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Ten Myths about Charles Darwin

KEVIN PADIAN

Charles Darwin is one of the most revered (and at times reviled) figures in Western history. A great many “facts” about him and his ideas are the stuff of textbook myths, others are inaccuracies spread by antievolutionists, and still others are conventional historical mistakes long corrected but still repeated. I present 10 such misconceptions, and some quick and necessarily incomplete rebuttals. New scholarship is rapidly clearing away some of these myths.

Keywords: Charles Darwin, evolution, history of science, Alfred Russel Wallace, selection theory

This Darwinian anniversary year (200th birthday, 150th anniversary of the publication of *On the Origin of Species*) gives scholars and students a chance to look afresh at the life and work of the greatest biologist of all time. If many of the arguments in the *Origin of Species* (Darwin 1859) feel modern to us, they should: After all, Darwin practically invented much of modern evolutionary and ecological biology, including many central concepts (Padian 2008). We think of Darwin as Victorian, but in fact, by the time the young queen ascended the throne in 1837, Darwin had already completed his basic education, two years at medical school in Edinburgh, three years at Cambridge, and five years on HMS *Beagle*; plus, he had returned home and opened his “transmutation” notebooks (figure 1).

Darwin lived in a world quite different from today’s. How people thought about biology, and even how they used many of the common words we still use today, was also quite different. Then too, there was Darwin’s personality—self-effacing, reticent, gentlemanly—but not above a fierce pride in his work, an unwillingness to share ideas and information except with those he deeply trusted, and a certain degree of dissimulation about his feelings and beliefs (Thomson 2009). All of these factors and more have contributed to a number of historical misapprehensions about Darwin’s life and work. Here are 10, accompanied by some necessarily brief corrections and clarifications.

1. As a boy Darwin was good only for “shooting, dogs, and rat-catching”

This assessment, famous from Darwin’s *Autobiography*, came from his father, after Darwin returned to Shrewsbury from Edinburgh (at age 18) without finishing medical school (Barlow 1958). He said Charles would be a disgrace to the

family. But he said this because the untitled Darwins had to have a profession, even though the family was well-to-do. (Charles did not know it then, but he would inherit family money; his older brother, Erasmus, who got his medical degree but never practiced, clued him in.) There weren’t many acceptable professions, either: law, medicine, the military, and the clergy were the most common. That was the way things were for the gentry, so Charles’s father had reason to worry.

In fact, Charles and Erasmus were keenly interested in science (Thomson 2009). They made collections of insects and built a chemistry lab in a shed by their house. Darwin as a boy knew the Latin names of a great many plants and animals, and avidly read Gilbert White’s *Natural History of Selborne* and other books, including narratives of the travels of Lewis and Clark and Humboldt. He stayed on at medical school a year after Erasmus finished because he wanted to take more chemistry and geology courses (although he did not finish his degree). So Darwin was more or less always on track for science, even though there was no such thing as a “professional”—that is, funded—scientist in his day. His reason for settling on a second choice as country parson (a goal he never realized) was that it would have given him most of the week to collect specimens.

2. Darwin was a “mere companion” to Captain Robert FitzRoy on the HMS *Beagle*

This myth is the idea that Darwin was merely a “gentleman companion” to Captain Robert FitzRoy on the HMS *Beagle*, chosen for his social standing rather than his ability, and that it was only the extraordinary experiences tendered by the five-year voyage that gave Darwin his great ideas (Eiseley 1958, Gould 1977). FitzRoy knew of his own tendency for

depression, which ran in his family. As a captain and a gentleman, he could not converse with the ship's crew of commoners, so he wanted another gentleman aboard to provide company—in part. As a first-rate scientist in his own right (Thomson 1995, Gribben and Gribben 2003), FitzRoy also wanted a “finished naturalist” to help with the collection and identification of specimens (Thomson 1995). Darwin's Cambridge professors were asked along first, but they declined and recommended Darwin instead. Darwin was known to his professors to be well versed in chemistry, geology, botany, and zoology (Herbert 2005, Thomson 2009). He boarded not as the ship's naturalist (a position held by Robert McCormack, the *Beagle's* surgeon) but formally as a “super-numerary” person, a common category on ships in those days.

