

PREFACE

When I have to decide whether or not to read a book, I first like to know a few things about the author. Why should I relinquish some of my precious time and dwindling span of attention to this one out of the profusion of books competing for my notice and respect, not to mention my cash? Now, I don't care whether an author is a wine aficionado, or makes a mean Creole gumbo, but I do need to know where he or she is coming from and what the true agenda of the book might be. How have personal background and experiences qualified the author to write, shall we say, authoritatively on the subject at hand? What driving force has inspired the writer to undertake the presumptuous task of committing his or her opinions and convictions to indelible print? Assuming that my readers have similar needs, I will now attempt to help them decide whether to go on reading.

I have been a research scientist and university teacher for most of my life, my scientific interests having focused on the borderline between chemistry and biology—the chemistry of life. For a long time, I have been a card-carrying molecular and cell biologist. These facts are especially relevant to this book because an understanding of modern biology is the strongest of the threads binding the book together. Remarkable new information and insight into the deepest nature of life have been obtained by molecular and cell biologists at an ever-increasing pace in the past 50 years. The nature and significance of this knowledge are not yet widely appreciated in the society at large, which is still uneasy about accepting the 150-year-old tenets of Darwinian evolution. Even scientists who are not modern biologists are generally only superficially aware of these more recent revolutionary developments.

Molecular and cell biologists are continually confronted in their studies with the material properties of life, how the chemical substances that make up living systems carry out their many operations. This materialistic outlook gives them no pause about the profoundly radical nature of their pursuits, one of which is biology's Holy Grail, the origin of life. Almost all molecular biologists now take for granted that life on Earth began spontaneously some 4 billion years ago solely by the inevitable action of chemical and physical forces and that it then evolved slowly but inexorably over time to its present spectacular state. Their work also cultivates in biologists a deep appreciation that our genes have an enormous influence on human life and behavior, a view that others in society are largely indisposed to accept. Having lived through and participated in this revolution from its beginnings, I have made these and related facts and ideas the sinews of this book.

For about 40 years, or until about 15 years ago, I was completely absorbed in my professional career. To be sure, I enjoyed my family, applauded the occasional string quartet, booed a baseball umpire once in a while, and was socially and politically conscious, if not active. But looking back on that time, I realize that science was my one consuming passion. As often happens when scientists become "mature," however, around the age of 60, I began for the first time to think seriously about things beyond the classroom and laboratory. From having been only casually conscious of the human condition, I became keenly interested in trying to understand it. Because my predilections were still scientific, I wanted particularly to explore what the new knowledge of biology and the other sciences might contribute to my comprehension of the world and its affairs.

What I have to write next is, unfortunately, not easy for me to convey. Opening my eyes and mind to the human condition was shattering. I experienced something close to Sara Teasdale's vision:

When I can look Life in the eyes,
Grown calm and very coldly wise,
Life will have given me the Truth,
And taken in exchange—my youth.

To my utter dismay, the inattentive unworldliness that had allowed my life its undeflected momentum vanished. I comprehended for the first time what the Preacher meant when he wrote, "He who increaseth knowledge increaseth sorrow." When I was much younger and joyfully dedicated to the pursuit of scientific knowledge, this aphorism did not make any sense to me. What I later came to understand about the human predicament, however, confirmed this ancient prophecy. The more I came to understand, the unhappier I became.

Life in Western society has become amazingly complicated and unmanageable, particularly in the past few hundred years. An unsparing view of our present condition is that we are heading for disaster unless much higher levels of intelligence and altruism are applied to our burgeoning problems, levels that well exceed what most human beings appear to be genetically capable of achieving. Wisdom, alas, consists in realizing that most people haven't a clue about the direction of the lives they lead, let alone about the supervision and control of the complex world around them. This idea is by no means mine alone; it is the unutterable and lacerating view of many intelligent people, who naturally find there is no profit in proclaiming it. This knowledge has not given me perverse pleasure, nor has it fueled a Nietzschean rage against my fellow human beings. What would be the point to that, when most of them, after all, are benighted victims rather than malevolent victimizers? (In this richest democracy on earth, fully one-third of our children live in households with incomes near or below the poverty level. One-fourth of all black youths have been, or are now, in prison. For most of the society, however, these intolerable statistics have about the same reality as UFO sightings. The solutions of society's leaders? Simple. Gut the welfare program, substituting for it a virtual, largely dysfunctional, workfare scheme; reduce taxes on the well-to-do so that they can buy their third Mercedes; and, of course, build more prisons.)

