



## Book Review

*On the Origin of Species* by Charles Darwin. Edited by Joseph Carroll. Orchard Park, NY, Broadview Press, pp. 630. ISBN 1551113376.

Reviewed by Alexandre Guilherme

This is an excellent edition of Charles Darwin's *On the Origin of Species*, which encompasses a very comprehensive introduction by the editor Joseph Carroll (who is a scholar of Darwin's works and influence), the first edition of the *Origin* (which is both a literary classic and a scientific treatise) and an Appendix with very notable material, such as excerpts from Darwin's autobiography, letters, *Voyage of the Beagle* (where Darwin tells about his trip around the world collecting plant and animal specimens, as well as fossil and geological data), *The Descent of Man* (where Darwin applies his theory of evolution to human beings) as well as excerpts of the writings of some of Darwin's contemporaries and predecessors, such as Lamarck's *Zoological Philosophy*, Lyell's *Principles of Geology*, Spencer's *Social Statics*, Malthus' *An Essay on the Principle of Population*, and Wallace's *On the Tendency of Varieties to Depart Indefinitely from the Original Type*. For these reasons this edition will be most useful to both the scholar and the beginning student of this field.

Darwin worked on his theory of evolution by natural selection for twenty years, from 1838

and 1839 to 1857 through 1859 when the *Origin* was first published. At first, Darwin foresaw a very large manuscript, which would present his views in minute detail; he started compiling this work, 1842 to 1844, but did not finish writing it since his plans were brought to an abrupt end when he received a paper from Alfred Russell Wallace for his appreciation. In this paper, Wallace set out his own description of the theory of evolution by natural selection, albeit less sophisticated than Darwin's. This fact prompted Darwin to seek advice from friends, since he did not want to do anything dishonourable, but did not want to lose the merits for the discovery of the theory of evolution by natural selection. It was suggested that a joint paper should be presented at the Linnean Society of London. All parties agreed this to be the best way forward. Lyell and Hooker wrote the introduction and prepared the text from Darwin's previous correspondence and Wallace's letter, and George Busk, Under-Secretary to the Society, read the paper on the evening of 1 July 1858. Soon after this, Darwin started working on his *Origin*, which is written with painstaking argumentation. Darwin tried to

foresee any possible objection to his theory, and worked on very eloquent and convincing replies. A question that is often raised here is, 'why the delay in making his views on natural selection public?' Commentators often lay weight on Darwin being concerned for his career, afraid of a backlash against himself and his family. Carroll places more weight on the fact that Darwin wanted to work out the theory in minor details, that he wanted to foresee possible objections, and work out convincing replies, and that he wanted to conduct a number of experiments so that he would have proper instances of his theory, and not mere rhetoric. Carroll makes a fair point here, since the *Origin* is a very long argument, in which Darwin explains why the theory of special creation is incorrect and why the theory of natural selection provides answers which were previously left unanswered or ignored.

The theory of evolution by natural selection was neatly summarised by Darwin in the introduction of the *Origin* as follows:

As many more individuals of each species are born than can possibly survive; and as, consequently, there is a frequently recurring struggle for existence, it follows that any being, if it vary however slightly in any manner profitable to itself, under the complex and sometimes varying conditions of life, will have a better chance of surviving, and thus be *naturally selected*. From the strong principle of inheritance, any selected variety will tend to propagate its new and modified form (p.97).

Darwin's insight into how species are formed and propagated represented the apex of much research and speculation by many of his contemporaries and predecessors, such as Lamarck, Cuvier, Spencer, and Lyell, and represents a clear break with the old school of thought which held firmly to the theory of special creation. Darwin's theory of natural selection

came to replace the theory of special creation because it provided better explanations of many facts, as well as explaining other facts, which were previously left unexplained by the theory of special creation. Carroll puts this extremely well when he says:

The theory of special creation and the theory of natural selection are both compatible with the integrated functional organization of animals – and indeed integrated functional organization is the primary evidence put forth in the argument of natural theology: the argument that design implies designer...But the theory of special creation, in contrast to the theory of natural selection, is not a causal explanation so much as a simple appeal to divine intervention – the *deus ex machina* of biology. More importantly, from the stand point of causal logic, while special creation can account for integrated functional organization simply by claiming that such organization displays wisdom and beneficence of the creator, it cannot account for *imperfections* in functional organization. If God created animals to be perfectly adapted to their environments, why did he provide them with rudimentary organs such as the human appendix? Why did he provide upland geese with webbed feet that they never use for swimming?...To questions such as these, special creation can provide no answer. In contrast Darwin's theory of descent with modification – the theory that all organisms have descended from previous organisms, and that in the course of descent the form of organisms has gradually become modified through a process of adaptation by means of natural selection – provides an answer (pp.13-14).