3. Darwin's epiphany about natural selection came while visiting the Galápagos Islands

The Galápagos Islands impressed Darwin more for what they said about biogeography and adaptive differentiation than what they said about natural selection (Sulloway 1982, Browne 1995, Quammen 2006). Darwin did not recognize the finches as finches; he thought they were different kinds of wrens, ground finches, and other birds. Unusually, he did not keep a careful record of the islands from which the various birds came; this had to be reconstructed from the records of other ship members such as the captain and Syms Covington (a cabin boy and, later, assistant to Darwin) (McDonald 1998). He also did not realize that the tortoises had evolved into numerous lineages on the islands; he thought previous sailors had brought them to the islands for food. The Galápagos governor set him straight.

Darwin did not open his notebooks on transmutation (evolution) until after his return to England in 1837. The Galápagos Islands gave him food for thought about biogeography, because he recognized that the animals had to come from elsewhere (in this instance, western South America), but only later did he tie this to evolutionary ideas about adaptation and speciation in isolation.

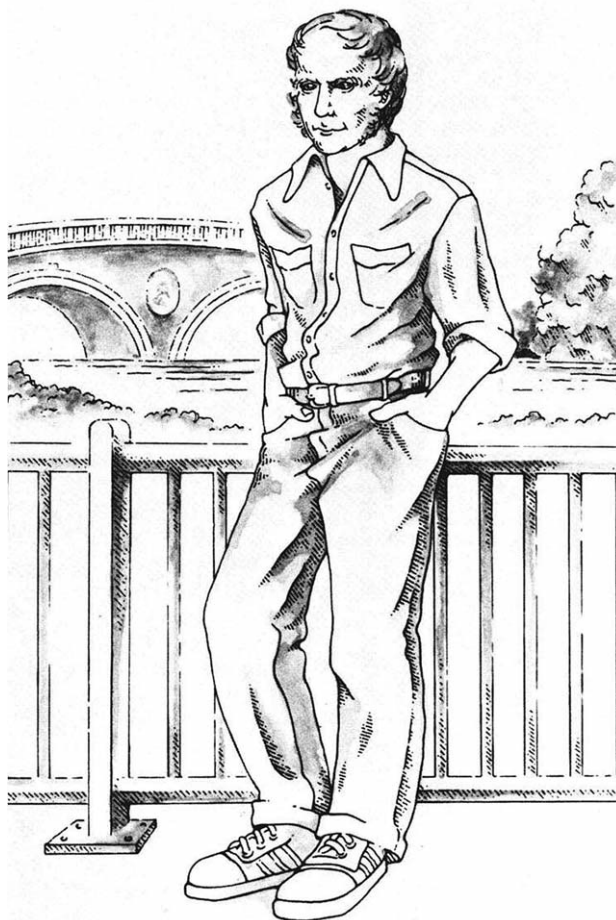


Figure 1. A sketch by P. J. Darlington Jr. “How Charles Darwin might have looked as a modern graduate student just back from five years of field work.... Darwin was at his most innovative at this age, and...Darwin might now be denied admission to a good graduate school because of his deficiencies in languages and math” (Darlington 1980).

4. Darwin stole the credit for natural selection from Alfred Russel Wallace

This myth is hardly possible, inasmuch as Darwin started to formulate his ideas more than 20 years before Wallace sent him that famous letter from Indonesia (Desmond and Moore 1992, Browne 1995, Thomson 2009). Darwin read Malthus's *Essay on Population* ([1798] 1826) in 1838 and started applying Malthus's ideas to natural organisms in his sketches of 1842 and 1844. Wallace came up with the idea of natural selection in 1858, and he had read Malthus some time before that. Wallace forced Darwin's hand, to be sure, and he also came up with the same general mechanism. But the thousands of pages of notes that Darwin had written over the years, which he hastily “abstracted” into *On the Origin of Species*, show that he had thought through not only natural selection but also all the implications of tree thinking, deep time, selective extinction, and many other topics (Padian 2008). Wallace recognized this: He reacted favorably to being notified about the joint paper at the Linnean Society in 1858, he coined the term “Darwinism” to encompass Darwin's worldview, he praised

Origin highly, and he always regarded himself as “the moon to Darwin's sun.” It is tempting to wonder how long it would have taken for natural selection to be recognized as an important force in evolution, even given Wallace's published work on it, if Darwin had not published his ideas (thanks to Wallace's spur).