Instead of responding with cynicism or rage, and since I could not ignore or forget what I had learned, I tried to accept and internalize that wisdom and come to live with it. Having been a teacher for most of my life, I was in any event not about to broadcast my newfound pessimism about the human condition. It is, after all, an almost unthinking optimism about the present and

the future that makes teaching and learning consequential, and I still honor that perception, particularly where the young are concerned. Having devoted most of my life to the search for and dissemination of knowledge, I needed to affirm that it had been worthwhile. I was therefore implacably resolved, even if it turned out to be for no one's benefit but my own, to create something that emphasized the sanguine rather than the bloody. (A modest enough resolution, I thought). To accomplish this, I sought to focus my thoughts on some truly auspicious element, some lustrous vein of gold, shining forth from what was to me an otherwise dismal human landscape.

There are several such rare and precious human gifts to admire and celebrate. I might have concentrated on music, or artistic expression, or spirituality, or altruism, or some similar high human talents that are all in equally short supply—if I were other than who I am. Being no Schoenberg, Kandinsky, Thoreau, or Condorcet, these happy blessings were not for me to explore in depth. (Nor could I dwell on more common human glories, such as sex or humor. Being neither a du Barry nor a Dave Barry, I ruled these out also.) My nature and experience directed me, instead, to celebrate that marvelous and uniquely human virtue, rationality, and to sing the praises of its most significant offspring, modern Western science. This is not to say that I think rationality is the be-all and end-all of human existence, but rather that I see it as a vital and exhilarating part of life, a part that is too little appreciated in the society at large. By writing this book, I have elected to engage with other rationalists and potential rationalists, who live in, and have to cope with, a decidedly irrational world. I believe that those who appreciate rationality as a way of life should revel in their unusual capacity to do so. They should

come out of the closet. Even as the world around them disparages it, they should constantly ply their powers of reason and absorb into their daily lives the deep knowledge that has been, and will continue to be, attained by the exercise of rationality. But they must enjoy the splendid feast of reason humanely and with sensitivity, without isolating themselves from, or dismissing the needs of, the world around them. Whatever their many differences, human beings are One only; we all carry the same stigmata.

The main purpose of this book is to encourage rationalists to achieve concurrently these ends of self-fulfillment and service to life. As such, the book is not meant to be a prescription for curing all the ills of the world, for which purpose I have neither ambition nor confident reassurance to offer. For reasons that will be made clear in what follows, I do not entertain high hopes that rationality or scientific knowledge alone can overturn the self-deluding and self-destructive ways of a world that is fundamentally indifferent or even hostile to them.

Because this book focuses on rationality, it is of necessity unsympathetic to irrational beliefs that are widely and deeply held in modern Western societies. But it is not my object to offend people who share such beliefs, although I suspect that is unavoidable. Much less am I concerned to try to convert them to rationality. I am under no quixotic illusion, as many rationalists from the Enlightenment on have been; I do not think that it is only a matter of time before the fog of fantasy will be completely lifted before the blaze of reason. On the contrary, I believe that irrationality is a surpassing fact of life. It is an ineradicable and overriding compulsion of most human beings, one of many fateful genetic residues from our evolutionary past. Shakespeare said it about his era, but really for all time: we must cope with "the temper of the times / when madmen

lead the blind." All the more reason that the power of rationality be continually honored and rejoiced in, so as to maintain and extend its arduous and precarious grip on human affairs.

In considering this book, the reader may also find it helpful to know something about my political and social beliefs, as I suspect that some, affronted by one or another of my opinions or assertions, will seriously question those beliefs. On the political side, I remain what I was in my youth, a left-of-center New Deal Democrat, which I suppose makes me a flaming liberal on the present-day American political scene. By "liberal" I understand someone who truly believes in, rather than just prates about, the birthrights of each individual human being and who upholds the view that the principal purpose of society is "the greatest good for the greatest number." This does not require accepting irrational beliefs to be as worthy as scientifically founded ones, just because the majority may favor them. It is not necessarily illiberal to think that the majority is often poorly informed and therefore likely to be wrong. Furthermore, it will become clear in what follows that I am confident in the reliability of other unorthodoxies: that none of our traditional religions or their deities warrant our credence; that our genes play a major role in determining our behaviors, including intelligence; that free market capitalism is not the consummate achievement of human culture; and that poverty in America is not necessarily a self-inflicted crime. I am therefore in most respects an unreconstructed and possibly dangerous heretic: I am a resolute rationalist, a political liberal, a confirmed atheist, a genetic partisan, and an economic proletarian. Read on at your own peril.

This book is directed to the general reader who is interested in the powers of rationality. Some of the ideas are scientific ones, but they are presented so that one does not have to be a scientist to un-

derstand them. Nevertheless, the book does not lend itself to speed reading. It is meant to be accessible to the intelligent nonscientist, but at the same time challenging. I hope the experience is like eating a fine whole lobster—part of it is easy, but some of it takes determination. I am continually amazed by the way that quite intelligent people sometimes misread and flagrantly misrepresent a written text. There is apparently a mental quirk that occasionally operates to transmute what is there in black and white into what a reader wants to believe is written. The more unorthodox and disturbing a book is, it seems, the more likely that misreading may occur. I can only echo Ben Jonson in this: “Pray thee, take care, that tak’st my book in hand. / To read it well: that is to understand.”

