982).

¹⁸John Maynard Smith, "Optimization Theory in Evolution," *Annual Review of Ecology and Systematics*, 9 (1978): 32.

¹⁹Nelson ("The Role of Theology in Current Evolutionary Reasoning," 503-4) points out a related problem. When we consider any instance of biological imperfection we can judge it either on its own terms (e.g., as a piece of biological engineering), or as a component of a larger system of which it is perhaps only a small part. Apparent imperfection of a part is compatible with the perfection of the whole. It is, of course, difficult to conceive of how inverted retina could contribute to the perfection of the universe. But the objection succeeds to the extent that it draws attention to a questionable assumption of the Imperfection Argument, *viz.*, that biological perfection can be judged *locally*.

²⁰Dawkins, *The Blind Watchmaker*, 93.

²¹*Ibid.*, 92.

²²There may, of course, be other reasons for preferring a theistic to a naturalistic worldview, or vice versa, but my concern here is only with the issue of biological design. It almost goes without saying that theists (e.g., Christians) have never considered "biological design" to be the primary, much less the only, argument in support of their religious beliefs. Indeed, talking of "arguments" reveals very clearly that the issue of biological design functions primarily in apologetic contexts rather than in the day-to-life of faith that most Christians would consider the center of gravity for their beliefs.

²³David Hume, *An Enquiry Concerning Human Understanding*, edited, with an Introduction by Eric Steinberg (Indianapolis, IN: Hackett Publishing Co., 1977). Originally published in 1779.

²⁴Even if natural selection proves inadequate to account for certain biological structures, e.g., the sorts of structures discussed by Behe (*Darwin's Black Box*), there will always be *other* potentially explanatory naturalistic principles to appeal to, e.g., "self-organization" *a la* Stuart A. Kaufmann, *The Origins of Order: Self-Organization and Selection in Evolution* (New York: Oxford University Press, 1993). As *metaphysical* positions, naturalism and theism are in principle compatible with any empirical states of affairs.

<http://www.asa3.org/ASA/PSCF/1997/PSCF9-97Shanahan.html>