

# WHY I AM NOT A CREATIONIST: THE DEVIL IN THE DETAILS

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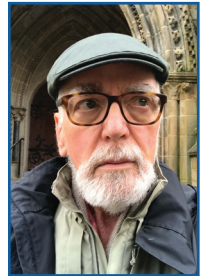
**G**ary Larson's smoking dinosaur cartoon entitled *The Real Reason Dinosaurs Became Extinct* has always been one of my favorites. Three dinosaurs furtively puffing on cigarettes with a pterodactyl flying overhead nicely illustrate some of the points I want to make here, in what will be a very personal essay, by which I mean I have not done any of the background reading that would be necessary if this was to be a thorough and scholarly account. What's relevant about the cartoon is that there are facts of the matter about smoking causing cancer, about the availability of cigarettes in the Mesozoic, about why the dinosaurs went extinct, and about how they came to be in the first place. If creationists are willing to accept detailed naturalistic explanations about the first and second, they should also be willing to accept them in the third and fourth. The methods by which we go to find out those facts, and the richness and diversity of the data that support them, are not different.

We seem to be relatively immune to the critiques of creationists here in Maritime Canada, and the few encounters I've had with them after lectures elsewhere have been remarkably civilized. Indeed, unfailingly those I've encountered have been polite and knowledgeable, able to quote from sources (including my own papers) I'd forgotten. Clearly, to them, the facts of biology provided support for their beliefs. All I could say to them, and all I can say here, is that the particular facts of the history of Life, that is to say the facts that evolutionary biologists accept, seem much more easily and fruitfully interpreted as the product of natural selection and chance than intelligent design and divine intent. But if they as individuals have some other compelling personal reason to believe in God or some higher power that intervenes in daily events (the particulars of Life's history), then I can offer no proof of the *absence* of such intervention, though I'd want to

know the detailed causal story in each case. Creationist explanations are seldom detailed and must, almost in principle, resort to miracles that defy explicit natural explanation. Most biologists are committed to naturalistic explanations, causal stories in fine detail. Indeed, evolutionary biology can and has been practiced by some committed theists, who seek to know in detail *how* God effected His plan, even if His plan remains hidden. In any case, what believers cannot do, I think, is use the facts of biology – *at the scales at which they are usually understood* – in any principled way to justify their belief.

Before Darwin that's just what most educated people in the English-speaking world *did* do. Natural theologians like William Paley saw the adaptedness of organisms (the exquisite refinements of the vertebrate eye fitting it for seeing) as analogous to the workings of a watch, and if the last needed a designer (a watchmaker), so must the former (God, from Paley's Christian perspective). I suspect that many creationists still hold such a view, but Darwin claimed it to be unnecessary. Not only was the watchmaker blind, "he" was the immutable natural force of natural selection operating iteratively on chance variations thrown up by populations – nothing divine or intelligent here at all [1].

It's important to realize that this is simply true, logically [2]. In any situation in which we find reproducing entities that bear traits affecting their likelihood of reproducing (their "fitness"), these traits being variable within large enough populations and to some extent heritable (passed down from parent to progeny), natural selection *will* ensue. Ancient Greeks already knew something about this: what Darwin added was the realization that such a process repeated generation after generation, and especially when there is competition among entities, could produce complex structures like the vertebrate eye. Adaptedness bespeaks adaptation. Again, this is logically true and many intelligent design creationists such as Michael Behe accept the principle. What is at issue is how often there are entities with those properties and whether the diversity and adaptedness of living things is adequately explained by this principle. Natural selection is a "how possibly" not a "how actually" theory, at least when it comes to explaining the past, and so there is an epistemological question here: how can we know that selection has been responsible in any particular instance, let alone in all instances?



