Editorial

On *The Voyage of the Beagle* and Other Great Adventures

My daughter, who by nature is reflective and who by virtue of her lively intelligence and superb education is interested in a panoply of things, always has a theme for the gifts she offers on important occasions. On one birthday, her presents to me reflected the Silk Road traveled by Marco Polo and his contemporaries; on another, her presents centered around Halley's comet and how the world marked its periodic appearances. She chose the work of Charles Darwin as her theme one Christmas, and supplied me with an array of gifts that echoed his observations: coral earrings, an antique brass monkey for a doorstop, a Victorian scarab brooch made of a marvelously iridescent green beetle, a tiger's claw mounted in gold, and a collection of shells from all the beaches of the world.

But the most interesting present of that "Darwin collection" was a copy of *The Origin of Species*, including *The Voyage of the Beagle*.[1] I leafed through it yesterday to learn what Darwin's thinking was on the differences between the sexes and, in particular, how the unique aspects of being male and female were established. Within minutes, I was completely captivated by the charm and originality of his prose: this young voyager, with a remarkable and ceaseless interest in what he observed around him, was impossible to resist. Darwin must have had enormous charisma; his descriptions of plants and animals create such a vivid picture that the reader almost believes he were at Darwin's side, sharing in the great naturalist's tremendous excitement at discovering the marvels of each new specimen. I remembered the feeling of incredulous excitement and astonishment when, looking through the electron microscope, I first watched the embryonic heart develop. Had Darwin been with me, peering into the field that held the initial delicate filaments of the heart muscle and the ribosomes lined up to make the proteins that were forming them, we both would surely have shared that awed amazement all biologists experience at the unsuspected, incredible complexity of life.

Darwin has other lessons for us. One of the most important is his imperturbable objectivity. He doesn't fear anything he sees: death, decay, struggle—all the phenomena from which we naturally shrink are for him simply part of nature's perfectly symmetrical plan to populate the world and shape the life that inhabits it. He finds destruction as acceptable and predictable as he does birth, youth, and growth. He describes it all with a serenity that never changes; he has a joyous acceptance of the world as he finds it. He never tries to twist nature into more palatable shapes for his audience; his wonder and fascination for the inevitability and perfection of the patterns he delineates are contagious.

Somehow this view is immensely comforting. Darwin comments on, for example, the extinction of a species:

"So profound is our ignorance and so high our presumption, that we marvel when we hear of the extinction of an organic being: and as we do not see the cause, we invoke cataclysms to desolate the world, or invent laws on the duration of the forms of life!"

I cannot help but think of our persistent, dedicated efforts to preserve whales, frogs, and other "endangered species." Doubtless, Darwin would serenely remind us that the rise and fall of individual forms of life is happening all around us, and that they flourish and perish in an inevitable sequence as a consequence of what he calls the "battle within battle" for survival on our teeming planet. As a physician deeply committed to prolonging human life, I recognized for the first time that our efforts as doctors were one of the forces involved in the "battle within battle" to preserve, and indeed alter, our own species in a prodigious effort to improve and empower the human race. Death, however, is an immutable, essential ingredient of the process.

The most remarkable feature of this stunning book is, of course, Darwin's sweeping insights into how the world has come to contain the near-infinite variety of forms and shapes life takes. These insights have the profound simplicity of all great truths that once uttered, are so credible that we immediately accept them as something we have somehow always known ourselves. Darwin even makes death palatable, explaining that without it, living beings would populate the earth without limit and the planet would literally become uninhabitable. I even understood the inevitability of war and murder:

"As more individuals are produced than can possibly survive, there must in every case be a struggle for existence, either one individual with another of the same species, or with the individuals of distinct species, or with the physical conditions of life....Lighten any check, mitigate the destruction ever so little, and the number of the species will almost instantaneously increase to any amount. The face of Nature may be compared to a yielding surface, with ten thousand sharp wedges packed close together and driven inwards by incessant blows, sometimes one wedge being struck and then another with greater force."

But it is the amazing prescience of Darwin's observations and hypotheses that is the most striking aspect of his work. He discusses what sets the final characteristics of the living organism in motion, and then predicts genetic mutation, stating:

"I am strongly inclined to suspect that the most frequent cause of variability may be attributed to the male and female reproductive elements having been affected prior to the act of conception."

I could not help but think that Darwin (who died in 1882) and the scientists who came after him—from August Weismann, who speculated in 1885 about the contribution of genetic information of a cell to its differentiation, to Marshall Nirenberg and Heinrich Mathaei, who broke the genetic code in 1966—would have had a wonderful time at a conference together. Darwin's book is on the same shelf in my library as a 2001 Institute of Medicine monograph that, in the language of 21st-century science, expands on Darwin's comment:

"Males and females have partially different genomes...many differences between the male and female sexes are predicted to be rooted in differences between the genetic contents of male and female cells and differences in the expression of those genetic contents."[2]

I put the book down reluctantly as the day wore on, wondering whether in the last analysis, a few geniuses over the entire course of human existence have already said, as Darwin had over a century ago, all that we needed to know. Our own individual voyages as scientists, using the spectacular tools of the human intellect, simply fill in the details.

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REFERENCES

1. Darwin C. *The Origin of Species* and *The Voyage of the Beagle*, with an introduction by Richard Dawkins. New York, NY: Knopf/Everyman's Library; 2003.
2. Wizeman TM, Pardue ML, eds, for the Committee on Understanding the Biology of Sex and Gender Differences. *Exploring the Biological Contributions to Human Health: Does Sex Matter?* Washington, DC: National Academy Press; 2001.