This long passage from Carroll's introduction to this edition was so well written that I

decided to quote it in full. Moreover, it describes so well the problems which were faced by the theory of special creation, and which were either left unsolved or dismissed with rhetoric, and which were completely solved by Darwin's theory of evolution by natural selection.

As I mentioned above, Darwin's formulation of the theory of natural selection was also the culmination of much research and speculation in the field of biology by Darwin's predecessors and contemporaries. It is worth mentioning here a rough sketch of the road from the theory of special creation and towards the theory of natural selection. Lamarck, Cuvier, and Lyell are among of the most important of Darwin's predecessors and contemporaries and he was very familiar with their theories. Lamarck understood that species were able to evolve and that they were driven forward and towards an ever more complex structure, which would ultimately end in the structure of a human being. Cuvier did not agree with Lamarck's evolutionism and held on to the theory of special creation, but he also recognised that extinctions happen. Cuvier tried to account for the discrepancies in the fossil record by presupposing that catastrophic events, such as sudden floods and ice invasions, could happen in any given area at any given time, and that plants and animals from other regions had migrated into the region where a catastrophic extinction had happened (NB one of Cuvier's most avid disciples, namely Louis Agassiz, even supposed that whole new biotas were created by God after every catastrophic extinction). Lyell rejected, at least partly, both Cuvier's and Lamarck's views. He rejected Cuvier's view about catastrophic events and he also rejected Lamarck's evolutionism. Lyell pushed the subject forward by designing a theory in which he supposed that only a small part of the biota was made extinct at any given time in any given area, and that these extinct species were replaced by new, specially created species. Lyell's theory of species left much unanswered, and this fact

puzzled Darwin, and thus it is no surprise that Darwin became somehow obsessed with solving the problem at hand. It is noteworthy here that Darwin himself acknowledged that Lyell was one of the major influences on his life; the other influences are Thomas Malthus, whose *An Essay on the Principle of Population* gave Darwin an insight into his theory of evolution, and William Paley's *Natural Theology* which Darwin so much enjoyed reading whilst studying at Cambridge.

It must be mentioned at this point that around the same time, when Darwin was working on his theory of evolution, another evolutionist, Herbert Spencer, was working on a particular theory, which represented an alternative to Darwin's. Spencer was a social philosopher and a disciple of Lamarck. His book *Social Statics* (1851) is a mixture of Lamarckian teleological progressivism, utilitarianism, and libertarian laissez-faire economics. In opposition to Darwin's views, Spencer understood that the members of any particular species adjust to their specific circumstances with varying degrees of success. With these adjustments a structural modification occurs in their physical make-up, and the most successful subjects will pass on this new physical feature to their young. I remind the reader that for Darwin, adaptation to new circumstances occur over random variations and the survival rate of the young over a period of many generations, and not, as Spencer held through behavioural adaptations over a period of one single generation. Scientific discoveries over time, such as the discovery of chromosomes and DNA, only served to discredit Spencer's views and to endorse Darwin's.

Carroll makes the interesting point that Darwin's revolution is still underway. That is to say, he understands that Darwin's scientific revolution did not suddenly happen soon after the publication of the *Origin* in 1859, but was carried out well within the twenty century, and still lingers on to this date. Simply, the full implications of Darwinism have not been well di-

gested by related fields, such as psychology and sociology. Carroll puts this rather well:

The history of evolutionary theory after 1859 can be divided into a few distinct phases. In the period from 1859 to that of Darwin's death in 1882 -...- Darwin radically transformed the received view of evolution. Within just a few years, most reputable scientists came to accept that evolution, the transformation of species over time, had in fact occurred. But most scientists did not confidently accept natural selection as the primary mechanism through which those transformations occurred. There was a long interregnum, lasting from about 1859 to 1920, in which uncertainty over the mechanism of heredity and the extent of geological time placed the theory of natural selection in doubt...Around 1920 three distinguished geneticists, Ronald Fisher (1890-1962), John Haldane (1892-1964), and Sewall Wright (1889-1988) began publishing the papers that reconciled Mendelian genetics with natural selection. In the period from about 1920 to about 1950, biological theorists from a wide array of specialized disciplines – natural history, systematics, paleontology, ecology and other areas –

integrated their work with that of the geneticists and thus produced the 'Modern Synthesis' (pp.54-55).

Within this section, Carroll also makes another interesting point, that is, that since the road to acceptance of the theory of evolution was a long one, this fact turns Kuhn's understanding of scientific revolutions on its head, exactly because Darwin's views were not suddenly accepted as a new scientific paradigm, rather it has taken almost a century for it to be widely accepted. Moreover, it seems that the Darwinian revolution has still some breath in it, as it still waits for broad recognition and application in fields such as psychology and sociology.

To go back to the beginning, this is an excellent edition, which is a most welcome addition to the literature in this area. It is very comprehensive and wide-ranging as it puts together a whole range of texts which are relevant to the field, as well as including an invaluable and most comprehensive introduction by Carroll.

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