

	Present, mole	Found, mole
Glycine	0.0100	0.0103
L-Alanine	.00297	.00300
L-Leucine	.00255	.00260
L-Proline	.00420	.00435

The results obtained by the application of this

type of analysis to protein hydrolysates will be reported elsewhere.

THE LABORATORIES OF
THE ROCKEFELLER INSTITUTE
FOR MEDICAL RESEARCH
NEW YORK, N. Y.

WILLIAM H. STEIN
CARL NIEMANN
MAX BERGMANN

RECEIVED JUNE 6, 1938

NEW BOOKS

Fortschritte der Photographie. (Progress in Photography.)

Edited by E. STENGER, Berlin-Charlottenburg, assisted by H. STAUDE, Berlin-Tempelhof. Vol. V. of "Ergebnisse der angewandten physikalischen Chemie." Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig, Germany, 1938. xiv + 415 pp. 78 figs. 16.5 × 24 cm. Price, RM. 33; bound, RM. 35.

Modern photography dates back to the introduction of the silver bromide-gelatin emulsion in the eighth decade of the last century. Since that time, there has been no basic change in the photosensitive material of the plate, film and paper—silver halides dispersed in gelatin. During the sixty years that the silver bromide-gelatin emulsion has been known, no substitute has been found which in any way approaches it in sensitivity to light, adaptability to varied purposes, and ability to reproduce tones satisfactorily.

The study of the photographic process by the methods of scientific research received its first important impetus in England in the hands of Hurter and Driffield in 1890, and Sheppard and Mees in the first decade of the present century. These investigators laid the foundations for the quantitative interpretation of the action of light on the plate and film. At the same time, the pioneer work on spectral sensitization was done in Germany, and extensive study of the development process was made in Germany and France. It was not until the years following 1918, however, that systematic research in Europe and the United States produced information which permitted clarification of the basic principles governing the action of light on the emulsion. These studies were made largely in the research laboratories of the photographic manufacturing concerns, particularly the Eastman Kodak Company in this country, the Agfa Company in Germany, and the British Photographic Research Association in England.

In Germany alone has the photographic process been the object of much research in the Universities. In reading the book under review, one is struck by the opportunities offered by photography as a subject for research in the Universities of this country. Even in those fields where the plate or film is used as an instrument for research on other subjects, many of the results are open to doubt because the investigator displayed lack of knowledge of the

capabilities and limitations of his tools. With the increasing use of photography as an instrument, there is growing need for courses of study in its principles. If these were associated with research on some of the infinity of unsolved problems, much of the misuse of photography in its applications to science and industry would eventually be avoided, and the results could not fail to be applied to an improvement of the product.

The photographic literature is singularly diluted by a large proportion of perfectly useless papers, written by people having no broad appreciation of the field, or no scientific training to guide their practical approach. It is very difficult for those not closely associated with scientific research in the subject to select the valuable material from that of doubtful basis. The book under review should provide a reliable guide for them. It is edited by Dr. Erich Stenger, head of the photographic and photochemical department of the Berlin Technische Hochschule, with particular assistance from Dr. H. Staude, who was trained at Dresden under Dr. Robert Luther, dean of German photographic research, and aided by a number of other competent co-workers. The book aims at surveying recent progress in the important fields of photographic research, and has succeeded singularly well. It is the most useful of the photographic textbooks which have appeared in recent years, considered from the point of view of those interested in the scientific aspects. It presupposes a moderate chemical and physical knowledge on the part of the reader. Its perusal will provide an excellent understanding of the state of knowledge of the subject up to the summer of 1937, for it covers not only the scientific and photographic publications, but the patent literature as well.

The first Chapter, compiled by W. Meidinger, treats of the photolysis of crystals of the alkali and silver halides, and of the latter in the presence of gelatin, as in the photographic emulsion, and closes with a survey of theories of the latent image. Progress in the technique of making photographic emulsions is handled by H. Socher, while H. Staude deals with the nature of developers and the theories of their action, and the problems of hypersensitizing, desensitizing, fixing, washing and drying. There is a very comprehensive survey by K. Meyer of recent research in photographic sensitizing dyes, in which field so much progress has been made in the past ten years, and which has been largely responsible for the recent outstanding ad-

vances in photographic plates and films, and particularly in color photography. W. Falta writes of the manufacture, properties and handling of photographic papers, W. Petzold of exposure meters, and M. P. Schmidt of diazo-type papers and films. The important subject of color photography is treated in two chapters by F. Lührig and K. Rantsch. The chemical and optical aspects are considered, although not so fully as the remaining subjects in the book. This is deliberate on the part of the editor, for the fundamental principles are not new, whereas the practical development of the art is undergoing such rapid changes at the moment, that a useful evaluation of it is not yet possible. There is adequate material provided, however, for a fair basis for understanding developments likely to occur in the near future. In any case, the chapters give the fullest general survey of current trends in color photography which has yet been published.

