Evolution: The First Four Billion Years

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Four Billion Years in a Thousand Pages

Evolution: The First Four Billion Years. Michael Ruse and Joseph Travis, eds. Belknap, 2009. 1008 pp., illus. $39.95 (ISBN 9780674031753 cloth).

This being the 150th anniversary of the publication of *On the Origin of Species,* as well as the 200th birthday of Charles Darwin, there is a frenzy of events and publications devoted to the founder of the field of evolutionary biology and, by extension, to the history, current status, and possible future of the entire discipline. There is much to celebrate—Darwin's ideas have surely been among the most influential (and controversial) in the history of humanity. There is much to think about because of the ever-changing structure of evolutionary theory (Müller 2007, Pigliucci 2007) and its expansion beyond the strict confines of biology to affect philosophy, the social sciences, and even literary criticism (Browne et al. 2009). And all of this, of course, does not even scratch the surface of the perennial controversy about evolution and creationism (Coyne 2009), or the contentious attempts to explain religion itself in evolutionary terms (Norenzayan and Shariff 2008).

At the same time, the idea of an encyclopedia, a comprehensive compendium in a given field of knowledge, has a very old and venerable tradition both among scholars and the general public, from Pliny the Elder's *Naturalis Historia* to the Chinese *Yongle Encyclopedia* of the 15th century, and continuing with the French encyclopedists of the Enlightenment, not to mention the surprisingly accurate and always controversial Wikipedia. As Diderot put it, the point of an encyclopedia is "to set forth its general system to the men with whom we live, and transmit it to those who will come after us, so that the work of preceding centuries will not become useless to the centuries to come" (Diderot and d'Alembert 1751–1777). It is therefore not surprising that someone went about producing an encyclopedic work (though not an encyclopedia per se) on evolutionary biology in time for this year of anniversaries and celebrations.

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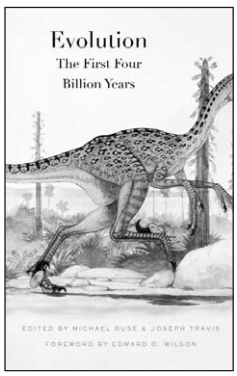

Evolution: The First Four Billion Years, edited by philosopher Michael Ruse and biologist Joseph Travis, is not an encyclopedia in the sense of Diderot. That volume would require a titanic effort by many more editors and authors, and a much more substantial commitment by the publisher. Even so, the book is a valiant attempt to produce a broad (if not comprehensive) work with the goal of conveying to the reader the breadth and depth of evolutionary thinking, both contemporary and historical. *Evolution,* however, falls short in its delivery, not because of what its editors and authors did or did not do, but rather because the era for large projects like this one has now definitively passed, especially when such projects are limited to the printed medium (the book is available from Amazon, for instance, but not for Kindle, its increasingly popular e-reader device, which would make the book's thousand or so pages easier to carry around and search through).

Ruse and Travis do try their best. For instance, they adopt an ingenious way to parse a vast amount of material that would otherwise be overwhelming both for authors and for readers. The book is divided into two parts: The first comprises 16 essays by well-known authors, on a variety of topics ranging from the history of evolutionary thought (Ruse) to adaptation (Travis and David Reznick), and from the evolution of development (Greg Wray) to American antievolutionism (Eugenie Scott). The second, bulkier part of the book is composed of shorter entries on more specific themes, written by a larger number of authors (who, annoyingly, are identified at the end of each piece only by their initials, so that one has to flip to the end of the book to see who wrote what). Rather puzzlingly, many of these shorter essays focus on individual biologists or even individual books, and it is not always clear why a specific topic or individual was chosen, or why that particular author was asked to write about it.

For example, an entry by Ron Amundson is devoted to *Monad to Man: The Concept of Progress in Evolutionary Biology,* a book authored by Ruse himself and published back in 1996. That volume is an interesting one, to be sure, but many other equally interesting texts are not covered by *Evolution,* including more poignant productions by the highly prolific Ruse. Or consider the essay on W. D. Hamilton: While he was unquestionably one of the most influential biologists of the latter part of the 20th century—think kin selection and the evolution of altruism—frankly, the comparison with Darwin would have embarrassed Hamilton himself. It is not a good idea to ask a person's former PhD student to write that person's biography if the aim is to achieve a balanced assessment of the subject at hand.

