

# The evolution of evolution

Looking back at the theories that shaped modern evolutionary biology

By Jim Endersby

**T**he question of how species evolved was debated long before the time of Charles Darwin, as Niles Eldredge shows in a meticulously researched history of evolutionary theories that will likely be unfamiliar to most readers. It is generally acknowledged that although Jean-Baptiste Lamarck had a few evolutionary notions (something about giraffes stretching their necks through their own efforts), they were wrong and can safely be ignored. However, as Eldredge demonstrates, this caricature of Lamarck's thinking obscures the context of Darwin's ideas. Nor was Lamarck the only person to speculate about evolution. In the early 1800s, the geologist Giambattista Brocchi offered an alternative to Lamarck's, one that briefly persuaded Darwin. Eldredge recovers Brocchi's largely lost contribution and links it to much more recent ideas in evolutionary thinking.

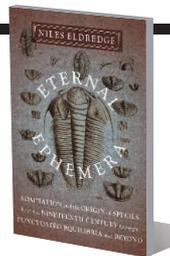
The key difference between Lamarck's and Brocchi's ideas about evolution lies in how they conceived of the nature of species. For Lamarck, life was continual progress from a simple progenitor up through stages of increasing complexity; each group of organisms traveled on its own evolutionary pathway and was constantly transforming. What naturalists call "species" are, according to Lamarck, arbitrary snapshots of something that is already on its way to becoming something else. That sounds, as Eldredge notes, very like conventional Darwinism. Following this line of thought, one could surmise that the species we observe, name, and classify only look like stable entities because the fossil record is incomplete.

By contrast, Brocchi saw species almost as individuals, things that were born and died, to be replaced by new species. This perspective is supported by the fact that speciation is more common among geographically isolated populations than it is within lineages that persist at a single location. In this case, the fossil record is perceived to be an accurate reflection of species that come and go because of speciation and extinction but do not change much in between. If you think that sounds a lot like the theory of punctu-

## Eternal Ephemera Adaptation and the Origin of Species from the Nineteenth Century Through Punctuated Equilibria and Beyond

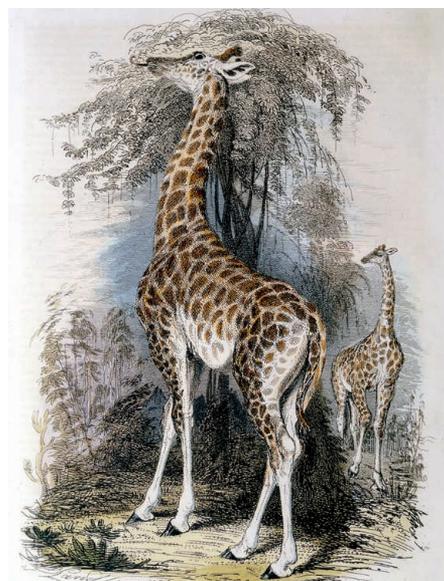
Niles Eldredge

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ated equilibria (which Eldredge developed with the late Stephen Jay Gould), that is not surprising, because so does Eldredge.

Eldredge's research into 19th-century history is meticulous; he has clearly spent many hours in the archive, tracing the development (and loss) of the Brocchian strand in Darwin's thinking. However, historians may feel (to paraphrase an old joke about statistics) that he uses history as a drunk uses a lamppost, for support rather than illumination. At one point, he announces bluntly, "I still think I am right" about punctuated equilibria and is pleased to see that Darwin once shared his opinion. Yet surely Darwin's opinion adds nothing to Eldredge's credibility, and the author's determination to juxtapose current evolutionary debates with historical theories leaves him puzzled by some of what he finds in the past.



Lamarck famously speculated that early giraffes stretched their necks to reach higher vegetation and that their offspring inherited the resulting long necks.

Why, Eldredge ponders, did Darwin not stick with his earlier, Brocchian approach? A fuller understanding of Darwin's times might explain the puzzle. As Eldredge notes, fossils "become progressively more and more like modern species" as one gets closer to the present. To the Victorians, that looked like a record of progress: slow and gradual improvement without revolutionary upheaval. This would have been an attractive model to gentlemen like Darwin—propertied men who feared radical change. It is always hard to judge something as nebulous as the spirit of an age and even harder to know what weight (if any) to give it when offering a historical explanation. But Darwin's gradualism is such a perfect fit for his times that it would be surprising if he had managed to formulate a radically different view (and even more surprising if he had persuaded his contemporaries to accept it).

Eldredge ignores everything between *The Origin of Species* (1859) and the development of the modern evolutionary synthesis of natural selection and population genetics in the 1930s. He dismisses the early-20th-century "eclipse" of Darwinism (the period when natural selection was considered inadequate to explain evolution) as "of little lasting interest," but in fact it was concerned with precisely the same questions he explores. As one late-19th-century wit put it, natural selection explained the survival of the fittest but not the arrival of the fittest. How, then, did speciation occur? The answers proposed during this time may not have been right, but they shaped biology during the early 20th century. For example, although Eldredge dismisses Hugo de Vries's mutation theory, which tried to explain speciation as the product of rapid genetic change during "mutation periods," as "egregious," it was the inspiration behind both Thomas Morgan's work at Columbia and the founding of the Cold Spring Harbor laboratory. De Vries turned out to be wrong in key respects, but it's unfair to say that he and his contemporaries are of "little lasting interest."

At times, it seems that history is not central to Eldredge's concerns, and he is aware that people will therefore ask what it is doing in the book. His reply is that the close parallels he sees between early-19th- and mid-20th-century evolution look a little like convergent evolution: two unrelated lineages converging on similar solutions to the problem of survival. He believes that this is the "best single set of phenomena" you can use to prove that evolution is true. Whether or not that is true of evolutionary theory, it seems like a weak historical argument. It will be fascinating to see whether biologists find Eldredge's analogy more persuasive.

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