the choppy, episodic nature of the presentation, though some may recognize in this the sign of an open field.

A training in geology is unique in giving students the ability to read landscapes in terms of physical and chemical processes and the appreciation that what we see today is the result of complex interactions that occurred at highly variable rates over long periods of time. Until recently the chemical emphasis in geology was on high-temperature igneous and metamorphic reactions of the aluminosilicates. This text is a notable attempt to redress the balance in favor of the water-rock reactions at low temperatures that determine the environmental characteristics of the planet and that have been accelerated, often drastically, by human activity. Their study has hitherto been left to a small band of geologists fascinated by their incongruity relative to igneous processes and of a handful of chemists wanting to do science in the vast arena of the open air in a milieu free of the manic and stifling competition of academic chemistry. Their former colleagues do not know what they are missing. There is a great need for a textbook "Geochemistry for Chemists." In its absence this is a good place to start.

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Neural Science III

Principles of Neural Science. ERIC R. KANDEL, JAMES H. SCHWARTZ, and THOMAS M. JESSELL, Eds. Third edition. Elsevier, New York, 1991. xlvi, 1135 pp., illus. $65.

The first edition of this now-standard textbook emerged from Columbia University's medical neuroscience curriculum in 1981 and met widespread success. It provided a definitive, encyclopedic view of neuroscience from a mammalian (and largely human) perspective, derived from lectures in a course led by people who themselves had made major contributions to the field. Although there were 20 contributors, their writing was edited into a smooth, uncomplicated pedagogical style, accompanied by abundant illustrations, declarative section headings, brief bibliographies with each chapter, and handsome typography. A second edition followed in 1985, substantially expanded from the first, and now a third has appeared.

After browsing through the new edition and making notes for a draft of this review, I reread my review of the first edition (*Science* **217**, 240 [1982]). I discovered that in the intervening ten years neither the authors nor I have changed our views very much. The third edition continues the strengths of the first by providing up-to-date, broad, thorough coverage of neuroscience as currently understood. It also continues the "fill 'em up" tradition of medical education, supplying abundant information but underplaying the development of ideas and experimental history that (in my view) could make it a more stimulating book.

What *has* changed dramatically in ten years is the book's size. The first edition had 52 chapters and 3 appendixes for a total of 731 pages. The second edition expanded to 62 chapters in 979 pages. Including a 25-percent enlargement in page size, the second edition was more than 60 percent bigger than the first. The new, third edition has grown another 18 percent, acquiring a third editor (Jessell), six more contributors, three new chapters, and a revised set of appendixes, topping out at a massive 1135 pages. (One should note, however, that the cost per page is very competitive with that of the book's less gargantuan rivals.) Neuroscience as a discipline is certainly growing vigorously, but it seems impossible for textbooks to expand at such rates indefinitely. Can students engulf this much information? Do they remember it?

The topics added to the newest edition largely reflect the areas (such as molecular neurobiology) in which neuroscience has grown recently, but some of the new material in the second edition also resulted from an expanded view of what the book should cover. The second edition added new chapters on cytology and the synthesis and transport of proteins, a revision of the section on synapses with two additional chapters on postsynaptic channels and molecular aspects of receptors, an entire new section on functional anatomy (four chapters), a new chapter on taste and smell, and a substantial reworking of the sections on development and behavior. The third edition's new chapters are on ion channels (an overview includ-

Vignettes: The Life of Science

"Rationalist philosophy is an altogether democratic discipline," noted A. Comte. For a scientist, this observation had a profound practical implication: it broadened the market for books and increased the number of jobs.

—Jaroslav Malina and Zdeněk Vašíček in *Archaeology Yesterday and Today* (Cambridge University Press)

America's first Jewish professor not appointed to teach a Semitic subject was a British mathematician, James Joseph Sylvester (1814-1897). He arrived at the University of Virginia in Charlottesville late in November 1841. But his stay was short. Tension arose from a combination of Anglophobia, anti-Jewish prejudice, and general student unrest. It was increased by Sylvester's antislavery opinions, and perhaps by the fact that he rather enthusiastically taught a difficult and unpopular subject.