5. Population thinking

It is often maintained that Darwin was the first biologist to think in modern populational terms (e.g., Mayr 1982). There is no evidence for this view. For Darwin, natural selection operated on individuals. He did not recognize population structure within species as we do today. For one reason, he didn't recognize species as real. He made no distinction among species, races, varieties, and subspecies. More than any other biologist of his generation, he thought of them as stages along a continuum of evolutionary diversification and separation of lineages. The word “population” does not appear

in *On the Origin of Species*, even though Malthus's *Essay on Population* was a principal stimulus to his idea of natural selection. The closest Darwin comes is in his discussions in *Origin*, *The Descent of Man*, and elsewhere that suggest how groups of individuals in the same species could diversify structurally and ecologically under different selective pressures in different geographical regions. Remember too that mathematical modeling, the basis of modern populational thinking, was not one of his strengths. He did not have a developed sense of the quantitative flow of inherited traits within and among populations—this was developed only in the early decades of the 20th century, and then by mathematicians (Fisher 1958, Provine 1971).

6. Dual criteria for classification:

Genealogy and similarity

This view of Ernst Mayr's (1982) was an attempt to remake Darwin in the image of the Modern Synthesis, so he had to fit the criteria of Mayr's "New Systematics." Mayr's contention that Darwin had "dual criteria" was based on misreadings of one line in *Origin* and another in a letter to Joseph Hooker. But there are a dozen other clear and unambiguous statements in *Origin*—as well as in letters dating back to 1843—that "the characters which naturalists consider as showing true affinity between any two or more species are those which have been inherited from a common parent, and insofar, all true classification is genealogical" (Ghiselin 1969, Padian 1999). Almost the same wording appears in *Origin* (see Padian [1999] for many other examples).

Ironically, in four monographs on living and fossil barnacles, the only taxonomic work that Darwin ever did, he was unable to resolve their genealogical relationships. He recognized why: Selective extinction over the ages had removed all the intermediate related forms as the successful lineages of barnacles continued to diverge from each other and grow more and more different. This became an important theme in *Origin* a few years later (Eldredge 2005, Padian 2008). However, Darwin's work failed to change classification practices: Taxonomists recognized that evolution had shaped the tree of life, but that didn't make them group their organisms any differently (Ghiselin 1969).

7. Gradual change is slow and steady

When in Chile during the voyage of the *Beagle*, Darwin experienced a huge earthquake that leveled Concepción and injured and killed many people. On the ship the next day he looked down the coast and saw that the cliffs had been raised several meters, and that this was simply the latest instance of such cataclysms. He referred to the event in his diary as a "gradual change." It seems strange to our ears to think of the effects of earthquakes as "gradual," but the etymology of the word comes from the Latin *gradus*, meaning "step." In Darwin's day, "gradual" often meant steplike (the *Oxford English Dictionary* uses the example from Addison and Steele's *Spectator* of rows in an auditorium). Consider the discrete markings on a *graduated* cylinder, and that students all *graduate* on the same day,

as opposed to all through the year. Yes, the gradual steps were small. But it is unlikely that Darwin would have endorsed the classic gradualism of the Modern Synthesis to the exclusion of punctuated equilibria (Eldredge and Gould 1972). On the other hand, he was opposed to any kind of large, sudden change, which is why he rejected Huxley's entreaty that he abjure the doctrine that "*natura non facit saltum*" (nature makes no leap).

8. Human evolution was shaped mainly by natural selection

Antievolutionists have long used this contention to suggest that human survival, in Darwinian terms, should be a dog-eat-dog struggle for existence. This lets them link evolution to many real or perceived societal ills such as war, oppression, abortion, and homosexuality (Scott 2005). Certainly natural selection played a strong role in shaping hominid evolution. But think about it: Why did Darwin title his second greatest book *The Descent of Man, and Selection in Relation to Sex*? These were not at all "two different books" (Eiseley 1972); they were founded on the same central theme (Desmond and Moore 2009). For him, the division between the sexes and the evolution of distinct roles had everything to do with the evolution of our species. Plus, of course, the cooperation of individuals fosters group selection, which Darwin thought was perfectly acceptable, unlike many more sophisticated mathematical biologists of today.

