the understanding of nuclear physics since the publication, 10 years ago, of Blatt and Weisskopf's authoritative book, which satisfied all three of the above purposes. Unfortunately very few books on this topic have been published since then, so I find this one particularly welcome. There is almost no overlap between this book and Blatt and Weisskopf, so that the author is enabled to concentrate on the newer developments. For example, all discussion of the two-body forces (by now a field large enough to spawn a monograph or two on its own) is omitted.

The first chapter, a discussion of the experimental data now available and of the basic theory underlying the derivation, ranges from the nuclear size measurements by electron scattering to magnetic moment measurements. Almost all of this is new material that has become available in the last 10 years. I would have hoped here for a tabular summary of the numbers available, or in cases where the data are too extensive, for a reference to other tabular data. This I find is not as complete as desirable.

In chapters 2, 3, and 4 the author discusses in turn the shell model, the collective model, and the optical model. I find the discussion in each case quite clear; one could again perhaps wish for more references to alternative, and in many cases more thorough and detailed, discussion of the topics.

Chapter 5 returns to the shell model and, in particular, radiative transitions are considered.

In discussions with Russian physicists I notice occasional resentment of the fact that foreign (particularly American) authors ignore their work. One may make the inverse complaint here. Because the majority of the work in nuclear physics since the war has been in America and Western Europe, no Russian book of any use at all can ignore this work completely. But in this volume Russian references are often used in preference to original Western work. For example, the scattering of neutrons by a coulomb field (through the medium of the magnetic moment) was authoritatively predicted in America and experimentally confirmed in Western Europe; yet the author refers solely to a less complete Russian paper.

These failings are minor; I find the book readable and useful, and I am glad to have it on my bookshelves.

RICHARD WILSON
Department of Physics,
Harvard University

Chemical Technology

Infrared Band Handbook. Herman A. Szymanski, Ed. Plenum Press, New York, 1963. xii + 484 pp. Illus. $35.

The *Infrared Band Handbook* is really a collection of bands listed by position in wave numbers. According to the publisher, more than 8500 bands are listed, and by my count these derive from about 1100 compounds. The book should be reviewed by a computer. Lacking an electronic model, this human computer made random checks with three objectives in mind: typographical errors, errors in data, and errors in the selection of data.

A book of this kind serves a useful purpose only if the information presented is accurate. That a check of about 400 bands uncovered only four typographical errors, all minor, gives the book a very good grade for this test. A failing grade must be given with respect to the test on the accuracy of the data put into the book. I checked 12 compounds (about 90 bands) chosen at random and found errors in the bands reported for four compounds. For example, the book lists two bands (1570 and 1566) for cyclobutene and cites Bellamy as the source. Bellamy actually gives only the 1566 band, and there is only one band in this region of the spectrum. A band at 972 is shown as very strong in a 0.036-mm sample, while the American Petroleum Institute (API) files give a medium to weak band at 972 for a 0.065-mm sample. I found a number of similar errors, but lack of space precludes enumerating them here.

When, as in this book, only a small fraction of the available information can be presented, selection becomes critical. The *Handbook* wastes precious space by giving data from too many compounds of great similarity, for example ten α- or β- *n*- alkylnaphthalenes. On the crucial problem of how to present intensities of the various bands the book fails miserably. More often than not the choice of sample thickness reverses, in terms of very strong, strong, and like designations, the true intensities of the bands. Note, for example, the data for cis-4-octene, with sample thickness in millimeters given in parentheses: 1650 VS (0.239), 1456 S (0.0153), 1381 S (0.064), 1343 VS (0.239). With a logarithmic relation between intensity and thickness, and three different sample sizes, it is exceedingly difficult to reproduce the true state of affairs in a single spectrum from these data. When, as is the case with 7-methylquinoline, no sample thickness is reported the relative intensities become meaningless. The handbook gives three strong bands at 885S, 828S, and 799S, but their true relative intensities are M, VS, and not present, respectively.

Since some 60 percent of the references listed are to the API files or to Bellamy, anyone who has ready access to these sources has little need for this book. I can recommend the book only to those who do not have access to more reliable data, and then only with great reservation.

ELLIOT N. MARVELL
Department of Chemistry,
Oregon State University

Mathematics and Chemistry

Chemical Applications of Group Theory. F. Albert Cotton. Interscience (Wiley), New York, 1963. x + 295 pp. Illus. $12.50.

Chemical Applications of Group Theory is a book from which the average chemist with little flare for mathematics can learn how to apply the results of point-group theory. The author has pared down to a minimum the purely mathematical part of the subject, but at the same time he has provided a large number of examples to illustrate each step. However, in attempting to avoid rigor mortis, he has missed a few points where rigor is required. I do not believe that these are serious, since the examples usually set one straight again. The book is planned for chemists who will not make extensive and sophisticated use of group theory, but who need to be familiar with the notation and simpler results currently used in the chemical literature.

The first section of the book includes a brief chapter on abstract groups, a chapter on molecular symmetry operations, and a detailed chapter on molecular symmetry classification which contains many good examples. The alias and alibi transformations are not explicitly discussed, and usually, but not always, the latter is used. Although only proper and improper rotations are necessary to specify all point-group symmetry operations, the author lists the four conventional types of operation as being fundamental. Representa-

tion theory is presented in two chapters, and such things as character tables and reduction of direct products are worked out. A rather serious error is the failure to use Hermitian scalar multiplication in the formulae dealing with orthogonality of representation coefficients. Explanations of many points are correct and illuminating. Detailed worked-out examples are provided at every step to bring home the more abstract ideas.

