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Evolutionary biology and the question of teleology

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ABSTRACT

Teleology—what Aristotle called "final cause"—is trying to understand things in terms of the future, as when we ask about the plates on the back of the dinosaur, stegosaurus, and suggest that they might sometime be used to control the internal temperature of the brute. Recently the philosopher Thomas Nagel has argued for a wholesale embrace of teleological thinking in the sciences, particularly the life sciences. I argue that Nagel's thinking is shoddy and ill-informed, but that in some sense biologists do (with reason) seem drawn to teleological understanding, and so the correct response is not outright rejection of the very idea but a more informed and sympathetic approach to those aspects of nature that seem to call for final cause thinking.

1. Thomas Nagel's bad book

Recently the well-known American philosopher Thomas Nagel published a book, *Mind and Cosmos*, in which he argued that the thus-far insoluble problems of the biological sciences (especially in the field of evolution) suggest that researchers need to return to teleological explanations.

> If contemporary research in molecular biology leaves open the possibility of legitimate doubts about a fully mechanistic account of the origin and evolution of life, dependent only on the laws of chemistry and physics, this can combine with the failure of psychophysical reductionism to suggest that principles of a different kind are also at work in the history of nature, principles of the growth of order that are in their logical form teleological rather than mechanistic. (Nagel, 2012, 7)

To say that the book was not well received is a bit like saying that Hitler had a thing about Jews. Harvard psychologist Steven Pinker wrote on Twitter of "the shoddy reasoning of a once-great thinker." Daniel Dennett bluntly said that Nagel's work "isn't worth anything—it's cute and it's clever and it's not worth a damn." And the *Guardian* newspaper carried a headline that Nagel's book was the most despised science book of 2012 (Chorost, 2013). Perhaps expectedly, the Creationists loved it!

Mind and Cosmos is not a great book (Ruse, 2010). Nagel's knowledge of biology is breathtaking in its nigh-willful superficiality. One suspects that only someone who knew his conclusion before he started his research could argue in so shallow and misleading a fashion. Nagel is no Creationist. One accepts his claim to be an atheist. He does however have a record of praising Creationist books—more specifically, he praises books by the so-called Intelligent Design Theorists, what I call "Creationism Lite"—and one senses a shared contempt for and fear of arguments about evolutionary origins. (See Behe, 1996.) Perhaps if we were to identify one single factor for this hostility—and this is made very clear by Nagel—it is that evolutionary thinking belittles the worth of humankind. We are reduced to mere matter in motion and that which makes us somehow special is downgraded and denied. I will not here go into more details; what I would like to do here is turn the tables somewhat and pick up and take seriously Nagel's claim that we need to take up teleological modes of understanding. Given that I am one who has written critically of Nagel's book, it may seem odd—hypocritical perhaps—that I would do so. But I am motivated by the ferocity of the reactions to *Mind and Cosmos*. Bad books appear on a regular basis. Generally such books get little press and they make no waves and are soon forgotten. Why then did Nagel's book so upset people?

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In part obviously the reaction was because of the Creationism factor. Any book praised by Creationists is going to be disliked and the fact that already Nagel had earlier spoken warmly of Creationist works did not help. I suspect however that there was something about teleology in itself that rattled people. This mode of thought is in some sense considered not just wrong but unclean, and when Nagel started pushing it, emotions were generated and poured forth. Embracing and advocating teleology is a bit like smoking in someone's living room. People used to do it but they don't anymore and very much disapprove of those that still do. It is just something that is alien to decent people, or perhaps as with smoking not done now but with a hint of past pleasures and urges that must now be repressed. Nothing like a reformed Magdalene for sanctimonious disapproval. This is the hunch I want to pursue and unpack. Teleology unnerves people because although it is wrong it is still tempting.

2. What is teleology?

What does one mean by "teleology," or more specifically what is a "teleological explanation"? It is a form of explanation that makes reference to causes that can be understood only in terms of the future (Ruse, 2003). To make sense of this definition, contrast teleological explanation with more usual forms of explanation that make reference to "proximate" or "efficient" causes. These latter explanations are in terms of causes that are understood in terms of past or present. So for instance if I say (to take a biological example) the reason why a child has Down's syndrome is because he has an extra chromosome, I am explaining the physical and psychological nature of the child in terms of some cause that already exists. In a teleological explanation I am explaining in terms of causes that do not yet exist. If I say (to take another biological example) the plates on the back of stegosaurus exist in order to (for the purpose of, have the function of) regulating the heat of the animal, I am talking of what I expect to happen. The stegosaurus has its plates now. Later in the day, the sun heats the brute and then the plates start to radiate heat or to catch the cooling breezes in the air.