9. Sexual selection is all about how many offspring you leave

Darwin (1859) invented the concept of sexual selection in *Origin*, so we have to read him carefully if we want to understand what the concept is and not conflate it with other ideas (see Clutton-Brock 2007, Carranza 2008). He is quite clear that it is the advantage in *mating opportunities* that is provided a member of one sex, by virtue of characteristics not present in the other sex (the one that does the choosing of mates). Darwin recognized two major mechanisms of sexual selection: (1) the attraction of females by virtue of traits that only the males possess, and (2) successful competition with other individuals of the same sex through fighting or display, again using traits that only males possess. These traits enhance mating opportunities (sometimes indirectly, as through control of territory). He readily admitted, however, that sometimes it was hard to tell how a given structure evolved.

Many animals (and some plants) go to elaborate lengths to compete successfully against rivals and attract mates. They evolve horns, spectacular plumages, and complicated dances. Sometimes these features are not advantageous for any other reason, and they may even leave individuals more vulnerable to predation or other unfortunate effects (Darwin 1871). But if they succeed in winning mates for their possessors, then they are part of sexual selection. On the other hand, when a second-tier male succeeds in surreptitiously impregnating the females of superior males, that is not sexual selection by Darwin's definition, because no choice by the opposite sex has

been made. Although, as Darwin recognized, it is sometimes hard to draw the line—as when, for example, a male uses barbed penile appendages to remove another male's sperm from a female's cloaca and replace it with his own. The female may not be exercising much choice here, but the male may be directly competing against another male for a mating opportunity.

Both natural selection and sexual selection have the eventual effect of leaving differential numbers of offspring with parental traits in future generations. However, natural selection does this through the survival of individuals best fit for their environments, whereas sexual selection accomplishes the same goal by gaining preference in mating opportunities. Whether the fittest and the sexiest leave more offspring is a subsequent question. In any case, sexual selection cannot be seen as a subset of natural selection. The rules are quite different, though they are both types of selection.

10. Darwin was a confirmed atheist who had a deathbed conversion to Christianity

Like his father and the rest of the males in his family, Darwin had little use for established religions because he thought they were authoritarian and discriminated against those who did not accept them. He was never an outright atheist, however. His statements on religion (Barlow 1958) suggest that he was a deist, like many cultured Englishmen of his time (Wilson 2002) and the American founding fathers (Holmes 2006). That is, he accepted the presence of some kind of Creator, but avoided the words Christ, Savior, or Redeemer. Darwin could not conceive how the universe could have been the result of “blind chance and necessity”; all this must have had a “First Cause” with “an intelligent mind in some degree analogous to that of man” (Barlow 1958). Nevertheless, like Benjamin Franklin, Thomas Jefferson, John Adams, and others, Darwin did not identify with any religious denomination in traditional terms. After the death of his 10-year-old daughter Annie, he lost his faith in Providence (the idea that everything is divinely ordained for the best), as many have done after similar tragedies. As he grew older, questions of religion simply ceased to interest him (Barlow 1958, Desmond and Moore 1992).

The deathbed conversion story is a myth started by a profiteering woman who never actually met Darwin, as far as can be told (Moore 1994). The legend is still repeated by fundamentalist Christian preachers and radio hosts, which prompted Darwin scholar James Moore to write his book *The Darwin Legend*.

Other myths

There are many other Darwin myths, but most have been long discredited. One is the idea that evolution was “in the air” at the time, and if Darwin had not thought of it when he did, someone else soon would have. Although the idea of evolution, in the sense of transmutation of species, was broached by Buffon, and was openly advocated by Erasmus Darwin and Lamarck, as well as by the anonymous author of *Vestiges of*

Creation ([1844] 1994), no one had proposed a plausible mechanism by which such change could occur.

Another myth is that as soon as *On the Origin of Species* was published, everyone jumped on the natural selection bandwagon. Actually, common descent was quickly accepted, but not natural selection (Ellegård 1958, Hull 1983).

A third long-disestablished myth is that Darwin avoided publishing his theory for so long because he feared backlash from the religious establishment. In fact, he was much more concerned about criticism from the scientific community after having seen the reaction to the anonymously published *Vestiges of Creation* in the 1840s (Secord 2000). For a more plausible explanation of his delay (during which he was working all the time to gather information and refine his arguments), see van Wyhe (2007).

Darwin's life and work have been dissected more than that of any other biologist, and perhaps more than that of almost any other scientist in history. This would not have occurred had he not been so extraordinary and his work so enduring. Myths will always arise and abound, and Darwin in his own *Autobiography* and letters may have contributed to some of them (Thomson 2009). His dual anniversaries this year remind us of the continued interest in his work and of the astounding flood of superb scholarship that the “Darwin industry” has produced in recent decades. It is hoped that this myth-busting scholarship will soon filter down to revisions of textbooks that discuss Darwin and to public discourse about his life and work.

