BOOKS: NATURE OF SCIENCE

A Wondrous and Poetic Spectrum

Charles M. Vest

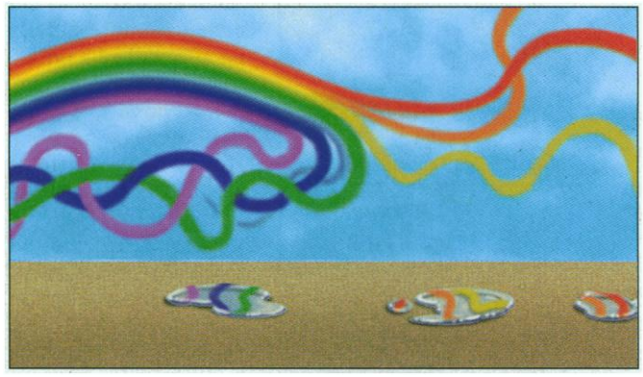
Unweaving the Rainbow
Science, Delusion and the Appetite for Wonder
by Richard Dawkins
Houghton Mifflin, New York, 1998. 351 pp. $26. ISBN 0-395-88382-2.

As a boy in an earlier, simpler time and place, I heard the siren call to a life in science as I read George Gamow's *One, Two, Three, Infinity.* I suspect that I am in the company of thousands of my generation so affected. Richard Dawkins' *Unweaving the Rainbow* is, on one plane, a *One, Two, Three, Infinity* for grownups, written in an age of computers, DNA, and incipient advances in brain and cognitive science.

Dawkins, like Gamow, offers readers a potpourri of wondrous tidbits of knowledge from a vast array of scientific fields. For example, there is a species of mite "specialized to ride on the first joint of one antenna of an army ant," and a "worm which lives exclusively under the eyelids of the hippopotamus and feeds upon its tears." One learns why walking chickens jerk their heads back and forth. Dawkins tells of a British magician who hoodwinked members of a national television audience by staring eerily into the camera and pronouncing that he would cause the watches of those receptive to his psychic power to stop on the spot—secure in the knowledge that, statistically, it was highly probable the watches of a few members of such a large viewing audience would indeed stop at approximately that moment. But I would do great disservice if I give away more tidbits, or, much worse, if I imply that this excellent book is merely a collection of amusing facts. It is much more than that.

Reading this volume produces the same delightful feeling as taking apart a Russian matryoshka, the doll within a doll within a doll. Several themes flow through it, sometimes smoothly and synergistically, sometimes a bit awkwardly, but always interestingly. The book communicates the wonder and fascination of science, presents the poetry within science (rather than poetry in opposition to science), executes a few thrusts in Dawkins' ongoing joust with Stephen Jay Gould, advances the author's view of genes as "selfish cooperators" being selected for survival in an "environment" of fellow genes, and reflects on the importance of co-evolution in many different contexts.

The title, *Unweaving the Rainbow*, derives from Keats' claim that Newton destroyed the poetry of the rainbow by reducing it to the prismatic colors. Indeed, many poets, including Yeats and Blake, shared this view. Not only did they disdain science, they found it to be destructive of the human ability to sense and grasp the wonder and beauty of the world. This opinion, or perhaps I should say this colossal and catastrophic misunderstanding of science, persists to this day. Dawkins turns this perspective inside out by devoting much of his book to advancing the proposition that "science is poetic, ought to be poetic, has much to learn from poets and should press good poetic imagery and metaphor into its inspirational service."



The goal of unleashing the poetry within brings to scientist-writers a responsibility to use poetics wisely. Thus, while Dawkins discusses a plethora of scientific disciplines, concepts, and concerns, he also carries on an embedded dialogue about "good" and "bad" poetry in scientific writing. His premise is that clever metaphor and beautiful language can, in the extreme, seduce readers to unscientific views or, more commonly, give rise to exaggerated interpretations of scientific observations. His strongest criticism is reserved for Stephen Jay You-Know-Who, especially in regard to their conflicting interpretations of the "Cambrian explosion" (*1*). Lacking any personal expertise to draw appropriate conclusions in this matter, I simply sat back and enjoyed the fireworks. You will too.

