

With the possible exception of the coverage of Tryon's cluster analysis, most researchers will find the treatment very sketchy and elementary (for example, "Correlations do not reveal causation but the degrees of association"). In no case is the coverage sufficient to make reference to the standard methods texts unnecessary. Furthermore, specific examples are nearly always drawn from the author's own research in the rehabilitation of mental patients. A broader selection of problems, situations, and settings would have greatly enhanced the value of this work as a general reference. The book would also be enriched by more references to other traditions of action research, for example, to the classic studies of Elton Mayo and to the many which grew from the pioneering work of Kurt Lewin. There is a vast array of possible strategies for conducting social action research, and a comparison among them would have enlivened and sharpened the author's special viewpoint.

The concluding chapter, which describes the type of center ideally suited for carrying out and disseminating this research, provides some useful ideas on what kind of institutional arrangements we should be building into our society to create effective linkage between social research and social practice. It is in urging social scientists to think upon such issues that Fairweather's book makes its mark. Taken as a whole, it adds to our understanding of how to advance with rational and steady steps toward a better society.

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Insulators and Semiconductors

The Optical Properties of Solids. Course 34, International School of Physics "Enrico Fermi," 1965. J. TAUC, Ed. Academic Press, New York, 1966. 448 pp., illus. \$22.

This volume is one of a kind that is now familiar; it consists of lectures given at a summer school. Such a presentation has both advantages and defects. It cannot be the careful, orderly, and lucid presentation that characterizes the best textbooks of a more or less stable discipline. What it can do is to bring into focus a field that has been developing rapidly. The present volume does indeed concern itself

with such a field—the intrinsic optical properties of insulators and semiconductors.

Band theory has been developed in studies of the simpler semiconductors and is now being applied to the more difficult problems of compounds. In this volume rare gas solids, alkali halides, silver halides, and zinc sulfide type materials are treated along with the classic subjects of germanium and silicon.

Similarly, experimental sophistication has increased. In addition to simple transmission and absorption, there are now a large variety of photoemission,

magneto-optic, piezo-optic, and electro-optic effects that are being exploited. These are described here. When alternating fields are used and the effects observed with phase-sensitive detectors, a vastly increased sensitivity is possible.

This book provides an extensive summary of these developments and is unique in doing so. Having it will be a necessity for those working or planning to work in this field.

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The Life of the Elasmobranchs

Sharks, Skates, and Rays. A symposium, Bimini, Bahamas, January–February 1966. PERRY W. GILBERT, ROBERT F. MATHEWSON, and DAVID P. RALL, Eds. Johns Hopkins Press, Baltimore, 1967. 640 pp., illus. \$15.

Since Darwin, the comparative method has provided by far the most significant approach to biological problems, but recognizing the existence of phylogenies has made comparisons more difficult as well as rewarding. Animals are similar because they are related, and animals are related because they are similar. To avoid circular reasoning, all possible anchor points must be utilized. Paleontological data provide the best of these, but increasing the number of units to be compared also helps. This volume abundantly shows that the elasmobranchs are not just another kind of fish but a distinct type of vertebrate, nearly as different from the bony fishes as from the tetrapods, and capable of furnishing an additional dimension, so to speak, to the disciplines of comparative anatomy, physiology, and behavior. The book resulted from an interdisciplinary symposium on "Current Investigations Dealing with Elasmobranch Biology," held at the Lerner Marine Laboratory in 1966, which was noteworthy for the cross-fertilization of ideas it brought about.

The book begins with an authoritative review of the evolution of the elasmobranchs that should improve the perspective of those comparative physiologists and teachers who still insist on considering the sharks and their relatives to be the ancestors of the mammals and bony fish. The elasmobranchs became separated from the other lines

of vertebrate phylogeny 400 million years ago, at about the same time the bony fish first evolved and long before the mammals and teleosts made their appearance. Systematists and laboratory instructors who have found little of interest in the uniform-appearing exterior of dogfishes and other sharks are due for a surprise when they read the chapters describing the several types of scales, the spines, hooks, spurs, and gaffs, and the elaborate array of sensory pit organs distributed over the bodies of these fish. Other surprising aspects of the lives of sharks turn out to be the complexity of their social relations, their migrations, and the rapidity with which they regularly replace their teeth. That elasmobranchs have complex nervous systems and sense organs is hardly unexpected, but recent studies on the histology and biochemistry of the brain, the morphology and physiology of the eye, and responses to chemical stimulation are noteworthy for the variety of techniques used, some of them specially adapted for handling such awkwardly large and dangerously strong subjects. Flourishing investigations on the electric organs of the bony fishes have revealed an amazing variety of structure and function; the organs of the torpedoes and skates may not be as varied, but they, too, exhibit exceptional properties that defy present explanation while offering exciting future possibilities.

