
DID DARWIN WRITE
THE ORIGIN BACKWARDS?
AN INTERVIEW WITH ELLIOTT
SOBER ON HIS BOOK

As it is commonly recognized in various academic milieus, professor Elliott Sober's work, both in philosophy of biology and general philosophy of science, represents a highly enlightening contribution to many of the most salient issues arisen in the intersection between philosophy and contemporary evolutionary biology. In books like *Reconstructing the Past: Parsimony, Evolution and Inference* (1988), *Philosophy of Biology* (1999), *Unto Others. The Evolution and Psychology of Unselfish Behavior* (1998) or *Evidence and Evolution* (2008), to name just a few titles, professor Sober's research has addressed an ample variety of topics ranging from the application of probabilistic thinking to scientific reasoning in current mathematical biology to the discussion of the concept of group selection and its role in our understanding of the evolution of genetic altruism. Most recently, in his book *Did Darwin Write the Origin Backwards?* (2011), Sober has thoroughly considered some of the debates concerning the implications of the Darwinian evolutionary theory for philosophy of science, philosophy of religion or philosophy of probability, among other arenas. This interview with professor Elliott Sober focuses on a sample of the many questions analyzed in his book.

I would like to start this interview by commenting on some of the claims sustained in the first chapter of your book Did Darwin write the Origin Backwards? (2011). The chapter consists of one very in-depth discussion on the relationships, both causal and evidential, between what you take to be the two most fundamental elements of Darwin's evolutionary theory: the concept of natural selection (NS) and the hypotheses of common ancestry (CA). In light of such analysis, why do you argue that Darwin's theory is not adequately described by characterizing it as a theory of "evolution by means of natural selection"? What is the role of CA within Darwin's evolutionary doctrine?

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The phrase “evolution by natural selection” does not say anything about Darwin’s thesis that all organisms alive today traces back to one or a few “original progenitors.” This idea of common ancestry is a very important part of his theory. In fact, I think it was evidentially more fundamental than his idea that natural selection was “the main but not the exclusive cause” of life’s diversity. Darwin develops his evidence for common ancestry by setting aside adaptive traits. Then, with the hypothesis of common ancestry in place, he develops detailed accounts of how natural selection changed lineages, leading descendants to depart from the characteristics of their ancestors. The idea of common ancestry was the platform on which Darwin erected his theory of natural selection.

In what sense is (or is not) the Origin of Species written backwards?

Darwin thought that natural selection causes the history of life to conform to a branching pattern. It is natural selection that leads some lineages to persist, sometimes giving rise to multiple descendant lineages, while other lineages go extinct. So, in terms of causality, I think Darwin was right to give natural selection top billing in how he presents ideas in *The Origin of Species*. But in terms of evidence, the situation is reversed. The evidential ordering is common ancestry first, then natural selection. Maybe Darwin wanted to put what he regarded as causally fundamental first in his book.

The second chapter of your book addresses the topic of the units of selection which has been the focus of much controversy in the fields of biology and philosophy of biology alike since the 1960s. What was Darwin’s position in this respect? What is the current state of affairs regarding this problem?

Many commentators have described Darwin as being opposed to the idea of group selection. I think this is a mistake. Darwin believed that group selection was an important cause of some evolutionary events. He didn’t think that all traits are group adaptations, however. The most famous example of Darwin’s appealing to group selection concerns his discussion on human morality. But he also invokes group selection to explain why there are sterile workers in the social insects, and why some bees and wasps have barbed stingers.

The idea of group selection is still controversial in evolutionary biology. It was criticized in the 1960s and many biologists are still thinking about the question in those terms. They think that group selection isn’t just factually mistaken; they think it is conceptually confused, a failure to see the logic of what natural selection involves. But there are many other biologists who see things differently. They think that the idea of group

selection is not a confusion and that many interesting adaptations have evolved because there was group selection. So the field remains divided.

Another hugely discussed issue in this connection is the problem of sex ratio. The third chapter of Did Darwin... is devoted to this one especially intriguing matter. How are sex ratio and the problem of the units of selection mutually connected? How does evidence about observed sex ratios bear respectively on the doctrine of special creation and on evolutionary biology?

George Williams, in his 1966 book *Adaptation and Natural Selection* (1966), argues that sex ratio is a test case for the idea of group selection. Williams reasoned that if sex ratio evolves by individual selection, then sex ratios in different species should be even. But if group selection influences the evolution of sex ratio, then we should observe species that have uneven sex ratios. Williams then asserts that the sex ratios we observe in nature are all pretty much even. He takes this to be strong empirical evidence against group selection.

Williams evidently did not know that there are many species in nature that have female-biased sex ratios. So one might expect that this empirical correction to Williams' picture would have led biologists in the 1960s to conclude that group selection is an important cause of sex ratio evolution. This is not what happened. In 1967, William Hamilton published a paper that explained how natural selection can cause uneven sex ratios to evolve. Most biologists who read the paper thought that Hamilton was talking about individual selection, not group selection. Only later did it become clear that Hamilton's theory actually involves group selection.

