EDWARD O. Wilson has already had three careers and has made major contributions to knowledge in all of them. First, as an entomologist, he elucidated the intricacies of behavior and organization in ant societies. Second, as a sociobiologist, he studied the biologic basis of behavior and organization in human societies. Third, as an environmental activist, he crusaded for the preservation of the natural ecologies that human societies are rapidly destroying. With this book he has launched his fourth career, as a philosopher, attempting to assemble the many issues of concern to the human species into a unified intellectual framework. To his framework he gives the name “consilience,” a word invented by the 19th-century philosopher William Whewell, which is derived from a Latin word meaning “jumping together.” Consilience is “a ‘jumping together’ of knowledge by the linking of facts and fact-based theory across disciplines to create a common groundwork of explanation.”

The book is a major contribution to philosophy, whether you agree with it or not. It brings together a rich diversity of ideas and stories, some of them arising from Wilson’s professional activities in his three previous careers, others from his omnivorous reading. The 20 pages of end notes provide an annotated guide to a vast literature covering science, history, art, and philosophy. The 12 chapters of the book survey all these areas and many more. Wilson’s purpose is to tie them all together into a package, with science serving as the string.

His central theme is the assertion that science can provide a firm foundation and a unified basis for ethics, religion, art, and the regulation of human society. Once we reach a scientific understanding of the biologic origins of religious and cultural quarrels, we shall be able to reconcile our differences and solidify our agreements. All men are brothers, and all women sisters, as seen through the impartial eye of science. The extension of scientific understanding to include the whole of human culture will bring with it an erosion of barriers, a unification of the human species, and a deepened respect for our natural environment.

This is a great and noble vision, portrayed with eloquence and passion. The vistas that Wilson sees lying ahead of us, if we share his faith in the all-embracing wisdom of science, are entrancing. The book, as a statement of the faith of an outstanding scientist and an outstanding being, is exciting to read. It is full of insights gleaned from Wilson’s encyclopedic knowledge of ants and humans. Everyone should read it. And yet, I have to confess that I came to the end of the book unconvinced. Although I admire the vision, I cannot share it. To me, the vision is too tidy. It has too much of the flavor of Plato’s republic or More’s Utopia, societies ruled by benevolent intellectuals with little tolerance for rebellious spirits.

Wilson’s view of human nature is narrow, and his view of science is hierarchical. He has little to say about medicine and law, the two professions that lie on the border between scientific rigor and practical wisdom. He writes with undisguised contempt for the many practitioners of the social sciences — psychology, anthropology, sociology, and economics — who try to understand human behavior without reducing it to biology. He wishes to squeeze the whole of human knowledge into a reductionist mold, reducing ethics and religion to biology, biology to chemistry, chemistry to physics. Being a physicist myself, I know how poorly physics is suited to be the root of the tree of knowledge.

It may well be that Wilson is right and I am wrong. The questions that the book raises are important, whether Wilson’s answers turn out to be right or not. I hope his answers are wrong, because I value the diversity of culture more highly than the unity of science, the rebelliousness of people more highly than the consilience of ideas. To me, science is only one of many ways of exploring the human landscape, without any overriding authority over the others. In the end, the future will decide who is right. Meanwhile, you should read this book and make up your own minds.

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A BEAUTIFUL MIND
By Sylvia Nasar. 459 pp., illustrated.

It is a common belief that once schizophrenia has bored its way deep into a person’s mind, the losses are irretrievable. But over the past decade or so, many patients have had their lives greatly enhanced by the new antipsychotic medications; others, admittedly few, improve in midlife without any treatment whatsoever. One person who seems to have had a substantial midlife improvement is Professor John Nash, who was first brought to the general public’s attention by Sylvia Nasar in a 1994 New York Times article. Not only was Nash improving after having been severely ill with paranoid schizophrenia for 30 years, but also he had just won the Nobel Prize in Economics for his stunningly original contributions to game theory. Knowledge of his successful struggle with psychosis brought hope to the millions of people with schizophrenia, their families, and those involved in their care. It also raised intriguing questions about the relation between mental illness and creativity.

Although artistic imagination has been associated, often controversially, with madness for thousands of years, there are now at least twenty studies demonstrating that the increased rates of mental illness in highly creative groups are almost invariably due to manic–depressive illness or other forms of mood disorders. No empirical studies have linked schizophrenia with creativity. Generally, if people with severe forms of schizophrenia have creative ideas, the illness is too debilitating for the creativity to be expressed in a productive, coherent, or sustained manner. Yet on rare oc-

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cisions, important and original thinking may come from some aspects of schizophrenia. There are people, with less severe or atypical forms of the illness, who see the world in a way it has not been seen before. And rarely, when the world that they can understand is, in turn, newly understood and appreciated by others, we acknowledge that it has been created by genius.