—Susanne Klingenstein in *Jews in the American Academy, 1900-1940* (Yale University Press)

We North Americans who have persisted in working in Latin America [as professional biologists] form a small coterie of frequently stubborn, single-minded individuals who have often overcome personal and professional adversity to pursue a passion. . . . We comprise a group of individuals accustomed to doing things the hard way, for the simple path was rejected when foreign research was begun. Such biologists are generally inured to criticism and professional barbs from colleagues at home and abroad, and are accustomed to ignorance from domestic and foreign bureaucrats. They are also accustomed to the hardships involved with field biology, including disrupted home lives, unsympathetic administrators, and frequent health problems. . . . Field biologists do not suffer fools easily.

—Michael A. Mares in *Latin American Mammalogy* (M. A. Mares and D. J. Schmidly, Eds.; University of Oklahoma Press)

ing patch clamping and molecular structures), coding of sensory information (split off from a chapter that formerly also discussed the somatic sensory system), visual perception, muscles, and the autonomic nervous system. In addition, new material (and in some cases new coauthors) have been added to many existing chapters; the distribution of topics has been rearranged and some chapters have been merged, especially in the sections on motor systems and development; some chapters (such as those on schizophrenia and affective disorders) have new authors and have been substantially reworked; and almost all chapters have been updated. The appendixes have been shortened by dropping cerebral blood flow, physiological optics, and a problem set on membrane potentials, while retaining the old sections on electrical circuits, stroke, and cerebrospinal fluid.

Although the book was written for medical students, the editors list subsets of chapters that they believe would make the book suitable for graduate and undergraduate courses. For a graduate course, a minor weakness is that information in the text and figures is not linked explicitly to the reference lists, although one can often deduce sources. For an undergraduate neurobiology course, my choice of chapters would differ somewhat from the editors' suggestions. I would incorporate all six of the cell biology chapters (instead of just one) and the four chapters on vision (but not the somatosensory chapters, the reverse of their choice), and I would skip the chapters on myasthenia gravis and brain imaging (while otherwise following their choices for motor systems, development, and behavior).

But in spite of the editors' suggestions, I would be reluctant to use this book for an undergraduate course. Its depersonalized presentation of facts requires a prestructured, detailed curiosity that some medical students may bring with them but most undergraduates certainly lack. If they are in a course where the lectures carry most of the weight, undergraduates can use this book as a reference, but not as a book that will in itself inspire their learning. Aside from an occasional "as X and his colleagues showed," the people who created neuroscience are largely invisible, experimental details are relatively sparse, old controversies are presented as resolved, and a sense of thrilling and puzzling intellectual inquiry is absent. It is not a good way to learn about how new science is produced. For example, six pages on phototransduction describe in detail the steps linking rhodopsin to a cyclic GMP–gated sodium channel and the modulating role of calcium. The account is clearly and straightforwardly written, but it is presented as revealed truth. There is no hint that phototransduction was a major puzzle for many years, or that calcium was once suspected to be the intermediate messenger, or that rapid action by a cyclic nucleotide was a surprise. In fairness, the book's homogenized approach is probably necessary for covering its vast territory, and comprehensiveness is definitely one of the book's attractive features. From time to time, however, a glimmer of what might have been done comes through. The first two chapters, both by Kandel, provide examples of the best and the worst. The first chapter makes the general point that different parts of the brain are specialized for different functions by recounting the historical clash of ideas about the localization of speech processing. It is vivid, concrete, and intellectually lively. The second chapter, in contrast, plods through a synopsis of neural and glial cell types and the steps in neuronal signaling, all but inviting students to memorize definitions with minimal context. It would be a major advance if the next edition had more chapters like the first and fewer like the second.

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Age of Propaganda. The Everyday Use and Abuse of Persuasion. Anthony Pratkanis and Eliot Aronson. Freeman, New York, 1991. xvi, 299 pp., illus. $22.95; paper, $11.95.

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