Note therefore that there is not really a straight analogy between proximate causes and teleological causes. In the former case, you know that the cause exists or existed. In the latter case, the cause may never exist! It could be that the stegosaurus falls of a cliff and never uses its plates for their intended purpose. How then can there be reference to the future if the future never occurs? There are two proffered explanations. One is that teleological explanation occurs in the context of intelligent design. The purpose of the airbags in the automobile is to explode on major contact. It may be that the airbags never are used for this purpose, but the point is that someone at some point thought about what might happen and designed and built them accordingly. The future reference comes because someone thought about it. (This has its roots in the thinking of Plato.) The other explanation is that there is some kind of special force that is future directed. The force may not be a thinking force, but it seeks out phenomena or events in the future. The idea here is rather like the goal-directed system you get in rockets. As the target moves, the rocket adjusts its direction accordingly with the aim of hitting the target. The analogy is not quite exact, because in the case of rockets someone—some bright engineer from MIT—designed the seeking system. But you get the idea. (This has its roots in the thinking of Aristotle.)

3. Charles Darwin and natural selection

I will take seriously Nagel's claim that he is not a believer, so I accept that he does not see the teleology of biology as literally designed. I presume therefore that he subscribes to some kind of view that has special forces—"vital forces"—focused on the future. This is a view made popular at the end of the nineteenth century by a group known naturally as "vitalists," led by the German embryologist Hans Driesch who spoke of "entelechies" and the French philosopher Henri Bergson who spoke of "élans vitaux." (See Bergson, 1907 and Driesch, 1908.) I will not stop here to criticize this view because this was done so often in the last century, but I will agree with the critics that the main problem with vital forces is that they seem not to add to the explanatory mix. Once you have finished talking about DNA and that sort of thing, it really doesn't seem that adding vital forces adds at all to one's understanding. However, I will agree with Nagel that there does seem to be something teleological about organism talk—we do have forward reference—and that this needs explaining. The eye does serve the future purpose of seeing. What I would say is that as always in science we have a metaphor at work here, the metaphor of design. We look at the eye as if designed, even though it may not be, and the reason why we do this is because it does seem as if designed and using the metaphor has incredible heuristic value. In the stegosaurus case, thinking of the plates as if designed for cooling led to all sorts of interesting hypotheses about blood flow, that were later confirmed.

Where I part company with Nagel is in thinking that, in the case the design of organisms, we have a more than adequate naturalistic—mechanistic—account. This is Charles Darwin's theory of evolution through natural selection. In his *Origin of Species*, Darwin argued that population pressures lead to a struggle for existence and (more importantly) reproduction. The successful in the struggle will tend to be different from the unsuccessful and it will be the differences that count. Given enough time there will thus be a natural form of selection.

> Let it be borne in mind how infinitely complex and close-fitting are the mutual relations of all organic beings to each other and to their physical conditions of life. Can it, then, be thought improbable, seeing that variations useful to man have undoubtedly occurred, that other variations useful in some way to each being in the great and complex battle of life, should sometimes occur in the course of thousands of generations? If such do occur, can we doubt (remembering that many more individuals are born than can possibly survive) that individuals having any advantage, however slight, over others, would have the best chance of surviving and of procreating their kind? On the other hand, we may feel sure that any variation in the least degree injurious would be rigidly destroyed. This preservation of favourable variations and the rejection of injurious variations, I call Natural Selection. (Darwin, 1859, 80–81)

Note that Darwin's mechanism not only leads to change but to change of a particular kind. Organisms will develop end-directed features like hands and eyes, what biologists call "adaptations." There will be an appearance of design, without need of vital forces or direct interventions by a designer. Blind mechanical law can do everything. It is not so much that final-cause type understanding is now gone—Darwin himself happily talked about final causes and he certainly thought that this involved explaining in terms of the future—but that teleology is now subsumed under mechanism (Ruse, 2009).

4. The challenge of history

For the Greeks, this would have been the end of the story. They, at least the philosophers, had no real thoughts of development through time. Their world was eternal and essentially unchanging. Historical development comes later and is due in no small part to the biblical narrative, with the movement from Eden to Calvary and later. It was after the Scientific Revolution, during the