To return to the first part of the book, let me note that the principal essays are often interesting. You can learn much about the state of things in the field of life's origin from the contribution penned by Jeffrey Bada and Antonio Lazcano, Kim Sterelny can help you understand what on earth the philosophy of biology is really all about, and you

learn to appreciate some of the advances and controversies in evolutionary developmental biology while reading Greg Wray. Then again, there is no essay on the role of phenotypic plasticity in evolution, a topic that has acquired central status during the past two decades; after perusing *Evolution* a reader might be excused for not appreciating the entire field of evolutionary genomics, or for being ignorant of ongoing discussions on crucial new concepts like evolvability. Even attempts to move beyond strict biology with entries on evolution and society, evolution and religion, and the above-mentioned essay on antievolutionism barely scratch the surface—why is there no discussion of evolutionary psychology, as controversial and somewhat dubious as the field is?

While some of these lacunae could have been avoided during the planning stages of the volume, I think the underlying problem is that encyclopedic efforts are a thing of the past, certainly when it comes to the paper variety of encyclopedia. In this bold new era of ubiquitous and increasingly cheap laptop computers, 24/7 Internet access, e-readers, smart phones, and so on, I simply do not see many people willing to lug around a thousand pages of what is going to be a necessarily incomplete and increasingly unrepresentative reference source like *Evolution.* Publishers, editors, and authors would be much better off embracing the anarchy and flexibility of the Web to develop decentralized and more focused projects, such as the excellent *Complete Works of Charles Darwin* online (*http://darwin-online.org.uk/*).

Even encyclopedias are taking a decidedly different form these days, and if one does not like the proletarian *Wikipedia,* excellent models of scholarly efforts are out there, such as the *Stanford Encyclopedia of Philosophy* (*http://plato.stanford.edu/*). These take seriously the idea of organic, grassroots growth arising from the efforts of a dedicated community, based on what the community itself sees as worth writing about, as opposed to the centralized planning typical of the standard model. Indeed, let me suggest to Ruse and Travis, both of whom I know and highly respect, that they go back to Harvard Press and propose to use the current version of their book as the seed for a community-wide, online, open-ended effort. Of course, it would also be nice if it were open access, but that's another story.

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WHAT IS IT LIKE TO BE A ROBOT?

Guilty Robots, Happy Dogs: The Question of Alien Minds. David McFarland. Oxford University Press, 2009. 256 pp., illus. $15.95 (ISBN 9780199219308 paper).

Any scientist who wants to investigate minds—our minds, animal minds, alien minds—will soon discover that there is no way to proceed without venturing into the playgrounds and battlefields of the philosophers. You can either stumble into this investigation and thrash about with a big scientific stick, thwacking yourself about as often as your opponents, or you can enter cautiously, methodically, trying to figure out the terrain using what you already know to interpret what you find. Fortunately, David McFarland has chosen the second option in *Guilty Robots, Happy Dogs: The Question of Alien Minds,* and there is much food for thought here for both scientists and philosophers.

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It is written in the spirit of Valentino Braitenberg's brilliant little book *Vehicles* (1984), a series of thought experiments that led readers from robotic vehicles even simpler than bacteria to ever-more sophisticated and versatile agents capable of tracking food, avoiding harm, comparing situations, and remembering things. McFarland starts his project a little higher on the ladder of sophistication, with a robot designed to serve as a night watchman of sorts, identifying interlopers, calling for help when needed, and, most important, preserving its energy supply for another day, budgeting its activities to stay alive at all costs. This basic robot is then enhanced in various ways, in a design process whose ultimate goal is a robot that can be held accountable and to whom things matter—a robot with subjectivity and values.

How do nonhuman animals compare with such robots? Animal minds (including our own) are the real quarry here, and McFarland uses the parallels and differences between clearly imagined robots and various well-studied animals to illuminate the issues in a host of research controversies currently raging in psychology and ethology. This has been his larger strategy for many years, and this book gives us a summary of the lessons he has gleaned from this interdisciplinary exploration.

One message driven home most effectively, in my opinion, is that it is entirely appropriate to consider natural selection to be a (mindless, purposeless) designer, and to compare the designs churned up by eons of natural selection on a par with designs generated top-down by would-be intelligent designers—engineers and roboticists. Sometimes the perspective is particularly bracing, as when McFarland insists on situating his imagined robots in a market economy so he can note