RICHARD DAWKINS

UNWEAVING THE RAINBOW

science, delusion and the appetite for wonder

by the author of CLIMBING MOUNT IMPROBABLE and THE SELFISH GENE

"If any recent writing about science is poetic, it is this." — WALL STREET JOURNAL

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Science, Delusion and the Appetite for Wonder

Richard Dawkins

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For Lalla

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PREFACE

A foreign publisher of my first book confessed that he could not sleep for three nights after reading it, so troubled was he by what he saw as its cold, bleak message. Others have asked me how I can bear to get up in the mornings. A teacher from a distant country wrote to me reproachfully that a pupil had come to him in tears after reading the same book, because it had persuaded her that life was empty and purposeless. He advised her not to show the book to any of her friends, for fear of contaminating them with the same nihilistic pessimism. Similar accusations of barren desolation, of promoting an arid and joyless message, are frequently flung at science in general, and it is easy for scientists to play up to them. My colleague Peter Atkins begins his book *The Second Law* (1984) in this vein:

> *We are the children of chaos, and the deep structure of change is decay. At root, there is only corruption, and the unstemmable tide of chaos. Gone is purpose; all that is left is direction. This is the bleakness we have to accept as we peer deeply and dispassionately into the heart of the Universe.*

But such very proper purging of saccharine false purpose; such laudable tough-mindedness in the debunking of cosmic sentimentality must not be confused with a loss of personal hope. Presumably there is indeed no purpose in the ultimate fate of the cosmos, but do any of us really tie our life's hopes to the ultimate fate of the cosmos anyway? Of course we don't; not if we are sane. Our lives are ruled by all sorts of closer, warmer, human ambitions and perceptions. To accuse science of robbing life of the warmth that makes it worth living is so preposterously mistaken, so diametrically

opposite to my own feelings and those of most working scientists, I am almost driven to the despair of which I am wrongly suspected. But in this book I shall try a more positive response, appealing to the sense of wonder in science because it is so sad to think what these complainers and naysayers are *missing.* This is one of the things that the late Carl Sagan did so well, and for which he is sadly missed. The feeling of awed wonder that science can give us is one of the highest experiences of which the human psyche is capable. It is a deep aesthetic passion to rank with the finest that music and poetry can deliver. It is truly one of the things that makes life worth living and it does so, if anything, more effectively if it convinces us that the time we have for living it is finite.

My title is from Keats, who believed that Newton had destroyed all the poetry of the rainbow by reducing it to the prismatic colours. Keats could hardly have been more wrong, and my aim is to guide all who are tempted by a similar view towards the opposite conclusion. Science is, or ought to be, the inspiration for great poetry, but I do not have the talent to clinch the argument by demonstration and must depend, instead, on more prosaic persuasion. A couple of the chapter titles are borrowed from Keats; readers may also spot the occasional half-quotation or allusion lacing the text from him (as well as others). They are there as a tribute to his sensitive genius. Keats was a more likeable character than Newton and his shade was one of the imaginary referees looking over my shoulder as I wrote.

Newton's unweaving of the rainbow led on to spectroscopy, which has proved the key to much of what we know today about the cosmos. And the heart of any poet worthy of the title Romantic could not fail to leap up if he beheld the universe of Einstein, Hubble and Hawking. We read its nature through Fraunhofer lines—'Barcodes in the Stars'—and their shifts along the spectrum. The image of barcodes carries us on to the very different, but equally intriguing,

realms of sound ('Barcodes on the Air'); and then DNA fingerprinting ('Barcodes at the Bar'), which offers the opportunity to reflect on other aspects of the role of science in society.

In what I call the Delusion section of the book, 'Hoodwink'd with Faery Fancy' and 'Unweaving the Uncanny', I turn to those ordinary superstitious folk who, less exalted than poets defending rainbows, revel in mystery and feel cheated if it is explained. They are the ones who love a good ghost story, whose mind leaps to poltergeists or miracles whenever something even faintly odd happens. They never lose an opportunity to quote Hamlet's

> *There are mare things in heaven and earth, Horatio,*
> *Than are dreamt of in your philosophy.*

and the scientist's response ('Yes, but we're working on it') strikes no chord with them. For them, to explain away a good mystery is to be a killjoy, just as some Romantic poets thought about Newton's explaining of the rainbow.

Michael Shermer, editor of *Skeptic* magazine, tells a salutary story of an occasion when he publicly debunked a famous television spiritualist. The man was doing ordinary conjuring tricks and duping people into thinking he was communicating with dead spirits. But instead of being hostile to the now-unmasked charlatan, the audience turned on the debunker and supported a woman who accused him of 'inappropriate' behaviour because he destroyed people's illusions. You'd think she'd have been grateful for having the wool pulled *off* her eyes, but apparently she preferred it firmly over them. I believe that an orderly universe, one indifferent to human preoccupations, in which everything has an explanation even if we still have a long way to go before we find it, is a more beautiful, more wonderful place than a universe tricked out with capricious, *ad hoc* magic.