I want to be very clear that this book is not intended as a work of original or rigorous scholarship. I have read a fair amount of relevant material, but I have certainly not read exhaustively on the many subjects in the book. Consequently, there well may be some serious omissions or unlearned neglect in the work; if so, this is inadvertent. In general, I have preferred to think things out for myself. I often took great pleasure in finding that someone had already thought and written much the same thing, and I was then happy to affirm that he or she had done so earlier than I. Nor is this book a work of scientific exactitude in all aspects. Terms such as *rationality*, like *intelligence* (or *beauty*, for that matter), cannot even be defined precisely and scientifically or to everyone’s satisfaction. As a scientist addicted to scientific precision, I well realize that I am venturing into, for me, uncharted waters. Hence I present this book not so much to establish eternal truths where controversy now exists, but rather as a personal commentary, one man’s thoughtful memoir, rehearsing the strange paradox of the high glories and the low estate of rationality in modern society.

A few words about this book's contents and organization. The first chapter considers the nature of rationality and analyzes who our modern-day rationalists are. I go on to consider the dual worlds that they and everyone else confront: their own internal world and the external world we all share. While recognizing that it is the internal world that is primary for each human being, I aim to illuminate the nature of the external world. In Chapter 2, I explore primitive people's prescientific views of the external world. Of particular interest is how they came to devise the myths and religions that brought their formidable and hostile world into an anthropocentric focus, in order to serve imperative human needs and to help people survive—and how in the process Man created God. For a rationalist, this mythical scheme of the external world is no longer tenable. In Chapter 3, I begin a journey into the world of modern science. I describe how scientific analysis was transformed about 400 years ago and led to a powerful method of establishing scientific truth and an understanding of the reality of the external world. The new method was first successfully applied to cosmology, the physics of the Heavens. Then, in Chapter 4, we enter the realm of biology, the science of life, humanity's oldest subject and, in many respects, its newest analytical science. It is also humanity's most deeply relevant, and most complex, natural science.

In the succession of Chapters 4 through 9, I survey the central ideas of modern biology for the intelligent lay reader. I deal with the scientific knowledge recently acquired about the panorama of molecular and cellular mechanisms that carry out life's chemical processes of energy production, of growth and development, of reproduction, and of evolution. These mechanisms illuminate the nature of and limits on human life, survival, and death; for a ra-

tionalist, they obliterate the myths and fantasies about them that still occupy the irrational world. It is becoming clear that our genes exercise a strong influence on our behavior, although the detailed dissection of this influence remains to be achieved. I also explore what we have learned about how evolution has functioned for billions of years to sustain life on this planet and how our widespread ignorance of these evolutionary survival mechanisms is having catastrophic consequences.

How a rationalist can achieve the difficult but essential synergy of the dual worlds of human beings, the vastly different egocentric internal and the scientific external worlds, is the vital subject of Chapter 10; here I develop Nils Bohr's idea of complementarity to cope with this duality. Finally, the last chapter delves into the enigma of the real world and its irrational and necessarily chaotic operations. I examine how a rationalist can not only survive but, one hopes, thrive in it.

After completing the book, I realize that this is a tremendous range of subject matter to be covered adequately in such a small volume. In thinking about the book's brevity, I suspect that it is in good part a result of my life-long conformity to the kind of succinctness required for writing professional scientific research papers. Scientists become trained to say something only once, and without entertaining embellishment. This sometimes makes for rather a staccato style. It puts scientists at a disadvantage with respect to their colleagues in the humanities, who seem to agree that only by paraphrasing each thought five or six times, preferably consecutively, can an argument be made sufficiently compelling. This is my first book. It is possible that in my books to come I will do better, repeat things five or six times, add some anecdotal trivia, and fill more pages.

A few words of acknowledgment and gratitude are in order. That I would finally write this book was by no means a foregone conclusion several years ago. In fact, it would never have gone beyond the stage of some collected thoughts most likely left unpublished if it were not for the constant encouragement, as well as superlative comments and suggestions, of several friends; so I hope that you will blame them if you don't care for the book. These worthies include Professors Russell F. Doolittle, Melford Spiro, and Avrum Stroll, all colleagues at the University of California at San Diego, and Edward O. Wilson of Harvard University. They have helped to see me and this book through a difficult time. I am also grateful to Dr. Anne H. Dutton for her help on research matters. Mrs. Myrtali Anagnostopoulos has graced the book with her drawings of Figure 1 and Figures A through E. And above all I want to thank my wife, Ruth Elizabeth Singer, because, being an eternal optimist, she has suffered through my abiding pessimism and has managed to do so unyieldingly but loyally.

