Book Reviews

Advances in Protein Chemistry. vol. IX. M. L. Anson, Kenneth Bailey, and John T. Edsall, Eds. Academic Press, New York, 1954. viii + 542 pp. Illus. $10.50.

The current volume of *Advances in Protein Chemistry* contains eight reviews that are a substantial addition to the excellent account of the proteins that this series has presented. The first two chapters are concerned with physiological aspects of proteins and amino acids. In these H. V. R. Arnstein discusses the metabolic relationships of glycine, and Chapman and Synge review the protein metabolism of ruminants. The following six chapters either consider the properties of proteins that can be related to their structure or deal with the chemistry of substances derived from proteins. They are thus more in keeping with what I expect from the *Advances* than the first two chapters are.

A diverse literature on the chemical and biological methods of resolving racemic amino acids has been usefully summarized by J. Greenstein. The survey of naturally occurring trypsin inhibitors by Laskowski and Laskowski brings out the dissimilarities in the nature of the protein substances responsible for this activity. In reviewing the keratins, Ward and Lundgren have considered the formation and morphological arrangement of keratinaceous structures as well as the chemical and physical properties of these proteins. The molecular structure of simple substances with peptide bonds and other similarities to proteins is discussed by Mizushima.

A comprehensive account of protein-protein interactions is presented by David Waugh. The discussion covers a survey of the forces responsible for molecular stability and interaction, the development of a model of the native protein, a summary of 15 specific cases of interaction and denaturation, and a discussion that relates some of the general aspects of these cases to the model. The chief feature of Waugh's model is a modern version of the nonpolar core or "internal volume" of the protein molecule. This assumption is interpreted in some detail in terms of the α-helix. The model is useful as an attempt to relate the α-helix to other characteristics of the structure of globular proteins and is helpful as a basis for discussing interaction and denaturation. It must be admitted, however, that the experimentally observable aspects of these phenomena do not provide as critical a test as might be wished of the details of the proposed model. The book is concluded by an excellent summary and discussion of the behavior of proteins at interfaces by Cheesman and Davies.

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Marine Shells of the Western Coast of Florida. Louise M. Perry and Jeanne S. Schwengel. Paleontological Research Institution, Ithaca, N.Y., 1955. 318 pp. Illus. Paper, $6; cloth, $7.

In 1940 Louise Perry provided the first serious attempt to monograph the mollusks of a small regional area anywhere south of New York. Her student, Jeanne S. Schwengel, has revised the earlier work, added several more species to the record and furnished further details on early life-histories of many species. There are 174 pages of systematic descriptions followed by 55 full-page plates. The illustrations are almost all from photographs of freshly collected material and in every instance indicate the natural size of the specimen. It will be a useful reference book for those who collect shells on Florida's Gulf Coast, but its binding is not likely to last long under field conditions.

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Applied X-rays. George L. Clark. International Series in Pure and Applied Physics, McGraw-Hill, New York–London, ed. 4, 1955. ix + 843 pp. Illus. $12.50.

Here is a book that will draw criticism from some specialists but will be praised by more educators. It covers a very wide range of topics, each one of which is so highly developed today that not less than a dozen experts could cover all with real authority. By way of illustration, perhaps a fifth of the pages are concerned with diffraction studies of polycrystalline materials. This phase of applied x-rays alone has recently been covered by a volume of more than 700 pages, issued by the British Institute of Physics, with three editors and 29 authors, all British [H. S. Peiser, H. P. Rooksby, A. J. C. Wilson, Eds., *X-ray Diffraction by Polycrystalline Materials,* Institute of Physics, London, 1955]. It can justifiably be said of the latter very useful book that not more than half of the chapters were written by men with the greatest experience and ability in the field concerned, because not all of these reside in Great Britain; and this fact is apparent to specialists. What, then, can be expected of a volume of roughly equivalent length, written by a single worker but with a scope at least 5 times as great?

It is clear, at the outset, that G. L. Clark's work is not intended for specialists or experts. For the latter, the author himself recommends "the clinical approach," of which the afore-mentioned British work is an example. A senior undergraduate, or a young graduate student, will find in this latest edition of *Applied X-rays* the same soundly enthusiastic incitement to interest in the manifold applications of x-rays in science and industry that characterized the earlier editions of the work. Clark is a pioneer enthusiast. I recall my own reading, as an undergraduate in 1931, of the first edition, published in 1927. I record with deep gratitude the fact that it was largely as a consequence of my reading of the 1932 edition, along with Meyer and Mark's 1930 volume on the structures of high polymers [K. H. Meyer and H. Mark, *Der Aufbau der hochpolymeren organischen Naturstoffe,* Akad. Verlag., Leipzig, 1930], that I decided to develop a deeper understanding of x-rays as a tool for the study of the atomic structures of materials. I gathered more than mere enthusiasm from Clark's writings; I learned a very great deal about what x-rays could reveal concerning the structure of matter and something of the problems that still awaited solution.

Here, in the fourth edition, is an in-the-main up-to-date comprehensive introduction to the present state of x-ray applications. Every chapter is a useful starting point for a student or other nonspecialist. The bibliographies in and at the end of each chapter cover the fundamentals and much of the special literature in the special fields concerned.

This is perhaps the last time that an author can attempt to include so much of the details of applied x-rays in a single volume. Information and experience are accumulating too fast. One is appalled

to consider what the subject must include in another decade; and how will our students' students cope with the material available a generation from now?