Having embarked on the task of discussing the aesthetic and philosophical argument alluded to by the title, Dawkins proceeds to scientifically unweave the rainbow and show us where doing so has led. In a remarkably effective manner, he traces the path from the physics of the refraction of light by rain drops to our knowledge of the nature of the physical universe, to our ability to perceive color, to the significance of protein structure, and to the use and misuse of DNA evidence in the courtroom. There are many fascinating detours along the way. This is writing about science for a broad audience at its best.

There is comfort in this book for those who, from time to time, hear a simple phrase or tune which then overtakes their thoughts, relentlessly repeating itself. Such repetition is a common phenomenon and can be an example of a "meme," a unit of cultural inheritance that replicates itself from brain to brain. The meme is one of Dawkins' candidates for the "software innovation" that launched the self-feeding spiral of explosive co-evolution that inflated the human brain so far beyond those of any other animals. His other candidates for this innovation include language, map reading, throwing of objects, and sexual selection. Another topic discussed in the book's final chapters is Dawkins' concept of a shared "virtual world, constructed from elements that are, at successively higher levels, useful for representing the real world," that we all inhabit in our brains. These interesting and enlightening musings leave the reader with a voracious appetite for the advances in understanding the mind, memory, and consciousness that we all hope will unfold in the years ahead.

It has been said of Carl Sagan that he gave science as a gift to the people. Dawkins too offers such a gift through this book, but he also worries aloud about the manner in which we should present science to the broader public. He warns effectively of the danger of "dumbing down" science and expresses concern about the trend to present it as "fun, fun, fun." These worries and the author's thoughts about them are important, because we live in an age in which science is valued to a very large extent for its utilitarian aspects and for the economy-driving technologies it makes possible. Indeed, the patrons of modern science, primarily governments, appropriately feel an obligation to show that public investment in science produces

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improvements in economies and quality of life. So, as we discuss science with the public and our patrons, we face an inherent dilemma: We must demonstrate science's utilitarian returns, but we know that science often thrives while advancing along circuitous pathways toward unpredictable destinations, propelled primarily by human curiosity. Dawkins gives us courage to articulate the latter view—and a means to bridge the gap between ourselves and the public—by showing us how to convey our sense of wonder, by using scientific reasoning to expose all-too-prevalent delusions such as astrology and misapplied statistics, and by providing a keen sense of scientific adventure.

Above all, Dawkins shows us how to discuss science by setting an absolutely admirable example. He informs, inspires, teaches, and challenges us. He helps us to draw out from science its poetry and its beauty. This beauty, observed the late Subrahmanyan Chandrasekhar, is "that to which the human mind responds at its deepest and most profound."

References

1. S. J. Gould, *Wonderful Life: The Burgess Shale and the Nature of History* (Norton, New York, 1989); S. Conway Morris, *The Crucible of Creation* (Oxford Univ. Press, Oxford, 1998).

BOOKS: EVOLUTION

Going to Extremes in America

Peter J. Bowler

Ronald Numbers has written extensively on the subject of creationism in the United States (*1*), and the topic still looms over this more general study of reactions to Darwinism. Outsiders such as myself still find it hard to credit the hold that creationism has over American popular culture, although—as Numbers points out—it is also strong in Australia and in the Islamic world. This study offers no simple answers to the question of how the 20th-century reaction to Darwinism in America came to be dominated by creationism, but it does dispel many myths about the origin, development, and distribution of this extreme form of anti-evolutionism. It thus offers major new insights for our understanding of how America responded to Darwin.

Darwinism Comes to America
by Ronald L. Numbers

Harvard University Press, Cambridge, MA, 1998. 222 pp. $39.95. ISBN 0-674-19311-3. Paper, $18.95. ISBN 0-674-19312-1.