In A Beautiful Mind, Nasar tells the painful yet ultimately remarkable story of Nash and the world around him. Nash, although always a person given to isolation, appears to have won the fierce loyalty of a surprisingly large number of people. The most important of these, his former wife, Alicia, continued to care for him during his many years of psychotic breakdowns, despair, and intellectual isolation.

On one level, Nash's story is a historical road map of some of the most important scientific scenes of this century. Post-World War II Princeton and its Institute for Advanced Study was home to an extraordinary collection of minds and personalities, including those of Albert Einstein, Kurt Gödel, Robert Oppenheimer, and John von Neumann. The last, with his collaborator Oskar Morgenstern, had developed a systematic mathematical description of games as an approach to rational thinking about economics. They described the zero-sum, two-person game that assumes total conflict or “perfect competition.” In their model there was, of necessity, a complete winner and a complete loser. In essence, they described an all-out war between the participants.

Challenged by the flaws and gaps in this approach, Nash, then a first-year graduate student, developed various approaches to the “bargaining problem.” How do parties bargain or compromise to solve a problem? We strike deals out of self-interest. His thinking and the mathematical foundation of his work became, in turn, the foundation of much of modern theoretical and experimental economics. It was Nash's notion that spawned what later became known as the “prisoner's dilemma.”

Neither Nash's work nor his personal life was able to progress smoothly. Within a few years, he was overtly psychotic. Nash had always been odd, but over time, his behavior became increasingly bizarre and inappropriate. His musings became utterly incomprehensible, and his actions disturbingly erratic. His delusions and hallucinations were severe, and he was involuntarily committed to psychiatric hospitals on several occasions. The severe symptoms of his schizophrenia lasted 30 years. But gradually, those who knew him noted that he was improving.

It was perhaps no coincidence that the Nobel prize committee, which, not unlike the United States Supreme Court, deliberates in rather arcane secrecy, began at this time considering his past achievements for the highest honor in economics. Nasar, with admirable sleuthing and tenacity, was able to delve into the politicking surrounding the deliberations of the committee. Full of intrigue, the committee became an arena for principle, stubbornness, personal persuasiveness, and not surprisingly, extraordinary pettiness. Although being a bit mad was certainly no disqualification for receiving the Nobel prize, it was quite another thing to award it to a man who was very mad and who could easily embarrass himself or, more disconcertingly, the Nobel Foundation. To the committee's credit, it did award the prize to Nash, who immediately demonstrated his rationality: the afternoon he received the Nobel prize he commented that he hoped it would improve his credit rating.

Nasar has written an intriguing account of a fascinating man, of a “beautiful” mind, and of terrible madness. She has also written a deeply moving love story, an account of the centrality of human relationships in a world of nightmare and genius.

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SACRED SPACE: STORIES FROM A LIFE IN MEDICINE

THERE is a renewed interest in the narratives of patients as recounted by their physicians. These stories of illnesses, often painful in the retelling, reveal much about the nature of the suffering experienced by patients and by the physicians who care for them. I suspect that the renewed focus on the stories of individual patients comes in part as a response to the manner in which medicine has evolved during the past quarter-century. The explosion of scientific information that finally allows us to understand and treat diseases on the basis of cellular and molecular pathophysiology has, at the same time, led to a form of reductionism that focuses on the common features of disease rather than the unique qualities of a patient’s illness. It seems that the loss that both physicians and patients have had in this evolution has given new value and meaning to the narratives of patients and their physicians.

Sacred Space: Stories from a Life in Medicine details the career of Clif Cleaveland, a physician who has practiced for most of his career in Chattanooga, Tennessee. He begins his own narrative with the statement, “I cost my parents thirty-seven dollars and fifty cents, that being the charge for labor and delivery plus several days of room and board for my mother and me.” That was in 1936; he was graduated from Duke University, attended Oxford University as a Rhodes scholar, received his medical degree from Johns Hopkins University, and did his medical training at Vanderbilt University Hospital. He has little to say about the tribulations of his rigorous medical training or his efforts to cope with the bureaucratic incursions of health care economics. And yet, as my father wrote in an unpublished memoir, “where is there a story that paints a true picture that is not worth reading?”