Paranormalism could be called an abuse of the legitimate sense of poetic wonder which true science ought to be feeding. A different threat comes from what may be called bad poetry. The chapter on 'Huge Cloudy Symbols of a High Romance' warns against seduction by bad poetic science; against the allure of misleading rhetoric. By way of example, I look at a particular contributor to my own field whose imaginative writing has given him a disproportionate—and I believe unfortunate—influence on American understanding of evolution. But the dominant thrust of the book is in favour of good poetic science, by which I don't, of course, mean science written in verse but science inspired by a poetic sense of wonder.

The last four chapters attempt, with respect to four different but interrelated topics, to hint at what might be done by poetically inspired scientists more talented than I am. Genes, however 'selfish', must also be 'cooperative'—in an Adam Smithian sense (which is why the chapter 'The Selfish Cooperator' opens with a quotation from Adam Smith, though admittedly not on this topic but on wonder itself). The genes of a species can be thought of as a description of ancestral worlds, a 'Genetic Book of the Dead'. In a similar way, the brain 'reweaves the world', constructing a kind of 'virtual reality' continuously updated in the head. In 'The Balloon of the Mind' I speculate on the origins of our own species' most unique features and return, finally, to wonder at the poetic impulse itself and the part it may have played in our evolution.

Computer software is driving a new renaissance, and some of its creative geniuses are benefactors and simultaneously renaissance men in their own right. In 1995, Charles Simonyi of Microsoft endowed a new professorship of Public Understanding of Science at the University of Oxford, and I was appointed its first holder. I am grateful to Dr Simonyi, most obviously for his far-sighted generosity towards a university with which he had no previous connection, but also for his imaginative vision of science and how it should be

communicated. This was beautifully expressed in his written statement to the Oxford of the future (his endowment is in perpetuity, yet he characteristically eschews the wary meanness of lawyer language) and we have discussed these matters from time to time since becoming friends after my appointment. *Unweaving the Rainbow* could be seen as my contribution to the conversation, and as my inaugural statement as Simonyi Professor. And if 'inaugural' sounds a little unbecoming after two years in the job, I may perhaps take a liberty and quote Keats again:

> *By this, friend Charles, you may full plainly see*
> *Why I have never penn'd a line to thee:*
> *Because my thoughts were never free, and clear,*
> *And little fit to please a classic ear.*

Nevertheless, it is in the nature of a book that it takes longer to produce than a newspaper article or a lecture. During its gestation this one has spun off a few of both, and broadcasts as well. I must acknowledge these now, in case any readers recognize the odd paragraph here and there. I first publicly used the title 'Unweaving the Rainbow', and the theme of Keats's irreverence towards Newton, when I was invited to give the C. P. Snow Lecture for 1997 by Christ's College, Cambridge, Snow's old college. Although I have not explicitly taken up his theme of *The Two Cultures,* it is obviously relevant. Even more so is *The Third Culture* of John Brockman, who has been helpful, too, in a quite different role, as my literary agent. The subtitle 'Science, Delusion and the Appetite for Wonder' was the title of my Richard Dimbleby Lecture, 1996. Some paragraphs from an earlier draft of this book appeared in that BBC televised lecture. Also in 1996, I presented a one-hour television documentary on Channel Four, *Break the Science Barrier.* This was on the theme of science in the culture, and some of the background ideas, developed in discussions with John Gau, the producer, and Simon Raikes, the director, have influenced this book. In 1998 I incorporated some passages of the book in my lecture in the *Sounding the Century* series broadcast by BBC Radio 3 from the Queen Elizabeth Hall,

London. (I thank my wife for my lecture's title, 'Science and Sensibility', and don't quite know what to make of the fact that it has already been plagiarized in, of all places, a supermarket magazine.) I also have used paragraphs from the book in articles commissioned by the *Independent*, the *Sunday Times* and the *Observer.* When I was honoured with the 1997 International Cosmos Prize, I chose the title 'The Selfish Cooperator' for my prize lecture, given in both Tokyo and Osaka. Parts of the lecture have been reworked and expanded in chapter 9. Parts of chapter 1 appeared in my Royal Institution Christmas Lectures.

The book has benefited greatly from constructive criticisms of an earlier draft by Michael Rodgers, John Catalano and Lord Birkett. Michael Birkett has become my ideal intelligent layman. His scholarly wit makes his critical comments a pleasure to read in their own right. Michael Rodgers was the editor of my first three books and, by my wish and his generosity, he has also played an important role in the last three as well. I would like to thank John Catalano, not just for his helpful comments on the book but for http://www.spacelab.net/~catalj/home.html, whose excellence—which has nothing whatever to do with me—will be apparent to all who go there. Stefan McGrath and John Radziewicz, editors at Penguin and Houghton Mifflin respectively, gave patient encouragement and literate advice which I greatly valued. Sally Holloway worked tirelessly and cheerfully on the final copy-editing. Thanks also to Ingrid Thomas, Bridget Muskett, James Randi, Nicholas Davies, Daniel Dennett, Mark Ridley, Alan Grafen, Juliet Dawkins, Anthony Nuttall and John Batchelor.

My wife, Lalla Ward, has criticized every chapter a dozen times in various drafts, and with every reading I have benefited from her sensitive actor's ear for language and its cadences. Whenever I had doubts, she believed in the book. Her vision held it together, and I wouldn't have finished it without her help and encouragement. I dedicate it to her.