of some value. But be warned – if you first learned Laplace transforms here, you would be in no position to interpret, or defend yourself from the remark of that modern master of the Ricatti matrix, Rudy Kalman: "In many universities the electrical engineers of the 1950's were taught to believe that all systems are or must be described by Laplace transforms (transfer functions), as if the world were linear. This barbaric rubbish precluded even defining what a nonlinear system is. . . ."

In other words, this book does not, and cannot deal with the advanced representation of compartmental structures by canonical state-variable forms, with the attendant identification problems fairly recognized as they really come: beset by noise. So, however it may look to the reader, this book is very elementary (not necessarily a pejorative term).

Is the book any good? Yes. I liked it because the style is clear, even conversational, the mathematics are treated respectfully, there are worked problems, and the flow of the discussion is very smooth. The author carries the reader along pleasantly. Now that is an achievement in a book on mathematics. So, by all means, refresh yourself and your mathematics here, but then notice that what you next have to do, if mathematical biology appeals to you, is get really serious. At that point you need a mentor. I wish you luck, and I hope you don't fall into the clutches of the modern algebraicist, without keeping a tight grip on geometry and the ordinary differential equation.

Unfortunately, I could not afford the time to verify many of the solutions, nor the equations themselves; i.e., I didn't try to proofread the book, even though a low error rate is essential in a self-help book on mathematics. From my sample, I judge the author's own proofreading to have been done with care. He has had six years since the first edition to collect and make corrections. In the case of mathematical books it is almost always better to get a revised edition, which this is – another point in its favor.

BOOK REVIEWS

THE RISE OF BRITISH PHYSIOLOGY

Michael Foster and the Cambridge School of Physiology. The Scientific Enterprise in Late Victorian Society. Gerald L. Geison. Princeton University Press, Princeton, N.J., 1978. xxii, 402 pp. $27.50

Few phenomena are as familiar in modern science as the "school"—a department, laboratory, or research group investigating a related set of scientific problems, approaching them with shared expectations and presuppositions and using a common set of techniques and instruments. Such unities often derive from a single man, whose scientific preoccupations influence the work of his students and colleagues, whose organizational talents sustain the school with facilities and financial support, and who in the process of founding a home for his own research sometimes projects his personality upon institutions that outlive him. If such patterns are commonplace in science, they are by no means so in scholarship on its history. The work of historians of science has been concerned largely with intellectual biography, genealogies of scientific ideas, and analyses of their inferential structure and of the organizational patterns of science on a societal scale.

The particular brilliance of Geison's book lies in the innovative way he blends biography with the history of scientific ideas and institutions to create one of the few convincing portraits of a "school," one that began a research tradition whose importance endures to the present day.

Geison devotes the first half of this book to men and institutions. He argues convincingly that the stagnancy of English physiology in the mid-19th century, especially in comparison with its German counterpart, stemmed from its subservient place as a nonexperimental adjunct to the teaching of surgical anatomy. Change began in the 1860's with two seemingly unrelated events: Parliamentary commissions forced reforms on Oxford and Cambridge that abolished religious tests and encouraged the teaching of science, and the Royal College of Surgeons amended its licensure examination to require a laboratory knowledge of experimental physiology. Thus in 1870 Michael Foster, a dissenter trained in medicine at University College, London, not only could be appointed, with the support of Thomas Henry Huxley, by Trinity College to its praelectorship in physiology (the first Cambridge teaching position in that subject) but could also find there an increasing number of medical students eager to take his courses. Geison shows how Foster, although an outsider, rapidly gained friends and influence, which he used to expand facilities for teaching and research. He set up courses in both biology and experimental physiology and infused his teaching with a broad evolutionary perspective a la Huxley. He identified promising students and turned them to research, provided them with facilities and direction, got them studentships and fellowships, and obtained them jobs in Britain and America when they left the banks of the Cam. As a basis for teaching, Foster wrote his influential *Textbook of Physiology* (1877), and as an outlet for research he founded and edited the *Journal of Physiology* (1878). His efforts were rewarded in 1883 by appointment to the new professorship of physiology, which he held until retirement in 1903. In three decades Foster created the institutional framework and the research ethos that was to carry Cambridge, and his own college, Trinity, to the forefront of discovery in the medical sciences. In the present century the Physiological Laboratory can number among its researchers scores of fellows of the Royal Society and no fewer than seven Nobel laureates (A.V. Hill, F.G. Hopkins, C.S. Sherrington, E.D. Adrian, H.H. Dale, A.L. Hodgkin, and A.F. Huxley), of whom all but Sherrington were associated with Trinity.

Had Geison ended his account here he would have produced a subtle and perceptive case-study of Victorian scientific "enterprise." But his subject poses a curious problem. Why should Foster, a researcher of reputedly negligible scientific accomplishments, prove the founder of a school that rivaled those of such great German investigators as Johannes Müller and Carl Ludwig?

The answer lies in the nature of Foster's brief career in original research, especially between 1869 and 1876. Geison shows in the second part of his book how during those years Foster's experiments convinced him that the widely accepted neurogenic theory of the heartbeat was wrong and that the essential rhythmicity of the heart originated in the cardiac muscle. The myogenic theory, Geison argues, became the central problem of the Cambridge school in the 1870's and 1880's, giving it intellectual cohesion and direction. The theory was ultimately vindicated in a classic paper of 1883 by Foster's student Walter Holbrook Gaskell and spawned such descendant lines of research as those of Gaskell and John Newport Langley on the autonomic nervous system and on