The book is an indispensable reference source for those concerned with a knowledge of the present state of the theory and practice of photography. The material is critically selected, and its study will give an excellent idea of the ramifications of photography in the fields of physics, and physical and organic chemistry, and of its suitability as a subject for research.

The work is most appropriately dedicated to Professor Robert Luther, outstanding son of the Ostwald school, and leader of German photographic research, who attained his seventieth birthday on January 2nd of this year.

WALTER CLARK

Piezoelektrizität des Quarzes. (Piezoelectricity of Quartz.)

By DR. ADOLF SCHEIBE, Physikalisch-technische Reichsanstalt. Verlag von Theodor Steinkopff, Residenzstrasse 32, Dresden-Blasewitz, Germany, 1938. xii + 233 pp. 175 figs. 15.5 × 22.5 cm. Price, RM. 20; bound, RM. 21.

This book is volume 45 of the "Wissenschaftliche Forschungsberichte, Naturwissenschaftliche Reihe," edited by Liesegang. The author, a member of the Physikalisch-technische Reichsanstalt, was associated with Dr. E. Giebe in a number of important investigations on piezoelectric crystals. In recent years in collaboration with U. Adelsberger he has designed the extraordinarily precise quartz clocks at the Reichsanstalt, which exceed in constancy the best astronomical clocks. As is to be expected, his own contributions are described in considerable detail. That the book is not for this reason one-sided is attested by the fact that the bibliography at the end contains three hundred and eleven references from foreign as well as German journals, all of which are at least mentioned in the text, while many are fully discussed.

In the main, the book deals exclusively with the piezoelectric properties of quartz and their applications in high-frequency circuits. It is only to a slight extent mathematical, but is considerably broader in scope than Vigoureux's "Quartz Resonators and Oscillators," which is now the only book on this subject in the English language.

Part A, on the static piezoelectricity of quartz, contains an excellent account of the various methods of measuring the piezoelectric constants, which should provide future investigators in this field with sufficient guidance without

recourse to the original sources. Ten pages are also devoted to a very complete classified list of all known piezoelectric crystals. The relation of piezoelectric to elastic properties and their dependence on temperature also receives fairly full consideration, although the general vibration equations are not derived.

Part B, on the quartz crystal as resonator, occupies the greater part of the book. The treatment includes full discussions of quartz resonators in the form of bars, plates and rings, their modes of vibration, overtone frequencies, temperature coefficients of frequency, construction of thermostats, methods of mounting, and devices for the detection and measurement of resonance. The luminous resonators developed by Giebe and Scheibe are minutely described and well illustrated. The space given to the equivalent electric constants of the resonator and to the analysis of the resonator as a circuit element, while adequate for a general survey, is hardly complete enough to be of much value to the research worker. The same remark may be made with respect to the brief treatment of the quartz filter. This part closes with an account of various optical methods for the investigation of vibrating crystals. It is to be regretted in this connection that nothing is said in regard to the use of polarized light for the detection of twinned regions in quartz crystals.

Part C deals with the construction and performance of the quartz piezo-oscillator, including various forms of the quartz clock.

Part D, on miscellaneous piezoelectric effects, contains a very brief account of the use of quartz as a source of ultrasonic waves and for a few other special purposes, and of the effect of vibration upon the Laue X-ray patterns of quartz crystals. It is to be regretted that this portion of the book is not sufficiently complete to be as useful as it might for purposes of reference.

Presswork and diagrams are uniformly excellent. Among the few errors noted may be mentioned the statement on page 35 that of the 32 crystal classes 21 are piezoelectric (instead of 20); the assertion on page 50 that β -quartz is not piezoelectric; wrong numbering of an equation on page 57; reference (279) on page 71 should apparently be (284); on page 129 the words "äusseren" and "inneren" should be interchanged. At a few points such matters as notation, the orientation of crystals shown in illustrations, and directions of vibration are either not specified or are ambiguous.

