



GUEST COMMENTARY

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Why Are There Still Misconceptions about Evolution?

There's a question that's all too familiar to biology educators: "If we evolved from monkeys, why are there still monkeys?" It's so prevalent that the anthropologist Jonathan Marks mischievously entitled a recent book *Why Are There Still Creationists?* (2021) without bothering to explain the joke. Sometimes the question is posed as a stumper, in the mistaken belief that it exposes a decisive failure of evolution; sometimes, perhaps more often, it is more of a cry for help, expressing sincere puzzlement. Either way, of course, the claim of evolution is not that humans evolved from monkeys but that humans and monkeys share a common ancestor that lived millions of years ago in the Oligocene.

Unfortunately, it's usually not sufficient just to correct the misclassification of that common ancestor. A useful way to continue the conversation: assuming that the questioner claims to be of, for instance, Irish descent, ask, "If you're descended from Irish people, why are there still Irish people?" The answer is that the Irish of yesteryear didn't become Americans en masse: rather, some remained in the Auld Sod while some immigrated to the Land of Opportunity. So too with the ancestors we have in common with monkeys: it's not that they all evolved into modern monkeys or modern apes; rather, some of their descendants evolved into modern monkeys while some of them evolved into modern apes, including humans.

The question thus reflects the common misconception that evolution is a linear progression, in which earlier species are replaced wholesale by later species. In actuality, evolution is a branching process, in which earlier species produce multiple successor species. The misconception is not new. The zoologist William K. Gregory once began a lecture by observing, "I suppose if you have talked to people about evolution they have said: 'Well, if monkey-like animals evolved into men at one time, why did not all monkeys evolve into men, and why are there any monkeys alive at the present time?'" He was speaking in 1917, but there's nothing, except for the gendered terminology, dated about his observation.

There are plenty of misconceptions about evolution. Project 2061, a long-term project launched in 1985 by the American Association for the Advancement of Science to help to improve American science education, identified no fewer than 27 misconceptions about evolution discussed in the science education research literature. Even so, that list was incomplete, with the idea of evolution as a linear progression surprisingly missing. But if misconceptions about evolution have been recognized as obstacles to the understanding and acceptance of evolution by scientists and science educators for more than a century, why are there still misconceptions about evolution?

The chief misconceptions about evolution appear to be rooted in intuitive notions about biological phenomena grounded in the nature of human cognition. In the case of "If we evolved from monkeys, why are there still monkeys?" the psychologist Andrew

Shtulman suggests in *Scienceblind* (2017), the culprit is a form of essentialism, "according to which all members of a species evolve together, their fates intertwined by a common essence. In such a view, it makes no difference whether a population has been split in two, because all members of the population are united by a common essence. The only way a new species could emerge from an old one is if the old species metamorphosed into a new one."

There are still misconceptions about evolution, largely because there are constantly new students, who come equipped, by nature and nurture, with such intuitive notions. Biology educators need to teach accordingly, by recognizing the range of misconceptions and then identifying, addressing, and helping their students to overcome their faulty notions about evolution. A growing body of research suggests that the approach of misconception-based teaching yields better engagement and retention in general. And for a topic such as evolution that is socially, though not scientifically, controversial, overcoming the misconceptions that stand in the way of student understanding is particularly important.

A collection of five model lesson sets developed by the National Center for Science Education (NCSE) (freely available at <https://ncse.ngo/evolution-lesson-sets>) takes the point to heart. Designed by and for teachers and aligned with the Next Generation Science Standards, each focuses on a set of common misconceptions about evolution and is geared toward helping the instructor guide students to overcome them by examining the evidence, replacing them with the correct scientific understanding. Lesson 4, *No More Monkeying Around*, focuses on three misconceptions about human evolution, including in particular "If we evolved from monkeys, why are there still monkeys?"

To pose a final "why are there still" question: why are there still biology educators who aren't teaching evolution effectively? There isn't a single answer, of course. Among these educators, there are still teachers who don't accept evolution (although happily their numbers are dwindling), teachers who are concerned about the possibility of backlash in their communities, and teachers who have not received adequate preparation. But hopefully, equipped with resources like NCSE's model lesson sets that help them to guide their students to overcome their misconceptions about evolution, more and more biology educators will be empowered to teach evolution effectively.

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