

**Review of Allan GOTTHELF's  
 "TELEOLOGY, FIRST PRINCIPLES, AND SCIENTIFIC  
 METHOD IN ARISTOTLE'S BIOLOGY"  
 Oxford Aristotle Studies, Oxford University Press,  
 New York, 2012, 440 Pages.**

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Allan Gotthelf is one of the leading experts in the analysis of Aristotle's biological works, books such as *Parts of Animals*, *On the Generation of Animals* and *The History of Animals*. Here he has a collection of sixteen essays, some previously published and some new, covering the methodological and epistemological bases of Aristotle's stances. The last chapter (p. 371) describes "the systematic and exploratory character of his (Aristotle's) work" (p. 371), and the way he explained and organized the collected data to form a "comprehensive (and revisable) body of scientific understanding" (p. 371), thus confirming that before Aristotle there were only "dialecticians of philosophy", mostly speaking through oral debate, but no real creator of a complete philosophical system, as was the case for Aristotle.

Gotthelf's book contains in-depth analyses of the axiomatic structure of the biological explanation given by Aristotle (pp. 153 et seq.). Other parts scrutinise Aristotelian metaphysics, e.g. the relationship between substance, form and psyche, as studied by Montgomery Furth (p. 241). The place of the classification of animals in the Aristotelian view (as described in *The History of Animals*) is discussed (p. 263). And a comparison is made between Aristotle and his successor Theophrastus who was more interested in plants than animals (p. 307).

The author displays extensive knowledge of the international literature on the subject and I was delighted to see quoted the brilliant Aristotelian scholar and my master in philosophy, the late Louis Bourgey. I cannot discuss all the content in this magnificent book, but shall focus on what I see as the most important issue: teleology or, in Aristotle's terms, final causality. Teleology is one of the central considerations in the philosophy of biology. All philosophers of life know that however reductionist and materialistic their stance may be, the question of teleology discreetly remains (or recurs) in their concept of living beings.

A large part of the book is devoted to Darwin's admiration for Aristotle: "Linnaeus and Cuvier have been my two gods, though in very different ways, but they were mere schoolboys to old Aristotle" (p. 345).

To a certain extent, Darwin's views as presented through the comments of some of his followers – may appear devoid of any teleological constraint, but this is unlikely. Several authors have observed that basic "natural selection" cannot explain

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all aspects of evolution or the fact that, despite opposite evolutionary processes, evolution overall leads to more complex structures. And many authors, for example Gould and Abrantes, are willing to accept that other rules governing complexity might complete the powerful selection process described by Darwin. In my own research, I have proposed a theory with a complementary model of complexity in mosaic formation (2013), based on asexual reproduction (natural selection being mainly based on sexual reproduction). This model fits the requirements of both Modell (2011), Abrantes (2011) and Saniotis (2013) emphasizing the need for non-Darwinian processes to complete natural selection.

Allan Gotthelf goes so far as to suggest that Darwin's well-known admiration of Aristotle "may have reflected some real insight into the teleological aspect of Aristotle's thought" (p. 346), suggesting that Darwin himself, unlike some of his strict followers, did not object to some form of final causality. "Darwin did not destroy teleology, as many friends of Darwin, as well as many enemies, had thought, but rather put it on scientific footing" (p. 368), the footing of adaptation.

The key point of the many excellent points in Allan Gotthelf's fine book is that he has drawn attention to the importance of final causality in both the work of the initiator of biology, Aristotle, and the work of the initiator of modern biology, Charles Darwin.

### References

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