These are minor criticisms. As a whole this book is probably the most complete and authoritative treatment of the piezoelectric properties and applications of quartz that has yet appeared.

WALTER G. CADY

Principles of Organic Chemistry. By H. P. STARCK, M.A., The Technical College, Kingston-on-Thames, England. Chemical Publishing Company of New York, Inc., 148 Lafayette Street, New York, N. Y., 1938. viii + 664 pp. 14 × 20.5 cm. Price, \$5.00.

This new textbook of organic chemistry offers enough new and significant features to justify its intrusion into a field that may, at first thought, seem to be supplied adequately with good texts. The author's approach has been

largely experimental and a much larger amount of theoretical and practical information is included than is usually found in such volumes.

"The present work originated," according to the author, "in connection with the author's teaching of organic chemistry to students reading for Pre-medical, First M. B., National Certificate, Pharmaceutical and General examinations in Chemistry. The theoretical sections cover the syllabuses of the Higher School Certificate courses of the Universities of Oxford, Cambridge, and London, and of various professional bodies." The introduction of complex compounds at an early stage in the text, before their methods of preparation and characteristic properties have been described, has been avoided. The treatment does not claim to be exhaustive. The author has sought to present the underlying principles as clearly as possible, in the hope of giving the student a sound foundation which will enable him to take full advantage of his further studies, whether in Chemistry, Biochemistry, Pharmacy, or Medicine. The first 486 pages are devoted to theoretical items, and the remaining 150 pages to practical work including tests for the elements, qualitative and quantitative analysis, and laboratory preparations. The appendix includes numerous tables, logarithms, first aid directions, a description of the Svedberg Ultracentrifuge, and answers to numerical questions.

The reviewer regrets that certain portions of this book, which otherwise might have been a valuable and unique addition to the list of organic textbooks, have not been somewhat modernized. The formulas frequently used for glucose, fructose, and other carbohydrates do not conform to the best modern usage, and the author on page 373 admits as much and yet seeks to justify this discrepancy on the basis of simplicity for the student. The references to the Grignard reagents and to the acetoacetic ester synthesis are again of the traditional, orthodox type, even though these explanations have now been proved to be either inadequate or incorrect. The directions for carbon and hydrogen determinations, as outlined beginning on page 497, might be improved by the use of "Ascarite" and "Dehydrite" and more modern absorption tubes. The naming of compounds might profitably be made to coincide more nearly with the Geneva system.

The valences of carbon, as shown on pages 53 and 62, may be confusing to beginning students. The index might logically and profitably be extended. The portions of the text devoted to organic qualitative analysis are not organized so as to permit of any systematic identification of unknown compounds. The preparation of 3,5-dinitrobenzoates might be superior to that of *p*-nitrobenzoates as derivatives for alcohols. Some twenty-six laboratory preparations and experiments are scattered throughout the first 486 pages or theoretical portion of the text. While they seem to be well organized, they are not of a suitable type, length, or number to constitute a complete laboratory program. Neither are they listed at any point in the index or table of contents. This number of experiments is, however, greatly supplemented by numerous additional exercises in Part II or the practical portion of the text. The reviewer also questions the wisdom of the preparation of hydrocyanic acid by students as outlined on page 331.

However, in spite of these adverse criticisms, the desir-

able features of this book far outweigh any objections that might be cited. The amounts and arrangement of theoretical and practical material is unique and far greater than usually found in elementary organic texts. Every chapter is concluded with a long list of splendid review and study questions. Important and related facts and properties are frequently summarized in convenient tables. There is a greater intermingling of the aliphatic and aromatic compounds than is usually found in such texts, thereby making the transition from one series to the other much easier and more logical. Important facts and conclusions are emphasized with large bold-faced type. The book is neatly and attractively printed and well bound. It is remarkably free from typographical errors.

The volume can be recommended to instructors who desire a new type of organic textbook that develops the subject largely from an experimental and theoretical standpoint, and then points out numerous organic applications to industrial and home activity.

RALPH E. DUNBAR

The Biological Standardisation of the Vitamins. By

KATHARINE H. COWARD, D.Sc., Reader in Biochemistry, University of London. William Wood and Company, Mt. Royal and Guilford Avenues, Baltimore, Maryland, 1938. viii + 227 pp. 44 figs. 15 × 22.5 cm. Price, \$4.50.