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Why should an Englishman resident in Northern Ireland be asked to review this book? One answer, perhaps, is that my province is the one part of the United Kingdom with a strong Protestant Fundamentalist movement (and we are still waiting to see if the violent legacy of our religious and social polarization can be put behind us for good). Another reason is that I have long been interested in the many forms of evolutionism that flourished before the modern synthesis of Darwinism and genetics (*2*).

In the late nineteenth century, "Darwinism" meant only evolutionism and few scientists or laypersons accepted natural selection as the driving force of change. Alternatives such as the Lamarckian theory of the inheritance of acquired characteristics gained great popularity. In the early chapters of this study, Numbers challenges our understanding of what both "evolutionism" and "creationism" meant at that time. It is virtually impossible to decide on an appropriate label for most scientists of that era, because many "Darwinians" denied the role of natural selection and still wanted to accept a divine intervention for the origin of humankind. Alternatives to selectionism abounded, although Numbers warns us that the so-called neo-Lamarckian school was never a coherent unit. On the opposite side of the disputes, the term "creationist" was not then in use and most of those who still believed in miraculous creation would not have accepted modern young-Earth creationism, in which Earth is only a few thousand years old. There is little evidence of any scientist undergoing a deep personal crisis on account of evolutionism.

The main outburst of religious anti-evolutionism did not begin until the 1920s, leading to the trial of John T. Scopes in 1925. Numbers successfully demolishes many of the myths surrounding this trial. It was neither the end nor the beginning of Fundamentalist opposition to evolution, which actually peaked a few years later. The South was not the locus of a particularly active anti-evolutionism; most southern states refused to pass legislation forbidding the teaching of evolution in public schools. William Jennings Bryan did not betray the movement by admitting that he accepted a great age for Earth because he had never been an advocate of the young-Earth doctrine. Numbers also shows how young-Earth creationism arose from the Seventh-Day Adventists' concern for biblical literalism, which generated the "flood geology" of John Whitcomb and Henry Morris (who claimed that the geological formations were all deposited in Noah's flood). His final chapter notes the less sympathetic attitude of the Holiness and Pentecostal traditions to young-earth creationism: although no friends to evolutionism, their emphasis on spiritual inspiration gives them less reason to adopt a literal interpretation of Genesis.

Despite the sophistication of his analysis of the 19th-century debate, Numbers account of the 20th century is dominated by the clash between modern Darwinists and Fundamentalists. Yet he admits at one point (p. 14) that probably 40% of Americans are theistic evolutionists, accepting evolution as the unfolding of a divine plan. Their views, he claims, have been drowned out by the cries of extremists on either side. But shouldn't a study such as this seek to rescue the voice of the middle ground from oblivion?

If we look to the other side of the Atlantic for comparison, we see a wide-ranging debate over the religious implications of evolutionism took place in Britain, especially within the Anglican Church. In the 1920s modernists such as Charles Raven and E. W. Barnes insisted that the Church must take evolutionism more seriously by rethinking the doctrines of the Fall and the Atonement. If humans evolved from apes, there was no original state of grace and the concept of Original Sin must be reinterpreted. Barnes attracted wide publicity by giving what were called "gorilla sermons" in Westminster Abbey. He also collaborated on eugenic projects with R. A. Fisher—a founder of the modern genetic theory of natural selection, who was also a lifelong Anglican. Raven later joined Julian Huxley in praising Teilhard De Chardin's mystical evolutionism.

Were there no equivalent episodes in America? Given the widespread use of Darwinian metaphors in social debates, it seems unlikely that the religious implications of evolutionism were not explored more fully by those who continued the 19th century's search for a compromise that would allow some elements of Darwinism to be incorporated into Christian belief. Is it possible that the polarization of American thought on this topic has concealed an equally interesting story of moderates seeking to reconcile modern science and traditional faith? If so, their story remains to be told.

References

1. R. L. Numbers, *The Creationists* (Knopf, New York, 1992).
2. P. J. Bowler, *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades Around 1900* (Johns Hopkins Univ. Press, Baltimore, MD, 1983); _____, *The Non-Darwinian Revolution: Reinterpreting a Historical Myth* (Johns Hopkins Univ. Press, Baltimore, MD, 1988).