I should mention that my chapter on sex ratio begins with eighteenth century explanations of sex ratio that invoked intelligent design. Darwin knew about these ideas even before he invented his theory of evolution, and they influenced how he thought about sex ratio in his book *The Descent of Man*. In the first edition of that book, Darwin advances a theory about how natural selection affects sex ratio evolution, yet in the second edition Darwin withdraws his suggestion without explaining why he thinks it is inadequate. In my book I speculate about why Darwin changed his mind on this interesting topic.

What were the reasons for such change of mind?

Darwin's theory in the first edition is that the mating pattern in a population causes sex ratio to evolve; if there is monogamy, natural selection will favor the evolution of an even (1:1) sex ratio, whereas if there is polygyny (mating groups with a single male and multiple females), then natural selection will favor a female-biased sex ratio. One reason Darwin may have

come to doubt his theory is that he believed that human beings and their ancestors had even sex ratios long before monogamy made its appearance.

I want to reflect on the two different types of naturalism that your book distinguishes in relation to evolutionary theory and other scientific theories. You maintain that while evolutionary theory abides by a refined form of methodological naturalism in that it does not make claims about the existence of a supernatural deity, it is neutral with regard to metaphysical naturalism and so does not deny that such deity exists. In this, you, and other philosophers or biologists such as M. Ruse or F. J. Ayala, seem to disagree both with evolutionist like R. Dawkins or D. Dennet and special creationist, who have tried to show how evolution and the image of a provident intervening God cannot be thought of as correct at the same time. In fact, you further defend that, if adequately defined, the claim that there is a provident God (and not merely a deistic type of divinity) who intervenes in the evolutionary process is not ruled out by evolutionary theory, at least so long as the data is incapable of excluding hidden variables. In this regard, we could perhaps safely conclude that there might be room in our understanding of evolution for an intervening God provided that the theory is not causally complete. What is more, it might not even be accurate to assume that scientific theories do not, in principle, postulate the existence of supernatural entities (for many of the branches of science entail the existence of numbers) or that all claims about supernatural entities are untestable (for some clearly aren't) or even that invoking the existence of a provident God has always prevented scientist from conducting good scientific research (many historical instances are testimony to the contrary). My question in this context is why should scientists act in accordance to methodological naturalism and leave their theology or atheology aside when doing science?

My answer is modest and practical. Science has done a remarkable job of helping us to explain and predict what goes on in nature without bringing in the alleged existence of supernatural deities. It is very hard to see how abandoning that tradition would improve science, and it is easy to see how abandoning methodological naturalism could weaken or destroy science. So my suggestion is: let's not tinker with a machine that is working well. The saying in English is "if it ain't broke, don't fix it!"

What is your opinion, along the same vein, about some recent attempts by F. J. Ayala (2007) to accommodate the core beliefs of theism and evolutionary biology?

I remember Francisco Ayala arguing that Darwin's theory is good news for religion because the theory solves the problem of evil. Darwin showed that there is a process at work in the living world (natural selection) that causes lots of suffering and death. This means, according to Ayala's interpretation, that this quantity of suffering and death is not God's fault.

To me that doesn't solve the problem of evil, since the question remains of why God would permit natural selection to be the process at work that causes organismic diversity.

To what extent does the prevalence of probabilistic thinking in evolutionary biology represent a challenge to the conventional hypothetico-deductive view on scientific theories, promoted by philosophers like Popper, among others?

The hypothetico-deductive model of science says that predictions can be deduced from theories (perhaps only when needed, "auxiliary assumptions" are added to the theories). However, for many scientific theories, there is no such deductive relation. Rather, theories (plus auxiliary assumptions) confer probabilities on this or that observation. This has at least two important consequences for philosophy of science. First, falsifiability cannot be the correct demarcation criterion that separates science from non-science. Second, it means that testing in science must be contrastive. One shouldn't ask whether an observation is evidence for or against a given theory, taken by itself. Rather, the more appropriate question is to ask whether an observation favors one theory over another.

More generally, what are, in your opinion, the most salient problems given rise by contemporary biological thought for (1) philosophy of science as well as (2) for other philosophical disciplines?

These are two very big questions! I'll describe one example for each. On (1), I think that evolutionary theory provides interesting ideas concerning the interpretation of probability. Philosophers of probability have described a number of objective and subjective interpretations of probability. It is interesting to see what these interpretations say about the probability ideas that biologists use when they theorize about natural selection and random genetic drift. On (2), a number of philosophers have argued that evolutionary theory throws doubt on moral realism. Moral realism is the view that some statements about right and wrong are true, and that they are true independently of what makes them to be believed if we deliberated about them in a certain way. These arguments connecting evolutionary theory to moral realism need to be looked at carefully.

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