The Firmament of Time (1960), is seen at his best, as poet and educator, in this slim volume. These three essays surely deserve publication in book form and a broad audience. In the strongest tradition and finest style, these meditations offer the best appreciation of the adventure and beauty of the scientific quest, and they will inspire the young to join the great unfinished work.

H. L. NIEBURG
Case Institute of Technology

Genetics

Methodology in Mammalian Genetics. Walter J. Burdette, Ed. Holden-Day, San Francisco, 1963. xiv + 646 pp. Illus. $6.

Questions about what the various presentations had to do with methodology were heard frequently by participants at the 1960 symposium on methodology in mammalian genetics (held at the Jackson Laboratory), the symposium on which this book of collected papers is based. Because of the usual presentations and particularly of the ensuing discussions, the questions were probably pertinent, but the published manuscripts vindicate use of the word methodology in the title of the book and by and large justify this effort by the Genetics Study Section of the National Institutes of Health, which sponsored the conference. In fact, in reading the papers a new or an old student in the field of genetics will acquire very useful information on techniques and will find many suggestions for future work in the various areas; furthermore he will realize the extensive possibilities for genetic understanding which can come from work with mammals.

At least two papers seem to have been updated and revised and as a result the comments of the discussants are somewhat without point. But this is a minor fault that is almost unavoidable in view of the rapid development in some areas and the publication delay. Another fault is perhaps the exclusion of papers that deal primarily with farm mammals, a decision that makes even more pronounced the heavy emphasis on the mouse; but the line had to be drawn somewhere, and the basic principles and methods of mammalian genetics are illustrated with laboratory forms.

Topics covered in the volume, which includes seven appendixes as well as 17 regular papers, range from stock lists, breeding methods, and linkage techniques through radiation genetics, immunogenetics, biochemical genetics, cytogenetics, and the very important new area of the genetics of somatic cells. In the largest section, which is entitled "Physiologic genetics," there are grouped seven rather different but very important papers illustrating special areas in which work with mammals has contributed perhaps most uniquely to genetics; they include papers on genic interaction, behavioral studies, and teratology, as well as a review of neoplasia and an important summarization of quantitative inheritance.

In addition to those who classify themselves as mammalian geneticists, anyone working with laboratory mammals, especially mice, who is at all concerned with genetic controls and genetic implications in his work should have the book, partly because of the distinguished scientists who have contributed comprehensive and thoughtful papers, partly because of the useful list of 1470 references, and partly because of the representative methodologies and genetic philosophies that are implied even if they are not always stated.

HERMAN B. CHASE
Biology Department,
Brown University

Analytical Chemistry

Ion Exchange Separations in Analytical Chemistry. Olof Samuelson. Almqvist and Wiksell, Stockholm; Wiley, New York, 1963. 474 pp. Illus. $9.50.

Workers in the ion exchange field have eagerly awaited this book. It is a sequel to the author's *Ion Exchange in Analytical Chemistry* (1952), the first definitive monograph on this subject. So much has happened since 1952 that Samuelson has written an entirely new book, somewhat more restricted in scope than the first but nearly twice as long.

The book's 17 chapters are divided into three sections: "General part," "Practical part," and "Applications." The first part reviews the nature of ion exchanging materials and the ion exchange process; equilibria, kinetics, and column theory are discussed. The second discusses the choice of exchangers and the technique of using ion exchange columns. The third part, about half the book, describes specific applications in the separation and concentration of inorganic substances. Organic and biochemical analyses, to which Samuelson has himself contributed so much, are excluded from the scope of the book, save for occasional mention.

The strongest section is the second. At one time or another every laboratory worker who has used ion exchange as an analytical tool has been frustrated by the difficulty of converting a strong base anion exchanger from the chloride to the hydroxide form, by the odd tenacity with which iron and other metals are held by cation exchangers in concentrated hydrochloric acid, or by the inordinately large solution volumes which accumulate from a column that was ten times too large in the first place. Samuelson warns of these pitfalls, and every page bears the stamp of the practical man who has used ion exchange since the modern resins were in their infancy. (His doctoral thesis, a masterpiece of thoroughness and imagination that, even today, is all too little known in the English-speaking world, was published in the Swedish language in 1944.)

The third section, "Applications," is detailed and comprehensive, almost to a fault. (Is it really necessary to name *all* the salts that have been quantitatively converted into their respective acids for analytical purposes?) But the reader can find reference to almost any application in inorganic analysis, and the coverage of Russian and European literature is especially complete. Literture citations run through early 1961.

The first section, "General part," is quite adequate for the purposes of this book, but it does not provide a scholarly insight into the physical chemistry of ion exchange. For this purpose one should have Helfferich's book, *Ion Exchange.*

The Swedish edition was published by Almqvist and Wiksell, and apparently this edition was printed in Sweden. The printing and makeup are superb, but there is one small, irritating fault. The author provided abundant cross-references by chapter number and subsection; although the chapter title is printed at the head of each page, the chapter number is omitted.

HAROLD F. WALTON
Department of Chemistry,
University of Colorado