

Why Evolution is True

By Jerry A. Coyne

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✓ Biology
✓ Evolution

When I recently told a taxi driver that I was on my way to give a lecture on evolution in northern Germany, the young man asked me, looking straight ahead, “So, do you think Darwin got it right?” A bit taken aback, I answered that yes, by and large, Darwin had got it just right – only to be told that there was strong evidence that evolution was false. I was being chauffeured by a friendly creationist.

Against this background of rising creationism, American biologist Jerry Coyne has given us a wonderful exposition as to *Why Evolution is True*. This is one of the rare books that is aimed at the beginner, but can also be enjoyed by the expert. It is based almost entirely on a naturalist’s perspective on evolution, leaving out the genetics and the mathematics. This is a good thing, as it makes evolution accessible and emulates Darwin, who, after all, knew little mathematics and got the genetics wrong.

Coyne lays out his case in nine chapters. After an introduction that explains the elements of evolution, we hit rock bottom: the fossils that have been collected for the past one and a half centuries. One of the most spectacular recent finds, the fossil species *Tiktaalik roseae*^{w1}, links terrestrial tetrapods with fish. It had been predicted to exist, and a likely place to find it was a particular site in the Canadian Arctic, where after five years of excavation it was finally unearthed in 2004.

This predictive power of evolution is a recurrent theme of Coyne’s book. The chapter ‘Remnants’ deals with vestiges and atavistic features. Given the fact of common descent, these should not surprise us, but I was still intrigued to read that human babies are occasionally born with fully formed tails, and that dolphins have inactivated 80% of their olfactory receptors, as most of them are useless under water.

The mechanism underlying dolphins’ adaptation to aquatic life is natural selection, the topic of the central chapter of the book. Natural selection is not popular among doubters of evolution, but in fact it can easily be observed around us in the increase of antibiotic resistance, recurrent influenza epidemics, and plant and animal breeding. In addition, natural selection can be measured in the laboratory and Coyne explains some of the most exciting work in experimental evolution of the past two decades.

A special kind of natural selection is exerted through female mate choice and male competition for females. This ‘sexual selection’ is an old idea, but it has been difficult to pin down. Coyne cites elegant experiments that explain why male peacocks have such splendid tails.

If natural selection is, as Coyne entitles the corresponding chapter, the ‘Engine of Evolution’, species are its product. But to explain speciation is to explain reproductive isolation, and

in many cases this has little to do with adaptation. Speciation is Coyne’s own research speciality, and he argues that in the vast majority of cases, it is an accidental by-product of geographic separation.

Although to doubters, the evolution of dinosaurs and dolphins might be harmless, they draw the line at human evolution. The chapter ‘What about us?’ carefully lays out how we know that modern humans originated in Africa only 150 millennia ago. Coyne’s presentation of the fossil evidence for this, complemented by a comprehensive time line and fine drawings of anatomical details, is particularly compelling. One consequence of the recent origin of modern humans is that we are genetically more similar to each other than one might expect given our diverse shapes and colours.

The topic of human genetic similarity brings us close to what Coyne calls the “unpleasant emotional consequences” that some people – including perhaps my taxi driver – feel when contemplating human evolution. Emotional reactions to evolution are also bound to come up in class, where Coyne’s book will be particularly helpful. Teachers of secondary-level biology will find it full of vivid examples ready for transfer to the classroom. The lucid text is augmented by a glossary summarising the vocabulary of evolution, annotated suggestions for further reading, and a succinct guide to relevant web pages

that cover topics ranging from Darwin's collected works to resources for students and teachers. Perhaps best of all, Coyne's measured tone may well entice students and readers to experience the liberating emotional consequences of contemplating the truth of evolution.

Details

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Web reference

w1 – To learn more about *Tiktaalik roseae*, visit this dedicated website: <http://tiktaalik.uchicago.edu>

Resources

Read more about natural selection and molecular evolution in:

Bryk J (2010) Natural selection at the molecular level. *Science in School* **14**: 58-62.

www.scienceinschool.org/2010/issue14/evolution

Learn more about common descent and gills in human embryonic development in:

Patterson L (2010) Getting ahead in evolution. *Science in School* **14**: 16-20.

www.scienceinschool.org/2010/issue14/amphioxus

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