The second section contains chapters on hybrid bonds, molecular orbital theory, ligand field theory, and molecular vibrations. The presentation of each subject includes enough physics to make the group theory meaningful. The examples are interesting, and they are taken from a wide variety of organic and organometallic molecules and inorganic anions and cations.

An appendix contains the character tables for the point-groups of interest to chemists. Only two double groups are included.

This book is certainly the most readable volume on the applications of point-group theory to chemistry. Many people will be grateful to the author for having taken the time to write it.

DONALD S. MCCLURE
Department of Chemistry and
Institute for the Study of Metals,
University of Chicago

Genetics Research

Methodology in Basic Genetics. Walter J. Burdette, Ed. Holden-Day, San Francisco, Calif., 1963. xii + 484 pp. Illus. $5.

One should not approach this volume with the hope that herein will be found a series of explicitly stated techniques for either "basic" genetic research or teaching at any level. A brief examination and the reasons become obvious. The contents consist of 18 papers and the discussions of the papers from an invitational symposium that included 60 participants, each an authority in his field. The papers are concerned with current genetic research utilizing such a diversity of organisms as bacteriophages, bacteria, fungi including yeasts, and *Drosophila.* As could be anticipated, no two participants approached their assignment in the same way. Some authors chose to emphasize review aspects, others focused on current problems, and still others on general methodology and its underlying rationale. The result is a bit of a hodge-podge.

The following authors prepared articles that are primarily reviews in the fields indicated: F. J. Ryan, mutation and population genetics studies in *Escherichia coli*; L. Lerman, kinetic studies on inactivation of pneumococcal transforming DNA; S. Emerson, tetrad analysis in fungi and problems of interference; H. Roman, gene conversion in fungi; G. Streisinger, bacteriophage-evoked proteins; J. L. Jinks, cytoplasmic inheritance in fungi (he stresses diagnostic criteria); and D. Nanney, cytoplasmic inheritance in protozoa.

The other authors chose to present papers that are concerned with general research approaches, and generalized methodology and its rationale in the indicated fields. E. Freese dealt with induced and spontaneous mutations in bacteriophages; R. S. Edgar with phage recombination; P. E. Hartman with transduction; W. Hayes, F. Jacob, and E. L. Wollman with conjugation in *E. coli;* R. H. Pritchard with the phenomenon of mitotic recombination and its demonstration (a good review); H. J. Muller and I. I. Oster with techniques for the detection of mutations in *Drosophila*; M. M. Green with pseudoalleles and recombination in *Drosophila* (he stresses the potential application of the analysis methods to other organisms); C. Yanofsky with the criteria for demonstrating gene-protein relationships in bacteria and fungi; E. Novitski with the construction of new chromosomal types in *Drosophila melanogaster* for studying chromosomal mechanics; D. L. Lindsley and L. Sandler with the construction of compound-X chromosomes in *D. melanogaster*; and D. F. Poulson with the demonstration and analysis of cytoplasmic inheritance in *Drosophila.*

The book is admirably suited for professionals in the fields of genetics and microbiology who desire updating in aspects outside of their own speciality and for graduate students working in areas other than those covered in the volume. The bibliography contains more than 1100 references and should go a long way toward providing a source for the detailed techniques which are omitted by the various authors. Genetic research and teaching today must be attacked with less devotion to a particular organism and more attention to problems in organisms in general; the choice of organism stems from the problem. This concept appears to have been an unstated objective of the genetics study section in organizing this symposium. We can hope that it will encourage more familiarity with more organisms by more geneticists.

R. W. BARRATT
Department of Biological Sciences,
Dartmouth College

Qualitative Analysis

Identification of Organic Compounds. A student's text using semimicro techniques. Nicholas D. Cheronis and John B. Entrikin. Interscience (Wiley), New York, 1963. xii + 477 pp. Illus. $8.95.

Identification of Organic Compounds is primarily an abridgment of the authors' well-known *Semimicro Qualitative Organic Analysis.* By concentrating on the more useful and essential material the authors have achieved a more easily used textbook for students at the elementary and intermediate level. This has been done by shortening the previous text about 300 pages, rewriting part of the material, and adding new questions, problems, and recent references.

The methods used for the identification of an unknown organic compound follow the accepted paths: purification, the determination of physical constants, elemental analysis by sodium fusion, classification by means of an infrared spectrum, solubility and functional group tests, and finally, the preparation of solid derivatives.

The impact of modern instrumentation methods on the identification of organic compounds makes it unlikely that the present-day course in qualitative analysis will survive another decade. At present, in the more affluent schools, a student can prepare an infrared spectrum and, by using the "spec finder technique," search through Sadtler's catalog of 20,000 spectra and identify almost any commercially available organic compound in less than an hour, whether it be acetic acid or "krebiozen."

To go beyond the intermediate level, this textbook, like others in the field, now needs to include material on elements of gas-liquid chromatography and the interpretation of ultraviolet, nuclear magnetic resonance, and mass spectra.

JOHN S. MEEK
Department of Chemistry,
University of Colorado