

Darwin's Dilemma: The Odyssey of Evolution

In S.J. Gould Ever since
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THE EXEGESIS OF evolution as a concept has occupied the lifetimes of a thousand scientists. In this essay, I present something almost laughably narrow in comparison—an exegesis of the word itself. I shall trace how organic change came to be called *evolution*. The tale is complex and fascinating as a purely antiquarian exercise in etymological detection. But more is at stake, for a past usage of this word has contributed to the most common, current misunderstanding among laymen of what scientists mean by evolution.

To begin with a paradox: Darwin, Lamarck, and Haeckel—the greatest nineteenth-century evolutionists of England, France, and Germany, respectively—did not use the word evolution in the original editions of their great works. Darwin spoke of “descent with modification,” Lamarck of “transformisme.” Haeckel preferred “Transmutations-Theorie” or “Descendenz-Theorie.” Why did they not use “evolution” and how did their story of organic change acquire its present name?

Darwin shunned evolution as a description of his theory for two reasons. In his day, first of all, evolution already had a technical meaning in biology. In fact, it described a theory of embryology that could not be reconciled with Darwin's views of organic development.

In 1744, the German biologist Albrecht von Haller had coined the term *evolution* to describe the theory that em-

bryos grew from preformed homunculi enclosed in the egg or sperm (and that, fantastic as it may seem today, all future generations had been created in the ovaries of Eve or testes of Adam, enclosed like Russian dolls, one within the next—a homunculus in each of Eve's ova, a tinier homunculus in each ovum of the homunculus, and so on). This theory of evolution (or preformation) was opposed by the epigeneticists who believed that the complexity of adult shape arose from an originally formless egg (see essay 25 for a fuller account of this debate). Haller chose his term carefully, for the Latin *evolvere* means “to unroll”; indeed, the tiny homunculus unfolded from its originally cramped quarters and simply increased in size during its embryonic development.

Yet Haller's embryological evolution seemed to preclude Darwin's descent with modification. If the entire history of the human race were prepackaged into Eve's ovaries, how could natural selection (or any other force for that matter) alter the preordained course of our sojourn on earth?

Our mystery seems only to deepen. How could Haller's term be transformed into a nearly opposite meaning? This became possible only because Haller's theory was in its death throes by 1859; with its demise, the term that Haller had used became available for other purposes.

“Evolution” as a description of Darwin's “descent with modification” was not borrowed from a previous technical meaning; it was, rather, expropriated from the vernacular. Evolution, in Darwin's day, had become a common English word with a meaning quite different from Haller's technical sense. The *Oxford English Dictionary* traces it to a 1647 poem of H. More: “Evolution of outward forms spread in the world's vast spright [spirit].” But this was “unrolling” in a sense very different from Haller's. It implied “the appearance in orderly succession of a long train of events,” and more important, it embodied a *concept of progressive development*—an orderly unfolding from simple to complex. The *O.E.D.* continues, “The process of developing from a rudimentary to a mature or complete state.” Thus evolution, in the vernacular, was firmly tied to a concept of progress.

Darwin did use evolve in this vernacular sense—in fact it is the very last word of his book.

There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.

Darwin chose it for this passage because he wanted to contrast the flux of organic development with the fixity of such physical laws as gravitation. But it was a word he used very rarely indeed, for Darwin explicitly rejected the common equation of what we now call evolution with any notion of progress.

In a famous epigram, Darwin reminded himself never to say “higher” or “lower” in describing the structure of organisms—for if an amoeba is as well adapted to its environment as we are to ours, who is to say that we are higher creatures? Thus Darwin shunned evolution as a description for his descent with modification, both because its technical meaning contrasted with his beliefs and because he was uncomfortable with the notion of inevitable progress inherent in its vernacular meaning.

