wise available in boiled-down versions, so there may be some useful material here for certain college courses. The illustrations (all of them line drawings) are for the most part clear and well chosen, but I am disappointed that there are no photographs of living protozoa nor any electron photomicrographs. A few of the latter would have greatly enriched the chapter dealing with structure.

I do not care for the subtitle, partly because it is too emphatic. The protozoa represent a highly diversified assemblage of plant-like and animal-like organisms, some of them far less simple than others. Hall does, in fact, explain this quite nicely. I wish he had not treated the protozoa as a phylum. However, he has done no worse than the Committee on Taxonomy and Taxonomic Problems of the Society of Protozoologists. His outline of classification follows that in some of the early drafts prepared by the committee. This is perhaps fortunate, because, at least with respect to the classification of ciliates, the published version (1964) is stiffer than some of the dry runs. All this classification is heavy stuff anyway, and cannot be of much use unless it is very complete and thoroughly illustrated. In any case, I hope impressionable young readers will not lay the book down with the idea that microsporidians and ciliates are related.

EUGENE N. KOZLOFF
Department of Biology, Lewis and Clark College, Portland, Oregon

Analytical Chemistry

Organic Complexing Reagents: Structure, Behavior, and Application to Inorganic Analysis. D. D. Perrin. Interscience (Wiley), New York, 1964. xii + 365 pp. Illus. $12.

The object of this book is "to discuss the principles involved in analytical chemical methods so that the matter may be placed securely upon a modern theoretical foundation." Or, to quote again from the introduction, "The aim . . . is to present a coherent account, based on modern theoretical inorganic chemistry, that will enable the reader to understand the choosing of reagents for particular determinations and the kinds of conditions under which the reactions can be carried out."

Actually the volume is a survey of organic compounds that have been used in various ways for the determination of the metals and anions. The coverage in this respect is extensive. The array and variety of organic compounds that have been used in the chemical analyses of the metals is formidable indeed, and in this book Perrin attempts to cover the entire bag of tricks employed by the analytical chemist: the effects of complex formation on oxidation-reduction potential, kinetics and equilibria in the formation of complexes, surface phenomena, ultraviolet-absorption spectrophotometry, solubility, and extraction into immiscible solvents. A brief treatment is given of the principal reagents and their characteristics for each of the metals.

A few chapters are devoted entirely to theoretical aspects. These are so brief and sketchy that they provide little more than an introduction to some new terminology and some guideposts to other fields of knowledge.

References are given at the end of each chapter, and the lists are quite impressive, as one might expect in a volume that reviews one of the fields of chemistry that has been most active in the last two decades. No names are mentioned in the text, however, and the results of whole papers are condensed to single sentences or phrases. This gives the volume an authoritarian, jumpy style. Results and explanations are put forth as gospel, without immediate hint about the original author or about Perrin's evaluation of his contribution. A fair amount of trivial material finds its way even into scientific journals, and an unconscionable amount of current publication is given over to correcting incomplete and careless work. It is the duty of the author of a monograph to start the sorting-out process. No hint is given in this book about the real value of any of the analytical reagents mentioned. Yet the mere size of the current literature on any particular analytical reagent gives an immediate measure of its importance; bathophenanthroline and calcein, for example, treated in most cursory fashion in this book, have been the subject of no less than 50 papers each in the last decade.

The present position of chemistry on its exponential growth curve makes it evident that no book can possibly cover, except in a superficial fashion, so broad a field of chemistry as that attempted here. Certainly anyone who thumbs through this volume will pick up some new ideas, for there is now a vast literature in this field. Those analysts who have been out of school for a few years, however, are in for some shocks. In the 42 lines devoted to a survey of the reagents for zinc, the following statement is made: "Because there is no ligand-field stabilization energy involved in zinc complex formation (zinc having a filled *d* shell), ligands that also permit back-double-bonding probably form the most stable zinc complexes." The words used are changing, but whether this will help in tomorrow's problem of determining zinc in a urine sample is problematical.

HARVEY DIEHL
Department of Chemistry, Iowa State University, Ames

Philosophy of Science

Philosophical Problems of Space and Time. Adolf Grünbaum. Knopf, New York, 1963. xii + 408 pp. Illus. $10.75.

Although spatial and temporal concepts have always occupied a central position in physical theory, 20th-century physics has demonstrated the need for a thorough reexamination of them. Physicists and philosophers alike, realizing that conceptual clarity in this area is prerequisite to an understanding of modern physics, have devoted considerable energy to attempts to explicate these notions. A large and important post-relativity literature has grown up, but the roots of many of the most significant and puzzling problems antedate Einstein by far, in some cases reaching back even to antiquity. *Philosophical Problems of Space and Time* provides a comprehensive and detailed treatment of this whole range of problems.

Grünbaum's book is divided into three major parts. Part 1, Philosophical Problems of the Metric of Space and Time, deals mainly with problems arising from the 19th-century development of non-Euclidean geometries. Given a variety of formally self-consistent geometries, we naturally ask about the choice of a geometry to de-