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-

cusses primarily the classical equations of mathematical physics. But he stresses the methods that are applicable to more general cases and concludes each chapter with a brief summary of recent work. It should be mentioned that these summaries reflect almost exclusively the important work done in Russia.

The book can be highly recommended as a textbook for first-year graduate courses and for self-study. A reader who has worked his way through this book will be prepared to read more voluminous monographs, such as the classical *Courant-Hilbert,* and current literature.

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A Symposium on Amino Acid Metabolism. Sponsored by McCollum-Pratt Inst. of Johns Hopkins Univ. William D. McElroy and H. Bentley Glass, Eds. Johns Hopkins Press, Baltimore, 1955. xvi + 1048 pp. Illus. $12.50.

The nature of this book is well epitomized in the first paragraph, page 950, of a summary chapter by Bentley Glass: "It must be admitted that the treatment of amino acids in many extensively used textbooks of biochemistry is woefully inadequate and misleading. There are generally said to be 19 (or 21), or maybe about 25, naturally occurring amino acids, although the number now known actually exceeds twice that many. Very little is said about the synthesis of amino acids, only generalities are stated in regard to protein synthesis, and no over-all view of the reactions of amino acids leading to the production of other amino acids, of peptides, of excretory products, or of other compounds is supplied. Of the 'general reactions' of amino acids, deamination receives the fullest recognition, probably because of its importance in the formation of ammonia and the ultimate production of urea. Decarboxylation is scarcely mentioned; transamination and transmethylation are beginning to be regarded as possibly of some future importance; while peptide and protein syntheses are customarily honored with a few generalities. A few works have begun to portray the field more adequately and to orient students in this obviously key area. Yet the time is surely ripe for a major revision and reorganization of our thinking about amino acid metabolism. The current McCollum-Pratt Symposium has undertaken to lay the basis for that."

The book consists of 58 original papers with discussion by participants other than the authors. The authors are in general the leading exponents of research in this field and the book may, on the whole, be accepted as authoritative. The exposition of the subject is extensive but not complete. The general student of biochemistry will be rewarded if he is prepared to devote several days to careful study of the text. The book's principal use will be as a convenient reference for the specialist in amino acid research, a purpose that will be greatly aided by its excellent author and subject indexes.

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Abstract Bibliography of Cotton Breeding and Genetics, 1900–1950. R. L. Knight. Tech. Communication 17, Commonwealth Bureau of Plant Breeding and Genetics. Commonwealth Agricultural Bureaux, Farnham Royal, Bucks, England, 1955. 256 pp. 21s.

This volume, containing the abstracts of 1191 articles on cotton breeding and genetics, will be extremely useful to workers in the field. R. L. Knight has done an excellent job of abstracting the various articles, and he has made an effort to include every major scientific paper on the subject published between 1900 and 1950. Our files of United States literature in the field of cotton breeding and genetics have been checked against Knight's list and the only striking omission found was J. O. Ware's résumé on cotton breeding in the U.S. Department of Agriculture Yearbook for 1936. It is felt that the book would have been improved if general references and review articles had been listed separately from original contributions.

Three useful appendixes are given in this book: (i) The genome of *Gossypium,* (ii) a gene list for *Gossypium,* and (iii) gene linkage. Workers in the field will be grateful to Knight for bringing up to date the gene list for *Gossypium,* inasmuch as this has not been done since Hutchinson and Silow published a similar list in 1939.

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Quantitative Methods in Histology and Microscopic Histochemistry. Olavi Eranko. Karger, Basel; Little, Brown, Boston, 1955. 160 pp. Illus. F. 19.75.

The title of this book is perhaps misleading, because the text is concerned with the mathematical appraisal of variation and selection of material to obtain statistically valid numerical expressions of prevalence of histochemical, tinctorial, or strictly morphologic components of tissues rather than with methods of quantitative microchemical analysis.

The book covers well, in lucid language, an area in histochemical investigation that has provoked much discussion in past meetings but has hitherto evoked no comprehensive treatment.

The table of contents is comprehensive and outlines well the real content of the book. The relationship of mathematical quantitation to selection of material, to ultracentrifugation, physical observation methods, staining and histochemical reactions, relative volume area and number estimation, absorption photometry, and statistical analysis of results is discussed.

The book should serve to introduce students and investigators to the application of numerical evaluation to histochemical investigation.

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Variable Stars and Galactic Structure. Cecelia Payne-Gaposchkin. Athlone Press, Univ. of London, 1954. xii + 116 pp. $3.50 (U.S. Distrib.: de Graff, New York 10).

During the past 30 years Cecilia Payne-Gaposchkin has written three major monographs, in addition to several smaller books and a large number of research articles. Her doctor's thesis, *Stellar Atmospheres* (1925), marked an epoch in astrophysics and interpreted the observational results of stellar spectroscopy in terms of E. A. Milne's theory of stellar atmospheres. In 1930 she published *The Stars of High Luminosity,* which was an extension of her earlier work that profoundly influenced the work of all contemporary astrophysicists. *The Variable Stars* (1938) written in collaboration with her husband, S. Gaposchkin, discussed the physical properties of all groups of variable stars, including those of the eclipsing and nebular types.

The present book is concerned with the intrinsic variables as tools in the study of the structure of our galaxy—the Milky Way. It is the best of her books, and it crams into the space of 116 pages an enormous amount of new research. Mrs. Gaposchkin remarks in the preface: "As a book of this kind is printed, the work that will make it obsolete is being done. Such is the price that must be paid for writing on a subject that is actively advancing, and it calls for no apology." There is no doubt that the appearance of this book will itself stimulate new research and thus accelerate its process of