Evolution entered the English language as a synonym for “descent with modification” through the propaganda of Herbert Spencer, that indefatigable Victorian pundit of nearly everything. Evolution, to Spencer, was the overarching law of all development. And, to a smug Victorian, what principle other than progress could rule the developmental processes of the universe? Thus, Spencer defined the universal law in his *First Principles* of 1862: “Evolution is an integration of matter and concomitant dissipation of motion; during which the matter passes from an indefinite, incoherent homogeneity to a definite coherent heterogeneity.”

Two other aspects of Spencer’s work contributed to the establishment of evolution in its present meaning: First, in writing his very popular *Principles of Biology* (1864–67), Spencer constantly used “evolution” as a description of organic

change. Second, he did not view progress as an intrinsic capacity of matter, but as a result of “cooperation” between internal and external (environmental) forces. This view fit nicely with most nineteenth-century concepts of organic evolution, for Victorian scientists easily equated organic change with organic progress. Thus evolution was available when many scientists felt a need for a term more succinct than Darwin’s descent with modification. And since most evolutionists saw organic change as a process directed toward increasing complexity (that is, to us), their appropriation of Spencer’s general term did no violence to his definition.

Ironically, however, the father of evolutionary theory stood almost alone in insisting that organic change led only to increasing adaptation between organisms and their own environment and not to an abstract ideal of progress defined by structural complexity or increasing heterogeneity—never say higher or lower. Had we heeded Darwin’s warning, we would have been spared much of the confusion and misunderstanding that exists between scientists and laymen today. For Darwin’s view has triumphed among scientists who long ago abandoned the concept of necessary links between evolution and progress as the worst kind of anthropocentric bias. Yet most laymen still equate evolution with progress and define human evolution not simply as change, but as increasing intelligence, increasing height, or some other measure of assumed improvement.

In what may well be the most widespread antievolutionary document of modern times, the Jehovah’s Witnesses’ pamphlet “Did Man Get Here by Evolution or by Creation” proclaims: “Evolution, in very simple terms, means that life progressed from one-celled organisms to its highest state, the human being, by means of a series of biological changes taking place over millions of years. . . . Mere change within a basic type of living thing is not to be regarded as evolution.”

This fallacious equation of organic evolution with progress continues to have unfortunate consequences. Historically, it engendered the abuses of Social Darwinism (which Darwin himself held in such suspicion). This discredited theory

ranked human groups and cultures according to their assumed level of evolutionary attainment, with (not surprisingly) white Europeans at the top and people dwelling in their conquered colonies at the bottom. Today, it remains a primary component of our global arrogance, our belief in dominion over, rather than fellowship with, more than a million other species that inhabit our planet. The moving finger has written, of course, and nothing can be done; yet I am rather sorry that scientists contributed to a fundamental misunderstanding by selecting a vernacular word meaning progress as a name for Darwin's less euphonious but more accurate "descent with modification."

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IN ONE OF THE numerous movie versions of *A Christmas Carol*, Ebenezer Scrooge encounters a dignified gentleman sitting on a landing, as he mounts the steps to visit his dying partner, Jacob Marley, "Are you the doctor?" Scrooge inquires. "No," replies the man, "I'm the undertaker; ours is a very competitive business." The cutthroat world of intellectuals must rank a close second, and few events attract more notice than a proclamation that popular ideas have died. Darwin's theory of natural selection has been a perennial candidate for burial. Tom Bethell held the most recent wake in a piece called "Darwin's Mistake" (*Harper's*, February 1976): "Darwin's theory, I believe, is on the verge of collapse. . . . Natural selection was quietly abandoned, even by his most ardent supporters, some years ago." News to me, and I, although I wear the Darwinian label with some pride, am not among the most ardent defenders of natural selection. I recall Mark Twain's famous response to a premature obituary: "The reports of my death are greatly exaggerated."

Bethell's argument has a curious ring for most practicing scientists. We are always ready to watch a theory fall under the impact of new data, but we do not expect a great and influential theory to collapse from a logical error in its formulation. Virtually every empirical scientist has a touch of the Philistine. Scientists tend to ignore academic philosophy as an empty pursuit. Surely, any intelligent person can think