The author, who is Head of the Nutrition Department of the Pharmaceutical Society of Great Britain, is a recognized authority on methods of vitamin assay. It is fitting, therefore, that the first book to be published in English covering all essential details of biological determinations of vitamins, should come from the pen of one who has contributed so much to the establishment of our present international standards of vitamin unitage.

As the title suggests, the book is devoted exclusively to questions involving the quantitative accuracy of vitamin assays. She has confined her discussion to those vitamins (A, B₁, C and D) the methods for which have been standardized and which have received the approval of the International Vitamin Standards Committee of the League of Nations.

The book is divided into two parts. Part I is devoted to practical phases of vitamin work and may be used without reference to Part II. The latter has to do with the biometrical phases of vitamin work and emphasizes the value of statistical treatment of assay data.

Part I contains seven chapters dealing with such topics as "General Principles which Govern the Biological Methods for the Determination of the Vitamins," "Animals Suitable for the Determination of Vitamins by Biological Methods," "The Determination of Vitamin A, B₁, C and D" (one chapter devoted to each vitamin) and "The Interdependence of the Vitamins."

Each chapter which deals with the determination of a vitamin is preceded by an outline of the material which is to be discussed. The following outline of Chapter III, "The Determination of Vitamin A," is typical of the plan and treatment followed in discussing vitamin assay problems:

1. The International Standard of Reference and Unit of Vitamin A Activity.
 - A. The dilution of the standard of reference for dosing.
 - B. The need for a simultaneous test of the Standard whenever a determination of vitamin A is made.
 - C. The general arrangement of the test for a determination of the vitamin A potency of a substance in terms of the International Standard.
2. The Preparation of Rats for Vitamin A Determinations.
 - A. Animals suitable for the test.
 - B. Housing of the animals.
 - C. Vitamin A-free diet.
3. Criteria for the Measurement of the Response of Rats to Doses of Vitamin A.
 - A. Increase in weight.
 - B. Occurrence of xerophthalmia.
 - C. Changes in the vaginal contents.
 - D. Comparison between prophylactic and curative methods.
 - E. Comparison between (a) the "increase in weight" method, (b) the "xerophthalmia" method and (c) the "vaginal contents" method.
4. Physical Properties of Vitamin A by means of which it may be Measured.
5. References.

Part II consists of five chapters dealing with "The Standard Deviation" and "The Accuracy Obtainable in Determinations of Vitamin A, B₁, C and D." An appendix consisting of ten pages contains a report of the Second International Conference on Biological Standardisation and a table of Vitamin Content of Some Common Foods, expressed in International Units.

The author shows remarkable familiarity with the various methods and laboratory practices prevailing in the best European and American laboratories. Even the experienced worker will find Part I (practical) of great value and it is the reviewer's opinion that every vitamin assay laboratory should have the book available, since Dr. Coward has brought together material which is widely scattered in the literature.

Part II, however, contains information that is even less readily available than that referred to in Part I. Furthermore, most workers are not familiar with the use of statistical methods. Dr. Coward has the happy faculty of making statistical methods usable and understandable for the average worker.

The author has shown excellent judgment in her choice of photographs, tables and charts which illustrate the points emphasized in the text. No worker in vitamin research can afford to be without this very useful book

R. ADAMS DUTCHER

The Economics of the Sulfuric Acid Industry. By THEODORE J. KREPS, Stanford University Press, Stanford University, California, 1938. xiii + 284 pp. 21 figs. 16 × 23 cm. Price, \$5.00.

Announced as the first of a series of four volumes in the field of chemical economics, this work deals preëminently with the sulfuric acid industry in the United States. The

author has collated and arranged, in this volume, a vast array of statistics and other data relating to the sulfuric acid industry. With unstinted labor he has delved into the archives of Government bureaus and into the files of technical periodicals, and has made conveniently accessible a mass of figures which might otherwise have been lost in oblivion.

The sulfuric acid industry is here displayed in an unusual light, interesting to both the economist and the technician. After the Introduction and two chapters tracing historical developments, the current status of the industry, including the dominance therein of the United States, is presented in Chapter IV. Then ensue eight chapters on different phases of competition, concluding with a chapter on Intercommodity Competition, and the "Outlook for Sulfuric Acid." The presentations of all these different aspects are interesting, and one must admire the painstaking care with which the author has handled his data, and the conscientious manner in which he has drawn his inferences. However, the experienced technician will be unable to agree that the premises are always adequate, or the conclusions always right.

