Book Reviews

Physics of Fully Ionized Gases. Lyman Spitzer, Jr. Interscience, New York, 1956. 105 pp. Cloth, $3.50; paper, $1.75.

The growing importance of the knowledge of the behavior of fully ionized gas plasmas, both in astronomy and in physics, indicates an urgent need for a convenient comprehensive summary of the basic characteristics of such plasmas. Existing analyses of the basic theory are largely scattered through an extensive, dispersed literature in the form of original papers serving interests ranging from those of the astrophysicist to the experimental physicist working on high-temperature arcs, intense shock waves, and glow discharges.

Lyman Spitzer, who has been actively interested in plasma properties and has been one of the major contributors to the field, has collected the basic mathematical theory of the plasma in a concise little treatise for the use of graduate student and investigator alike. The subject matter is well chosen and restricted to the properties that are essential to an understanding of the subject. Where observational data are readily adapted to confirm the theoretical deductions, they are indicated. However, no attempt is made to give a detailed comparison between theory and experiment. The applications and significance of the relationships derived are, however, indicated along the way.

This book is written for those who have had an introductory course in theoretical physics and for those who have a knowledge of Maxwell's equations and a working knowledge of the vector analysis.

The contents cover five chapters: "Motion of a particle" (equations of motion, particle drifts, magnetic moment, and acceleration of particles); "Macroscopic motion, principles" (electric neutrality, basic equations, steady-state solutions, and relationships between microscopic and macroscopic velocities); "Macroscopic motion, problems" (electric currents, motion of material across lines of force, and pinch effect); "Waves in a plasma" (electromagnetic waves, hydromagnetic waves, electrostatic waves); and "Encounters between charged particles" (distant encounters, diffusion coefficients, relaxation times, electric resistivity, thermal conductivity, and radiation).

This book is up to date, and the literature coverage is adequately complete. It is extremely clear, concise, and well written. It is an excellent and welcome addition to the literature in the general field of gaseous electronics and will be useful to astronomer, physicist, and engineer alike.

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Advances in Genetics. vol. VII. M. Demerec, Ed. Academic Press, New York. 1955. ix + 309 pp. Illus. $8.

This latest in a series of annual monographs on genetics contains six chapters, an index of this volume, and, of special value, a cumulative index of the preceding six volumes. A study of the cumulative index yields a broader perspective of the diverse phenomena and of the multiplicity of organisms used in studies of genetics than the study of any one volume alone. The fruit fly *Drosophila* is still a favorite organism for genetic studies, although its position is being rivaled by certain microorganisms, Lepidoptera, corn, cotton, mice, and man. The studies involve physiological, population, and cytogenetics as well as many aspects of formal genetics, including linkage and recombination.

In the present volume, the first chapter on "Microbial drug resistance," by Vernon Bryson and Waclaw Szybalski, is an incisive discussion of the origin of drug resistance, pointing out that induced resistance may be either genetic or nongenetic and that critical evidence must be adduced if one is to discriminate between the genetic and nongenetic origins. In the second chapter on "The 'obscura group' of the genus *Drosophila*," Adriano A. Buzzati-Traverso and Renzo E. Scossiroli bring together the wealth of data on this group to offer a unified picture of the phylogeny and distribution of the American and Eurasian members.

The role of chromosomal inversions in tying together adaptive gene combinations is thoroughly reviewed in the next chapter on "Chromosomal polymorphism in the Diptera," by A. Brito da Cunha. By means of hybridization and several experimental techniques, an astonishing variety of nuclear-cytoplasmic combinations is possible in Amphibia. The contributions of studies of these combinations to embryology and to some extent to the interpretation of evolution are discussed by John A. Moore in the fourth chapter on "Abnormal combinations of nuclear and cytoplasmic systems in frogs and toads."

The fifth chapter on "Recent genetics of the domestic rabbit," by Paul B. Sawin, is an exhaustive survey of the 100 or more studies on the genetics and physiology of the rabbit in recent years. There are 38 named loci, and 16 of these are distributed in six genetic linkage groups. In addition, a large number of loci are known to affect the variability in numerous quantitative characters. The final chapter, by Ryuhei Takahashi, is on "The origin and evolution of cultivated barley." Since barley enjoys a position as an important food crop and has probably been even more important in the remote past, an unraveling of the problem of its origin will be of interest to geneticists, agronomists, archeologists, and anthropologists. The question cannot be finally settled at this point, because several alternative hypotheses are admissible.

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Resonance in Organic Chemistry. George Willard Wheland. Wiley, New York; Chapman & Hall, London, 1955. xiii + 846 pp. Illus. $15.

George Wheland candidly presents in this book an unvarnished picture of the sad state of affairs that exists regarding attempts to treat quantitatively from first principles the forces that hold together even slightly complicated molecules. At the same time he imaginatively explores the firm, qualitative successes of the application of the theory of resonance to molecular structure and reactivity in organic compounds. His treatment refreshingly avoids any tendency toward oversimplification and reflects an outstanding command of the material.

Readers who are familiar with his earlier efforts to translate quantum mathematics into the symbolism of organic chemistry will be pleased to find that the new work contains sections on spectroscopy and systems in transit, omitted from the earlier works. Some may object to the somewhat limited treatment afforded portions of these subjects, but their objections should be tempered by

the author's necessary circumscription of the area to be mapped and his scrupulous attention to the clarification of detail in what is discussed. The specific failures to broaden the section on spectroscopy to include the infrared and the useful empirical relationships in the ultraviolet, as well as that on reactivity to include carbonyl addition reactions, may be noted. In this regard the work cannot serve completely to introduce the student of theoretical organic chemistry to his subject.