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References cited

- Anonymous [Robert Chambers]. [1844] 1994. *Vestiges of Creation*. University of Chicago Press.
- Barlow N, ed. 1958. *The Autobiography of Charles Darwin, 1809–1882: With Original Omissions Restored*. Collins.
- Browne J. 1995. *Charles Darwin: Voyaging*. Knopf.
- Carranza J. 2008. Defining sexual selection as sex-dependent selection. *Animal Behaviour* 77: 749–751. doi:10.1016/j.anbehav.2008.11.001
- Clutton-Brock TH. 2007. Sexual selection in males and females. *Science* 318: 1882–1885.
- Darlington PJ Jr. 1980. *Evolution for Naturalists: The Simple Principles and Complex Reality*. Wiley.
- Darwin CR. 1859. *On the Origin of Species by Means of Natural Selection*. John Murray.
- . 1871. *The Descent of Man, and Selection in Relation to Sex*. John Murray.
- Desmond A, Moore J. 1992. *Darwin: The Life of a Troubled Evolutionist*. Little, Brown.
- . 2009. *Darwin's Sacred Cause: How a Hatred of Slavery Shaped Darwin's Views on Human Evolution*. Houghton Mifflin Harcourt.
- Eiseley LC. 1958. *Darwin's Century*. Doubleday.
- . 1972. The intellectual antecedents of *The Descent of Man*. Pages 1–16 in Campbell B, ed. *Sexual Selection*. Aldine.

- Eldredge N. 2005. Darwin: Discovering the Tree of Life. Norton.
- Eldredge N, Gould SJ. 1972. Punctuated equilibria: An alternative to phyletic gradualism. Pages 82–115 in Schopf TJM, ed. Models in Paleobiology. Freeman, Cooper.
- Ellegård A. 1958. Darwin and the General Reader: The Reception of Darwin's Theory of Evolution in the British Periodical Press, 1859–1872. University of Chicago Press.
- Fisher RA. 1958. The Genetical Theory of Natural Selection. 2nd ed. Dover.
- Ghiselin MA. 1969. The Triumph of the Darwinian Method. University of California Press.
- Gould SJ. 1977. Ever Since Darwin: Reflections on Natural History. Norton.
- Gribben J, Gribben M. 2003. FitzRoy: The Remarkable Story of Darwin's Captain and the Invention of the Weather Forecast. Yale University Press.
- Herbert S. 2005. Charles Darwin, Geologist. Cornell University Press.
- Holmes DL. 2006. The Faiths of the Founding Fathers. Oxford University Press.
- Hull DL. 1983. Darwin and His Critics: The Reception of Darwin's Theory of Evolution by the Scientific Community. University of Chicago Press.
- Malthus TR. [1798] 1826. An Essay on the Principle of Population. 6th ed. John Murray.
- Mayr E. 1982. The Growth of Biological Thought: Diversity, Evolution, and Inheritance. Belknap.
- McDonald R. 1998. Mr. Darwin's Shooter. Atlantic Monthly Press.
- Moore JR. 1994. The Darwin Legend. Baker.
- Padian K. 1999. Charles Darwin's views of classification in theory and in practice. Systematic Biology 48: 352–364.
- . 2008. Darwin's enduring legacy. Nature 451: 632–634.
- Provine WB. 1971. Origins of Theoretical Population Genetics. University of Chicago Press.
- Quammen D. 2006. The Reluctant Mr. Darwin. Norton.
- Scott EC. 2005. Evolution vs. Creationism: An Introduction. University of California Press.
- Secord JA. 2000. Victorian Sensation: The Extraordinary Publication, Reception, and Secret Authorship of *Vestiges of the Natural History of Creation*. University of Chicago Press.
- Sulloway FJ. 1982. Darwin and his finches: The evolution of a legend. Journal of the History of Biology 15: 1–53.
- Thomson KS. 1995. HMS *Beagle*: The Story of Darwin's Ship. Norton.
- . 2009. The Young Charles Darwin. Yale University Press.
- van Wyhe J. 2007. Mind the gap: Did Darwin avoid publishing his theory for many years? Notes and Records of the Royal Society 61: 177–205.
- Wilson AN. 2002. The Victorians. Hutchinson.

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