

related metabolites. In the next chapter, "Metabolism of sulfur-containing compounds," Greenberg gives further information on methionine and cysteine and describes the important role of the sulfur group in several coenzymes. H. Borsook, author of "Enzymatic syntheses of peptide bonds," presents the biochemical data in terms of thermodynamic types. Such welding of organic and physical chemistry treatment is most desirable. The important nuclear substances are covered in the next two chapters, "Purines and pyrimidines," by M. P. Schulman, and "Nucleotides and nucleosides," by L. A. Heppel. The first of these deals with the modes of synthesis and breakdown; the second, with deamination as well as enzymatic splitting and exchange, with special reference to synthesis of the coenzyme nucleotides. In the last chapter, "Metabolism of heme and chlorophyll," S. Granick traces the metabolic pathways of principal members of the porphyrin family, giving more space to the heme than the chlorophyll branch.

The book is authoritatively written and is interlarded with hundreds of citations of original articles. The chapter organization follows a uniform pattern. The authors are to be commended for the clarity achieved through liberal use of graphic formulas and diagrams in presenting complicated structure and mechanism. Although the story at times becomes involved, I found little that could be pruned. The volume is printed on good paper, is relatively free of error, and is well indexed by both author and subject. It is recommended to all those interested in a comprehensive review of this field.

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An Outline of Developmental Physiology. Chr. P. Raven. Trans. by L. de Ruiter. McGraw-Hill, New York; Pergamon Press, London, 1st Eng. ed., 1954. viii + 216 pp. Illus. + plates. \$5.50.

This book was written to *introduce* topics of interest in embryology. The fault in accepting this as the total tale is in the reader, not the author.

This work was completed in 1942, published in Dutch in 1948, with an English translation in 1954. In it Raven has given a running account that brings together the parts of the developmental story which never should have been separated. The separatists usually subdivide the continuity of embryology by stressing the individual attacks upon the continuum of development. Embryology is, therefore, referred to as consisting of (i) classical (prehistoric or maybe slightly in the historic period), (ii) experimental, which is premodern, (iii) chemical, including enzymatic, almost modern, and (iv) novogenesis. In this artificially fragmented area both the embryo and the embryologists are bewildered.

Raven has attempted to discard some of these artificialities in giving a nicely organized view of the embryo from the standpoint of the embryo's chronology.

He has oversimplified the treatment of his topics with full knowledge and intent, for he is trying to present a subject to readers who are new to it. He has avoided as far as possible the overcomplicated jargon which has been superimposed upon the description of development. Since such treatment must always be a compromise, many experts will take exception to all of the book and all will object to some of it. This is a calculated risk that Raven must have had in mind. As for the embryo, it will be a relief to try to develop in Raven's pattern rather than some of the others which it finds entirely too difficult to follow.

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Elements of Food Engineering. vol. 3: *Unit Operations*, pt. 2. Milton E. Parker. With the collaboration of Ellery H. Harvey and E. S. Stateler. Reinhold, New York, 1954. 241 pp. Illus. \$6.75.

In this third volume of *Elements of Food Engineering* the authors complete their discussion on the conversion of raw materials, the first part of which was presented in volume 2. In this continuation, special reference is given to aspects of evaporating and distilling, dehydration and drying, and controlling as a unit operation.

In the chapter on evaporating and distilling, there are descriptions of atmospheric evaporators including steam-jacketed kettles and pans, jam pans, continuous sugar cookers, an atmospheric concentrator, reduced-pressure evaporators (including single-effect, multiple-effect, and recompression evaporators), and distillation equipment.

The procedures used and the types of equipment available for food dehydration or drying of solid and liquid foods are presented. An explanation is given of the general practice of quality control by objective testing and statistical analysis, and there is a section on measurements of temperature, pressure, humidity, fluid flow, and liquid level as well as a brief discussion of the instruments that may be utilized in controlling the physical properties and the composition variables of processed food products, ingredients, and raw materials.

A chapter on the treatment of the final products of food processing is concerned with the unit operations of coating, decorating, panning, enrobing, forming, and packaging.

Considerable space is devoted to the packaging aspects of food engineering, including descriptions and various tests of the properties of packaging materials, the different forms of packaging containers, packaging machinery, and the different aspects of quality control in food packaging, such as the legal, purchasing, production, traffic, sales, consumer, and sampling aspects.