Surely the most difficult feeling one should try to instill in a graduate student is a grasp of where the general development of a field stands, and where he might start his own research. Clark has accomplished what few of us would have either the courage or the ability to begin: a broad and yet a detailed summary of the uses of x-rays. His knowledge, enthusiasm, and care will be of great value to our students. Some chapters, such as the one on the chemical effects of x-rays, summarize information not as yet collected elsewhere and so will be useful to a larger group of readers.

The volume has the usual excellent format of the *International Series.*

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Vorlesungen über Differential- und Integralrechnung. Alexander Ostrowski. vol. 1 (1945) *Funktionen einer Variablen,* xii + 373 pp., F. 36.40. vol. 2 (1951) *Differentialrechnung auf dem Gebiete mehrerer Variablen,* 484 pp., F. 69.70. vol. 3 (1954) *Integralrechnung auf dem Gebiete mehrerer Variablen,* 475 pp., F. 78. Birkhäuser, Basel.

This full-scale treatise on the calculus represents an extended form of lectures given by Ostrowski during the past 20 years in Basel. The scope is so large that it covers a good part of the material studied in American colleges in all 4 years.

The first volume presents the key notions of differential and integral calculus of functions of one variable. The emphasis is on gaining an intuitive feeling, and, although rigor is stressed, the proofs of many fundamental theorems are postponed to the later volumes.

The second volume is devoted to the differential calculus of functions of several variables. This is prefaced by a thorough discussion of point sets, with proofs of such theorems as that of Heine and Borel. Extensive applications of the calculus to differential geometry are given in concluding chapters.

The third volume goes quite deeply into the theory of integration. In particular, double integrals are defined for bounded regions G having a null set as boundary and for functions bounded in G and continuous except for a null set; null sets are understood in the sense of Jordan (based on finite coverings) and the integral is obtained as a limit of Riemann sums. Further topics studied are line and surface integrals, substitution in multiple integrals, improper multiple integrals, special functions defined by integrals, and Fourier series and integrals.

The most striking feature of this work is its extreme thoroughness. For each topic a very careful foundation is laid, the standard theorems are established, and then a study is made of many refinements of the theory; for example, the section on integration by partial fractions leads up to the theorem of Ostogradski that the rational terms of the integral are obtainable by rational operations on the coefficients. The refinements are further pursued in the exercises that occupy almost one-fourth of the work. The great value of these would be much enhanced by appendage of "solutions"; the author states his intention of providing them in a separate publication.

The three-volume work stands as a major contribution to the textbook literature, and it will also be of much value as a reference work for those interested in classical analysis.

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Acetylenic Compounds in Organic Synthesis. R. A. Raphael. Academic Press, New York; Butterworths, London, 1954. xii + 219 pp. $6.20.

The chemistry of acetylenic compounds has developed rapidly in recent years. A feature of this expansion has been the wide application of these compounds in the synthesis of many more complicated unsaturated compounds and especially of naturally occurring substances. R. A. Raphael is particularly well suited for the task of summarizing these recent advances critically and from a practical viewpoint, because he has been closely associated with the main currents of research in acetylene chemistry for the past 10 years, has had wide experience with these compounds, and has contributed a number of notable syntheses that make use of acetylenic compounds; methods for carbohydrates, polyhydric alcohols, unsaturated fatty acids, and penicillic acid may be mentioned.

This volume is divided conveniently into a general section on the preparation and properties of acetylenes, a series of chapters on the synthesis of aliphatic compounds, conjugated systems including allenes, carbocyclic compounds and heterocyclic derivatives, and a final section on practical techniques. There are frequent references to unpublished material. Critical descriptions of the best procedures are given, and the book will be invaluable to the synthetic organic chemist who has only a general familiarity with acetylene chemistry and wants to choose the most convenient method for a synthesis involving an acetylene. Many unusual reactions offering wide possibilities for development are mentioned, and the volume will be interesting reading for all organic chemists, including the rising generation of mechanism-minded individuals who will encounter many unexplained transformations.

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Lectures on Partial Differential Equations. I. G. Petrovsky. Trans. by A. Shenitzer. Interscience, New York–London, 1st English ed., 1954. x + 245 pp. Illus. $5.75.

The theory of partial differential equations is almost as old as the calculus itself but is still in the process of rapid development. The interest in this theory is twofold: it is an important part of mathematical analysis and is also a basic tool in the rational description of natural processes. The literature of the subject is extremely voluminous, but there was a definite need for a short introductory textbook. The present book fills this need admirably.

I. G. Petrovsky is one of the most eminent representatives of the brilliant mathematical tradition of Russia and has contributed significantly to the theory of partial differential equations. This book is based on lectures given at the Moscow State University. It is remarkable that the author succeeded in conveying to the reader some of the basic ideas of a far-flung mathematical discipline in only 245 pages. The book is written with a high standard of rigor; at the same time the connection with physics, which provides the motivation for much of the theory, is emphasized throughout.

The first chapter contains examples of partial differential equations arising in physics, the fundamental Cauchy-Kowalewski theorem, and the classification of linear equations of second order. The second chapter, the largest and most original in the book, deals with hyperbolic equations. The Cauchy problem in the domain of nonanalytic functions and the theory of vibrations of bounded bodies are discussed. The chapter on elliptic equations (Chap. 3) contains a thorough description of various methods for solving the first and second boundary value problems. The final chapter on parabolic equations is much shorter but provides an adequate introduction.

In the body of the text the author dis-