Half of the book concerns comparative physiological and biochemical studies. Elasmobranchs differ distinctly from mammals in the types of proteins and enzymes of their body fluids, respiratory response to hypoxemia, level of blood lactic acid under stress, drug

biotransformation, blood-brain barrier, importance of glomerular filtration, hormonal regulation of water conservation, nervous control of the stomach, and immune responses. In the hydrodynamics of cerebral fluid and in electroretinograms, however, similarities overshadow differences. The mammals more closely resemble the teleosts than the elasmobranchs in their spectral sensitivity curves, calcium metabolism, and the amount of serum albumin. The development and functioning of the elasmobranch reproductive system is more like that of the mammal than the teleosts. In cardiac output, it is the elasmobranchs and teleosts that are alike. Obviously, we are far from being able to generalize—at any level. Nevertheless, as two of the book's contributors point out, "much can be learned about man in considering sharks and much can be learned about sharks in considering man."

In addition to the ichthyologists, physiologists, and behaviorists that will need this volume for ready reference, it ought to find a place in every laboratory where the comparative anatomy of the dogfish or skate is taught. Even a casual look through it by the students should invest their smelly fish with a vital glow.

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Organic Compounds

Advances in Alicyclic Chemistry. Vol. 1. HAROLD HART and G. J. KARABATSOS, Eds. Academic Press, New York, 1966. 405 pp., illus. \$16.50.

In the beginning of this century, chemists were largely concerned with the properties of aromatic compounds. In the last 20 years, however, the attention of organic chemists has been directed increasingly toward the study of the aliphatic compounds. The advent of conformational analysis, gas chromatography, and nuclear magnetic resonance provided the tools necessary for a detailed investigation of many of these compounds. Coupled with the realization that many previously unknown types of structures could be prepared and that they would be valuable in the study of more theoretical aspects of organic chemistry, this has led to the present great interest in aliphatic and particularly alicyclic compounds.

The new series is designed to summarize important developments in this field. Three of the chapters in the first volume are concerned largely with the effects of bond-angle deformation on reactivity and on physical properties. The first of these, by Meinwald and Meinwald, is concerned with bicyclo[1.1.1]pentane and bicyclo[2.1.1]hexane and with tricyclic compounds containing these ring systems. The compounds have received extensive study and have proved to have properties quite different from those that might be expected from studies of larger ring systems. Meinwald and Meinwald present a very good discussion of both the preparation and reactions of the compounds. The next chapter, by Closs, is concerned with the most strained of the *cis*-alkenes, cyclopropene. The chapter begins with a consideration of methods of synthesis, and then presents a detailed discussion of the physical properties and chemical reactions, with primary emphasis on the theoretical implications of the experimental observations. The last chapter, by Fort and Schleyer, is concerned directly with the effect of bond-angle changes on the energies of carbanions, carbonium ions, and free radicals. These three chapters give a very good review of the general subject and present the material from several different viewpoints.

The remaining two chapters are concerned with larger ring systems. One, by Koch, deals with the photochemistry of the tropolones. Here, a major interest is in the nature of the products, which are usually cyclobutane derivatives. It is perhaps unfortunate that the more general subject, the photochemistry of cycloheptatrienes and -dienes, was not considered. Nevertheless, the chapter presents much interesting material. The last chapter, by Waring, considers the cyclohexadienones. These compounds have been studied more extensively than the others in the volume, and are related to syntheses of natural products. Consequently, this is the longest chapter in the volume.

The presentation is quite good throughout. Each chapter contains sufficient introductory material that any graduate student or practicing organic chemist could follow the discussion without difficulty. The coverage appears to be quite complete through 1964, with many additional references to the 1965 literature. The material in volume 1 would appear to be of sufficiently gen-

eral interest that it should be read by most graduate students in organic chemistry, and the book should be a very useful reference work for all organic chemists.

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Photochemistry

Organic Photochemistry. Vol. 1. ORVILLE L. CHAPMAN, Ed. Dekker, New York, 1967. 351 pp., illus. \$15.75.

The photochemistry of organic compounds is a field in which there has been intense activity in the last few years. At least four new books, a new journal, and two new review series have appeared. In addition, the field has attracted new investigators, with a variety of backgrounds, who have published their contributions in a large variety of information sources. Many workers, including myself, have found it difficult to keep up with this information explosion.

In this timely series, the editor intends to provide critical summaries which will draw together some of the new information and clarify problems. The first volume contains seven papers written by contributors who have been active in their respective subjects. The contributors and their papers are: Paul J. Kropp, "Photochemical transformations of cyclohexadienones and related compounds"; Albert Padwa, "Photochemical transformations of small-ring carbonyl compounds"; Virgil I. Stenberg, "Photo-Fries reaction and related [re]arrangements"; Daniel J. Pasto, "Photochemistry of tropenoid compounds"; G. J. Fonken, "Photochemistry of olefins"; and O. L. Chapman and G. Lenz, "Photocycloaddition reactions." Most contributors approach their subjects in a straightforward manner which I found helpful. The book contains a wealth of information, as indicated by the large number of references given with each chapter. The book has achieved what the editor intended and is a valuable reference.

The typographic quality is uneven and seems to depend on the individual contributors. Many errors were found in chapters 3 and 5.

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