Definitions and explanations of technical terms used, illustrations and diagrams of equipment, tabular presentation of information, formulas, and equations for

calculations are liberally interspersed throughout this 240-page book. A seven-page subject index helps the reader to locate topics of special interest.

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New Instrumental Methods in Electrochemistry.

Theory, instrumentation, and applications to analytical and physical chemistry. Paul Delahay. Interscience, New York-London, 1954. 454 pp. Illus. \$11.50.

Everyone who has followed the rapidly increasing interest in the development of electrochemical methods, which are of interest to both analytical and physical chemists, will welcome this textbook written by one who himself has contributed extensively to these new developments. The theoretical fundamentals and critical examination of the new methods are presented in sufficient detail, along with some data from typical experiments. In the mathematical derivations, after the problem is set up and the assumptions are clearly presented, the details are omitted. However, the solution of each diffusion problem is discussed fully.

Part I begins with a chapter that reviews the newer electrochemical methods. This is followed by 9 chapters that discuss subjects such as electrode potentials and the kinetics of electrochemical reactions, also voltammetry and polarography at constant potentials for reversible, irreversible, kinetic, and catalytic processes. Here is presented the work that has been done in the field of irreversible waves and kinetic currents by such pioneers as Brdicka, Wiesner, Koutecky, and not least by the author himself. Throughout the entire book numerous references are given to the original literature. There are chapters dealing with polarography using continuously or periodically changing potential, or voltammetry at controlled current in stirred solutions or with moving electrodes. There is even a chapter on the use of polarized electrodes in potentiometric titrations. More than half of the text is devoted to Part I.

Coulometry and electrolytic separations are presented in Part II. Here one can find, for example, a description of recently introduced methods of coulometry at controlled potentials or coulometric titrations, or even methods for determining the thickness of metallic coatings and corrosion films.

The chapter in Part III on the use of high-frequency circuits, written by Charles N. Reilly, presents a well-written mathematical analysis of both the condenser and coil types of circuits, together with applications and instrumentation. The discussion outlines the possibilities of this new analytic tool not yet fully explored in the laboratory.

In Part IV descriptions are found of the instruments and circuits that are required and have been designed for these newer techniques. Here are diagrams of various types of electrodes for electrolysis,

circuits for electric integration or differentiation, or various kinds of coulometers.

In the appendix there is a brief presentation of the Laplace transformation, which the author uses extensively for the solution of the partial differential equations that are developed at numerous places in the text. This indicates the thoroughness with which the author has presented his subject.

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Water Supply and Waste-Water Disposal. Gordon Maskew Fair and John Charles Geyer. With a chapter (on water chemistry) by John Carrell Morris. Wiley, New York; Chapman & Hall, London, 1954. xii + 973 pp. Illus. \$15.

The first half of this work deals with the collection and distribution of water and the collection and removal of waste water. The second half deals with the treatment of water and waste water. Among the topics presented with accompanying examples are analysis of hydrologic data, collection of surface and ground water, water supply and drainage of buildings, flow in sewers and their appurtenances, biology of water and waste water, and industrial water supply and wastewater disposal.

This book sets forth many of the important advances that reduce water sanitation to an orderly process of calculation. In order to emphasize fundamentals, the authors have classified the subject matter according to principles. "Principles rather than practice, methodology rather than method, and rationality rather than rule of thumb" are stressed. To give emphasis to principles, a structural rather than a functional treatment of subject matter has been chosen. "This has made for an integrated discussion of water supply and waste-water disposal." Such a presentation in my experience and in that of some other teachers in the field has not been found successful below the second year of postgraduate study.

This is not a handbook on engineering practice (descriptions of materials, methods, equipment, and structures have been kept to a necessary minimum). It is intended however as a reference for practicing engineers. An appendix includes useful tables and a diagram that facilitates the solution of the Williams-Hazen formula for the flow of water in pipes.

Especially commendable features are the chapter, "Statistical analysis of quantitative information"; the chapters, "Ground water" and "Collection of ground water," which include much-needed discussions of the hydrologic and hydraulic aspects of the problem of evaluating ground-water resources; the chapter, "Physical properties of water"; the treatment of acid-base equilibria and oxidation potentials in the chapter, "Elements of water chemistry"; and the extensive coverage of the literature.

It is unfortunate that the two chapters on ground water are separated by the chapter, "Surface water collection." The omission of reference to Dorsey's