The valence-bond approach is used almost exclusively—a decision of the author that will certainly be welcomed by the majority of organic chemists who have found the resonance hybrid symbolism more convenient to their understanding. One questions, somewhat, the insistence that the difficulties of the valence-bond theory are so evenly matched by those of the molecular orbital approach to structure. The latter seems clearly ahead in comprehensibility to an organic chemist where electronic transitions are involved and, given time, may provide a clearer notion of molecular structure.

All will welcome the substantial appendixes; one provides a thorough grounding in the mathematical basis for the theory of resonance, and the other represents an extensive collection of data on bond lengths and angles.

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Problems in Amoebiasis. Charles W. Rees. Thomas, Springfield, Ill., 1955. x + 119 pp. Illus.

After devoting a lifetime of investigation to the subject of amebiasis, Charles Rees has written a small, compact book on the problems that might be encountered today by one interested in studying *Endamoeba histolytica.* This book, although admirably brief (100 pages), covers various aspects of amebiasis quite adequately.

Although the author has been more closely associated with basic investigations, the review of the clinical question is more complete with respect to such topics as diagnostic procedures, chemotherapy, pathology, and so forth.

The reason for a less detailed account of the fundamental biological and physiological properties of *E. histolytica* is well presented by the author. Although the protozoan has been successfully cultured for approximately 30 years under a variety of conditions, the apparent dependency for growth of the ameba on the presence of other living cells, either bacteria, protozoans, or animal cells, has greatly hindered basic studies of the organism.

Therefore, quite a respectable amount of knowledge is presented on the culture of the ameba—albeit in association with other organisms—and this contrasts quite sharply with the paucity of information on the physiology of the ameba. Rees, with his considerable experience in cultivating *E. histolytica,* on the subject of culture, has deviated from the review form to present selectively some of his own work in greater detail. This is justified on the basis of practical aids included to help obtain monaxenic cultures. It is not justified, perhaps, in the case of his own physiological experiments which he has included. There is a fairly complete bibliography at the end of each topic.

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Recent Studies in Avian Biology. Albert Wolfson, Ed. Published under the sponsorship of the American Ornithologists' Union. University of Illinois Press, Urbana, Ill., 1955. 479 pp. Illus. $7.50.

This volume was prepared at the request of a committee of the American Ornithologists' Union for a book that would present recent research in ornithology. The editor states in the preface that the book has two objectives ". . . to stimulate further research in ornithology" and "to provide . . . a convenient and authoritative source of the contributions of ornithological research to broader biological fields." Although the book falls somewhat short of these objectives in its over-all presentation, certain of the chapters are very well written and should stimulate interest. Part of the difficulty of the book is that there were 13 different contributors, and the chapters were received for publication at various times from January 1952 to April 1955. There is a considerable difference, therefore, in the recency of bibliographic references.

The book is divisible roughly into three phases: systematics, including paleontology (three chapters); anatomy, physiology, behavior, migration, and diseases (eight chapters); and population studies (two chapters). The first chapter, "Avian Systematics" (Alden H. Miller) should be of considerable interest to all biologists. The author gives an excellent summary of the advantages and disadvantages of bird study in relation to the broad problems of taxonomy and evolution. He emphasizes that avian taxonomy suffers from inadequate collections and inadequate genetic studies and that, in common with some other fields of taxonomy, there is a tendency to overemphasize minor differences of racial character. The author is an advocate of the importance of geographic isolation in avian evolution. Biologists should also find much of value in the chapter on "Recent Revisions in Classification" (Herbert Friedman) and on "Paleontology" (Alexander Wetmore).

The chapter on "Anatomy" (Harvey I. Fisher) is especially impressive because of the suggestions of anatomical problems that remain to be solved. The chapters on "Bird Navigation" (Donald R. Griffin), "Migration" (Donald S. Farner), "Nocturnal Migration" (George H. Lowery, Jr., and Robert J. Newman), and "Breeding Biology" (David E. Davis) are interestingly written and well documented. These chapters will be valuable because of their excellent bibliographies.

The physiology of birds receives very modest treatment in this book. It is true that much of the recent avian physiology has centered about domestic forms and that data for wild birds are relatively scarce. It was a disappointment, however, to discover that the discussion of endocrine glands is concerned primarily with their relation to migration and that hormones per se are considered only in relation to sex differentiation. The latter chapter (L. V. Domm), although it was the most recent to be received for publication, has the least complete bibliography.

The chapters on "Population Research" (Joseph J. Hickey) and "Bird Banding" (Donald S. Farner) are interesting and have elaborate bibliographies. These should be particularly valuable to other biologists. The final chapter on "Diseases of Birds" (Carlton M. Herman) is also well documented; but, as the author points out, this subject has been sadly neglected except for poultry diseases.

There is much to commend this book and any lack in unified presentation is probably compensated for by the excellence of bibliography.

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The Chemistry of Tanning Processes. K. H. Gustavson. Academic, New York, 1956. 403 pp. Illus. $9.

This is a book on the fundamental chemistry of tanning. Besides extensive coverage of chrome and vegetable tanning, which are the two most important tannages, the author has included chapters on Syntans, aldehydes, and quinone