## SUMMARY

**Darwin offered a naturalistic alternative to intelligent design which has the advantage of being experimentally accessible, and wherever so accessed provides satisfactory explanations for Life's diversity and adaptedness. One cannot use these phenomena alone as evidence for the existence of God.**

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ID (intelligent design) creationists, including Behe [3], like to point out areas in which evolutionary biologists are not in agreement about exactly what happened in the history of Life, and of course there will be many, small and large. We *are* an argumentative lot. Three areas that are worth discussion are the origin of Life, complexity, and consciousness. The first provides a good example of how science makes progress. Life as we know it needs DNA to make proteins and proteins to make DNA, posing a chicken-and-egg problem, seemingly insoluble, and generalizable to “information” and “metabolism”. In the 1980s, a “how possibly” solution fell out of experiments aimed at isolating proteins responsible for excising unwanted parts of RNA (“introns”) from longer molecules. It turned out that no protein was needed [4]. The RNA could catalyse its own removal, so chicken = egg. We now have a well-elaborated “RNA-world” theory in which the first entities capable of showing heritable variation in fitness were RNAs. While Darwin of course had no conception of self-replicating molecules, the RNA world theory fits his vision of natural selection driving an increase of complexity over time. Clever biochemists have evolved such RNAs in the lab and are working on membranes to encapsulate them. When we will have “life in the test-tube” if we don’t already, depends on how we define “life”, a philosophical question, really. So we have a good “how possibly” story that does not require divine intervention. We will never have a fully proven “how actually” story, though. The history of Life, just like the history of our own civilization, will always have its mysteries, but we should be no more sceptical or more inclined to invoke the supernatural in the former than the latter.

In the second area, critics such as Behe make much of the “irreducible complexity” shown by multi-subunit complexes (the bacterial flagellum, for instance) whose parts must have evolved individually, but seem to have no function except when together. In the case of the flagellum, “how possibly” stories gradually yield to “how actually” explanations, as analysis of the genome databases come to show how its several components evolved and laboratory experiments demonstrate the functionality of many of them in their particular original genomic and cellular settings [5]. The self-assembly machinery of flagella, for instance, is homologous to (shares a common ancestor with) genes known to be involved in injecting toxins into other cells.

Consciousness, that of our traits making us seem closest to God, is a far thornier issue, and both philosophers and biologists remain divided as to whether it’s really a thing at all, as opposed to an illusion [6]. Unquestionably, our minds and their contained thoughts are the products of millions of years of biological evolution and thousands of years of cultural evolution, in part under the direction of natural selection whose concern is only differential reproduction of genes or memes. Mapping to external reality may be a good but not a necessary feature, more relevant to survival and reproduction at the mesoscale of other organisms that we might eat or be eaten by than at the microscale of atoms or the macroscale of the cosmos. Clearly we do not yet understand consciousness, and we may never, but there is a natural, evolutionary, explanation for that, too. Just as my dog cannot figure out where her treats have gone when I hold them behind my back, I am intellectually limited. There may be room for God in these gaps in comprehension, but we don’t need Him to explain mesoscale phenomena such as the extinction or origin of the dinosaurs.

At the mesoscale, many of our “how possibly” explanations have become believable “how actually” stories as we have learned more of Life’s history. There is likely no particular event in the history of Life that demands a supernatural explanation – that will not yield to Darwin’s principle or ordinary chance, stuff that “just happened”. As evolutionary biologists, our job is to explain these individual events according to such principles, not to prove the principles. Elsewhere I have argued that we need no grander “evolutionary synthesis” and have made ourselves unnecessarily vulnerable to creationist critiques by pretending that we do [7,8]. What the theory of evolution is, in practice, is the claim that the diversity and adaptedness of existing organisms can be explained through the operation, over four billion years, of ecological, population genetic, and gene-level processes of the sort we already largely understand. If we want higher-level theory, supposing for instance that the mere existence of Life has implications in the same sense as the existence of something rather than nothing has spiritual meaning, the evolutionary toolkit is inadequate to the purpose. Evolutionary biologists can — at least in principle — tell how any particular event in Life’s history might have happened and what natural forces might have been at play. If God were responsible, we can tell you *how* he (likely) fulfilled that responsibility, but not *why*. Most of us don’t think there *is* a why, but that’s another matter.

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