

Books

Statistical Mechanics

by Norman Davidson
McGraw-Hill \$14.50

Reviewed by Robert M. Mazo, assistant professor of physical chemistry

This book is intended as a text for a graduate course in statistical mechanics, the terminal course for those students who do not intend to specialize in the subject; in fact, it is the outgrowth of Professor Davidson's lectures in such a course at Caltech. It is an excellent text, well written and handsomely produced. Although the cost at first seems rather high, at 2.7 cents per page it provides excellent value for the money, as scientific book prices go these days.

The first third of the book reviews some background material and develops the statistical mechanics of independent particles. This encompasses the theory and practice of the calculation of thermodynamic functions from spectral data, and is the absolute minimum amount of statistical mechanics that every physical scientist should know. The theory is developed by the "method of the most probable distribution," which goes back to Boltzmann. Although more sophisticated and elegant approaches are mentioned, they are not pursued. This appears to be a pedagogically wise choice.

The remainder of the book discusses other applications, including the extension of the theory to systems of interacting particles. Many of these applications are fairly standard in books at this level, but it is a great merit of Professor Davidson's book that many are not. The wide scope of the applications can be illustrated by noting that at one point the student is asked to compute the noise in a simple photocell circuit, while at another he is asked to solve a problem having to do with the configuration of polypeptide chains in solution.

Professor Davidson has coined a new word in this volume; he calls the (hypothetical) objects which obey the statistics of distinguishable particles "boltzons." Indeed, his lively personality and sense of humor are evident throughout. (See, for ex-

ample, the footnotes on pages 374 and 425.)

Statistical Mechanics is a very worthwhile addition to the growing list of texts on the subject. The student who masters its contents will be well prepared indeed.

Qualitative Elemental Analysis

by E. H. Swift and W. P. Schaefer
W. H. Freeman and Company . . . \$6.75

This volume — by Ernest Swift, chairman of the division of chemistry and chemical engineering; and William Schaefer, instructor in chemistry — puts between hard covers the system of qualitative analysis that has been used in freshman chemistry at Caltech for the past eight years. The system is a simplified form of one developed during the war for the Army Chemical Corps by Professors Swift and Niemann.

This system departs from most conventional qualitative analysis schemes in that the major separations are designed to correlate with the fundamental properties of the elements, and therefore with their electronic structures and positions in the periodic table. The authors believe that such an approach "offers certain unique potentialities for teaching descriptive inorganic chemistry and the principles of chemical reactions."

The Last Problem

by Eric Temple Bell
Simon and Schuster \$4.95

Reviewed by Lance Taylor '62

The Last Problem, the last book by the late Caltech mathematician, Eric Temple Bell, is officially a history of the mathematical ideas that led to the famous Last Problem of Pierre Fermat: "To prove or disprove that if n is a number greater than 2, there are no numbers a , b , c such that $a^n + b^n = c^n$."

Actually, *The Last Problem* is nothing like what it is officially supposed to be. It is an uneven but fascinating combination of what might well

be two entirely different volumes — one being a sort of pocket history of the theory of numbers, and the other being a set of sarcastic observations by a canny Scotsman on men in general and the history of the world in particular.

What Bell does is devote a chapter or so to one "culture" or "civilization," like Babylon or early Alexandria. For each culture, he then spends about half his time talking about its history and rulers, and the other half talking about its mathematics, especially that part relating to number theory and the Fermat problem. Thus, he devotes 30 pages to Babylon, 15 of these to mathematics, and the other 15 to random topics in Babylonian history like temple prostitution or the cleverness of the Babylonians in boiling their river water.

Following this method of history through juxtaposition, Bell carries his saga of numbers from early Mesopotamia up through the 17th century France of the curious Fermat. He weaves, more or less, a consistent history of number theory — providing the reader is very diligent in pursuing all the various Celebrated Theorems of eminent and long defunct mathematicians which are scattered sporadically through the book.

Bell's success with social commentary is a bit less lustrous, however. What he says is funny, most of it, and some of it is even to the point (judging from a poor historian's knowledge), but it still doesn't quite fit in with the mathematical aim of the book. If you are interested in a history of the Fermat Problem, do you really care that much about funny remarks about Caesar and Cleopatra (especially since George Bernard Shaw made the same remarks, only funnier, some years ago)? On the other hand, if you are interested in a satiric view of history, why not look in *1066 and All That*, and forget about mathematics?

All of which is not to say that *The Last Problem* doesn't have merits, which it does. However, for all its wit and for all of its interesting and wryly-presented mathematics, *The Last Problem* is still a tour de force that fails.