The chapter on Interprocess Competition might well have been expanded to include some subdivisions of this title, such as Intercatalyst Competition and Competition between Tower- and Chamber-Processes. The "idealized" table of comparative operating costs of chamber and contact plants (p. 72) may be objected to as established on incorrect data and forced into balance. Chapter VI contains an interesting account of the struggle between brimstone and pyrite, but why do the statistical tables stop with the year 1934? The discussion of the minor and potential sources of sulfur in Chapter XII seems to belong in Chapter VI.

Quite inadvertently, no doubt, some elements of unfairness seem to have crept into the text here and there. A good deal of publicity is given to one firm of contact-plant contractors to the exclusion of its competitors. In fact the influence of the intense pressure for business on the part of competing vanadium-mass contact-plant builders on (1) the displacement of platinum catalysts; (2) the relative decline in the production of chamber-plant acid; and (3) the creation of an over-supply of acid-plant capacity in the United States, has been omitted altogether. In the last chapter, the tendencies toward curtailment in sulfuric acid demand in certain industries are detailed without any mention of offsetting new uses and expanding consumption in certain other industries.

The author, Associate Professor of Business Economics at Stanford University, shows a remarkable grasp of many of the technicalities of sulfuric acid manufacture. It is true, however, that some inaccuracies and debatable statements have been included. The solution of the "vanadium mass problem" is ascribed to the wrong man (p. 54); the chamber process is erroneously said to have completely lost the market for oil of vitriol (p. 65); copper ores are said to enter the United States free of duty (p. 79), whereas a duty has been imposed since 1932; it is incorrectly implied (pp. 110 and 264) that vanadium mass can use pyrite gas without gas-purification; for the recent progress of America in contact-process technique, too much credit is given to vanadium mass, and too little to other developments (p.

55); and on p. 187 it is stated that many manufacturers of joint-cost products "do not even attempt to find particular costs for particular products, but are quite happy when the receipts from the totality of their operations show a profit over the totality of their outlays." which is in direct conflict with the practice of all manufacturers of joint-cost products with whose accounting methods the reviewer is familiar.

Several misprints (such as "turbo-dispenser" for turbo-disperser, pp. 60 and 264; "niter coke" for niter cake, p. 61; "carts" for cars, p. 90; and "767 caustic soda" for 76% caustic soda, p. 261), besides faulty English on p. 192 (line 14) and at the top of p. 215, escaped the proofreaders. It seems probable that a pre-publication critical review by a competent sulfuric acid engineer would have served to avoid most of these errors, as well as to guide the author to better sources of information and to bring the data more nearly up to date.

On the whole, this book, the first of its kind, is a valuable contribution to the literature of sulfuric acid, and will be welcomed in the libraries of the economist, the business executive and the technologist.

ANDREW M. FAIRLIE

Annual Tables of Constants and Numerical Data. N. THON, Editor-in-Chief. Vol. XI. Published for the International Union of Chemistry by Hermann et Cie.: McGraw-Hill Book Company, Inc., 330 West 42d Street, New York, N. Y., 1937. 17 × 25.5 cm.

This volume, No. XI, Part 1, is the first to be issued by the Managing Board appointed at the Twelfth Conference of the International Union of Chemistry at Lucerne in 1936. It contains numerical data which have been published during the years 1931-1934 classified in twenty-five sections and in addition a list of forty-four sections in which the other numerical data to be included in subsequent volumes will be classified. It is printed in a smaller and therefore more convenient size than the previous volumes of these Tables. Two other sections, namely, No. 26, Raman Effect, and No. 27, Rotatory Power, printed in the older, larger format, are available as separate monographs.

The Editors state that in this new series of Annual Tables emphasis will be placed on the selection and critical examination of the numerical data without abandoning the ideal of complete presentation to which Annual Tables have adhered in the past. Quantitative data are often divergent because of the different methods employed in, or the different conditions prevailing during, their determination; also because of the different methods of computation or different standard values which have been employed. It is very difficult to assign proper weights to these various factors and it would be unwise to select one single determination and discard the rest. The Editors believe that the best results will be obtained if, after elimination of data which are clearly inaccurate or are dependent upon uncertain factors, the remaining data are simultaneously tabulated and adequate information as to the attendant conditions and the methods or hypotheses involved in their determination is added.

The Editors consider it impossible to include all the

data relative to industrial materials, so that in this field a few typical examples will have to suffice.