In a series of sensitive vignettes and stories that cover his career from medical school to his current medical practice, Dr. Cleaveland paints a true picture of “the sacred space,” the circle of caring at “whose center is a terribly sick or injured fellow mortal” and a physician. Many of the narratives, describing patients with unremitting problems such as depression, intractable headache, or severe refrac-
tory hypertension, extend over periods of many years and are framed against Cleaveland's understanding of important aspects of his patients' lives that could be revealed only after years of trust, or in one instance, only in a diary left to him after his patient died. Speaking of a patient whose story began with the finding of a nodule on her lower jaw and concluded with visits to her home as she was dying of cancer, he observed:

I began to comprehend the fallacy in the notion that as a physician I "take a history." Rather, I take in my patient's story, sometimes sequentially, sometimes in scattered, almost random segments. This story, if honored with time and privacy, defines an immediate illness or problem not as some isolated calamity but as part of a continuity of experience. This history speaks to the dreams and fears, regrets and joys of a unique person.

He comments on "the persistent and unflinching awareness of a shared humanity, which finally dissolves all barriers when speaking and listening to one another."

I found myself formulating my own differential diagnosis as he described some of the illnesses presented by patients in his practice. Some of the short case histories, such as that of a student with thallium poisoning, represent medical detective work that would have made Berton Roucechó or Sir Arthur Conan Doyle envious. His touch is consistently light, and many of the stories leave much unsaid; Cleaveland has a deep respect for the sacred space of his patients. These stories from the life of a man who is a dedicated, sensitive physician have much to say about what excellent care means to patients, but equally they have much to say to physicians about the unique rewards of caring for the patient. These are messages for all of us.

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DISCOVERIES IN THE HUMAN BRAIN: NEUROSCIENCE PREHISTORY, BRAIN STRUCTURE, AND FUNCTION

As the decade of the brain draws to a close, it is worthwhile to review some of the progress made in advancing our knowledge of this fascinating and enigmatic structure. Louise Marshall (director of the Neuroscience History Archives at the Brain Research Institute) and Horace Magoun (a noted research neuroscientist who unfortunately died before the completion of this book) have taken on a huge subject, but they have succeeded in rendering it not only comprehensible, in spite of the convoluted twists and blind alleys that constitute the development of neuroscience, but also genuinely interesting. Their presentation allows the story to speak for itself as much as possible. The reader is able to appreciate how, as Thomas Kuhn noted, scientific progress is generated by cycles of concept and counter-concept that successively fit the experimental data better — the energy generated by differences of opinion serving to drive researchers forward to find ways to support their own ideas and refute those of others.

An attractive feature of this book is due to its origin as a series of historical posters that Magoun exhibited at various international meetings. The book is highly visual, illustrated throughout with pictures that have been well chosen to help convey rapidly and accurately what the various investigators made of what they were seeing. It is also amply illustrated with pictures of the investigators themselves. These serve to break up and individualize the panoply of views presented. The book is peppered with quotations from the great figures in the history of neuroscience, and the authors have leaned heavily (as they freely admit) on the bible: Clarke and O'Malley's History of the Brain and Spinal Cord (Berkeley: University of California Press, 1968). The quotations have been well chosen to demonstrate just how carefully the investigators, perhaps mindful of the many controversies that dog their subject, interpreted their findings. One of the quotations, from Santiago Ramón y Cajal, is a warning to all current and budding neuroscientists: "The supreme dignity which surrounds the brain and the awesome complexity of its workings presuppose the existence of an extremely complicated warp, sure to ensnare those who imagine that nature unfolds multifarious exalted phenomena according to schematic formulae."

The topics covered represent a fair survey of our knowledge until the beginning of the 1970s, the stated end point of the authors. The book starts with some general issues, such as theories of phylogeny and ontogeny, and then addresses the interpretation of the cerebral structures, with the history of interpretations for each structure treated separately, culminating in syntheses of theories to explain three major integrative systems: the limbic system and memory, corticothalamic connections and cybernetics, and the brain-stem reticular formation and arousal. Although the book ends at a point where the field accelerates and diversifies rapidly, it provides a sound basis for surveying the newer developments. One stated aim of the authors is to demonstrate how collaborations between different disciplines (such as that between experimental psychology and neuroanatomy) have often led to breakthroughs in science. The strengths and weaknesses of such approaches (the former due to the extra insights gained, and the latter to the use of unjustifiable assumptions) are noted throughout, and they prove instructive.

This book is certainly sufficiently clear and well illustrated to be of interest to general clinicians as well as workers in neuroscience or the cognitive sciences. It is also refreshingly free of jargon. I highly recommend the book both as an introduction to the history of neuroscience and as a secondary source, since it includes comprehensive references. The book's quality and reasonable price (thanks to a charitable grant) should thus attract many and varied readers.

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