Data for the years 1935-1936 belonging in the above twenty-seven sections will be included in the forthcoming Volume XII, Part 1; data for the years 1931-1936 belonging in the remaining forty-four sections will appear in Parts 2 and 3 of the forthcoming combined Volumes XI-XII. The Managing Board states that the preparation and printing of these three volumes are progressing rapidly. Prior to their publication the separate sections will be issued in the form of monographs containing one to three sections.

Finally, the Managing Board points out that the publication of these volumes has been possible only because of a substantial grant received from the French Government.

Workers in the physical sciences everywhere will be gratified not only at this continuation of Annual Tables but particularly at the prospect of prompt publication of future volumes.

ARTHUR B. LAMB

The Chemistry of Plant Constituents. By OLE GISVOLD and CHARLES H. ROGERS. Burgess Publishing Company, Minneapolis, Minn., 1938. 309 pp. \$3.50.

The authors state in the preface to the first (present) edition that the subject matter deals with the chemistry of plant constituents, with various possible reactions involved in their formation, and that "a rather complete bibliography is presented." When a book covers a vast field, the reviewer's critical competency must be limited to the topics with which he is intimately acquainted. His approval or disapproval of the book as a whole depends upon the thoroughness of his sampling of these topics.

The synthesis of hexoses *in vitro* by Baly (p. 6) is complete to 1928. No mention is made of the work of Ramsparger and Porter, nor of the work of Dhar and associates. The criticisms of Barton Wright (1930), the detailed discussion by Spoehr (1933), the Cold Spring Harbor Symposium (1934) are all ignored. Credit is given (p. 30) to Ehrlich for our "quite complete knowledge about the pectin molecule." Yet Norris and Resch (1937) point out the difficulty of distinguishing the essential structure from incidental adjunct. The authors make no reference to the work of Nanji, Paton and Ling, Carré, nor to the review by Bonner (1936). The work of Myers and Baker (1931, 1934), of Stoep (1928) and the important contributions of Link are all ignored. They suggest (p. 32) that the name pectin should be retained for substances now known as "urpectin" and "protopectin." This is contrary to the A. C. S. committee nomenclature (1927). The suggestion is made (p. 33) that the "definite ratio of calcium and magnesium in the pectin molecule might well explain the necessity of a balanced calcium and magnesium supply for normal plant development." A perusal of Norman ("Biochemistry of Cellulose, the Polyuronides and Lignin," 1937) shows how grossly inadequate is the present treatment.

The carotenoids (chapter X) were next examined. Reviews of this topic tend to conform to a set pattern but, in the reviewer's opinion, this chapter does not compare with the extremely readable account contributed by

Bogert to Gilman's "Organic Chemistry" (1938). Loose statements are frequent. Although Bogert uses xanthophyll synonymously with lutein (to the reviewer's regret, as it has for long been associated with the non-hydrocarbon carotenoids of the leaf), the present authors (p. 178) devote brief paragraphs to (1) *xanthophyll* and (2) *lutein or leaf xanthophyll*. This they state has been isolated from Dotter (sic) pigments. (*Egg-yolk*, *Eidotter*, or *Dodder*?) Strain has shown that leaf xanthophyll is not synonymous with lutein. They point out (p. 178) that rhodoxanthin does not have a double bond in the center of the molecule and therefore has a different type of symmetry. Application of Pauling's discussion on resonance (Gilman) to a conjugated system of double bonds indicates this to be illusory. On p. 184 they offer a confused discussion of water-soluble yellow pigments, carotenoids, and the autumnal coloring of leaves. "Some of the red colors are developed by the oxidation of the yellow ones. In the tomato, the yellow pigments are masked by the predominating red pigment, lycopin." The sentences, in juxtaposition, entirely unrelated, illustrate the confusion. The contribution of the late K. W. Hauser (1934) to color and bond conjugation might well have been mentioned. The improved method for isolating carotene by Homes (Holmes) and Leicester is hardly their most important contribution, and it has not found wide application because of the re-introduction of the Tswett column, of which but brief mention is made.

Russell's spectrographic evidence in favor of flavinacol formation in phlobatannins might well have been stressed, and his lucid review (1934) should have settled the undesirability of including caffetannins and chlorogenic acid with the true tannins. The term *leucocyanin* has been substituted (p. 166) for *leuco-anthocyanin*. The development of color was first noted by Willstätter, explained by Rosenheim (1920), but this is not mentioned.

A discussion of chlorophyll is wedged (p. 272) into the chapter on enzymes. The sole reference to chlorophyll chemistry is Hans Fischer's review (1937). Willstätter and Conant are to be remembered, not for their positive chemical contributions, but by less valuable suggestions as to the photosynthetic mechanism. The theory of Muller (p. 272) is put forward, though it has no widespread acceptance, while the views of van Niel on assimilation, and of Emerson and Arnold, Gaffron, on a possible photosynthetic unit are ignored.

Let us set to one side the irritations caused by numerous typographical errors, the indifference to accepted spelling, (carotinoid, lycopin interchangeably with carotenoid, lycopen), the innovations on nomenclature. Limitations of space necessitate compression and even omission. Instead of a highly incomplete bibliography, a critically selective one is required. A further ground for uneasiness lies in the general framework into which the facts are set. Let us examine pp. 1-4 in some detail. "In general, the greater the water supply, the smaller the root system. Too much water will result in the death of most plants." Solution culture technique is overlooked, and no hint is given that oxygen supply is an essential factor. "(Leaves) are the laboratories in which 'nuclear' or simple materials are synthesized." When did chemist or biologist use nuclear in this sense? "Fruits . . . have the lowest percentage of ash, and leaves have the highest. The latter is prob-

ably due to the fact that the water leaves the ash behind as it evaporates from them in transpiration." There is no differentiation of constituents immobilized to a great extent, notably iron and calcium, and those of great mobility, particularly phosphorus and potassium, and we are told the ash is left behind as the water evaporates.

The book shows evidence of uncritical compilation, typographical errors are inexcusably numerous, the style is in places too staccato, and many expressions are both irritating and unscientific, (e. g., p. 1 "a myriad number," p. 5 "a myriad of organic reactions," p. 14 "a myriad of plant products"). It is fair to add that these remarks apply to five of the fifteen chapters, and to slightly less than one-third of the book. The residue is certainly much more free from irritating or obvious defects, and appears to be more carefully reasoned. Unfortunately the reviewer has already limited his field of critical competency, but drastic changes must be made if this book is to survive.

G. MACKINNEY

Handbuch der Lebensmittelchemie. A. BÖMER, A. JUCKENACK and J. TILLMANS. Dritter Band. **Tierische Lebensmittel.** (Handbook of Food Chemistry. Vol. III. Animal Foodstuffs). Edited by A. Bömer. Verlag von Julius Springer, Linkstrasse 22-24, Berlin W 9, Germany, 1936. xvi + 1049 pp. 174 figs. 17.5 × 26 cm. Price, RM 129; bound, RM 132.60.

The first two volumes of this series are devoted to those constituents of the plant and animal world which constitute, or are a part of, man's food. Reviewed and described, also, are the relevant analytical procedures. In the third volume, and so to continue in the others which are contemplated, individual foods are treated. Unlike the practice followed by others, for example König, volume I and supplements of his "Chemie der Menschlichen Nahrungs- und Genussmittel," no attempt has been made at compiling the voluminous data on the proximate composition of foods which have appeared within the past century. Claimed as a novel feature which has been introduced to extend the serviceability of the work for the (German) food chemist in official or private practice is the inclusion of a digest, written by members of the profession (Holthöfer and Bames), of the legal aspects, both domestic and foreign, of the regulations under which the various substances are sold.

An excellent monograph of some 540 pages on milk and milk products, the work of A. Gronover and R. Strohecker who had the assistance of several others on certain special topics; similarly one on meats and meat products (359 p.) by A. Beythien and others; and a 74-page section by J. Grossfeld on the subject of eggs represent the major points of emphasis in this volume. Of lesser interest, although not without value, are the following topics: proprietary foods (23 p.) and sampling and preparation of material for analysis (17 p.) by A. Beythien; a brief discourse on foods and nutritive values (4 p.) by A. Bömer; and German food and food label laws (18 p.) by H. Holthöfer (18 p.).

References to the German literature on all of the topics are rather complete. That apparent ignorance of the world literature against which criticism was directed in respect to an earlier volume (THIS JOURNAL, 57, 2017

(1935) appears to have been avoided by the present authors, who have gone beyond their own frontiers in their attempts to bring into the picture the work of other scientists. Keeping pace with the advances in a field as large as that defined by the term food chemistry is, indeed, a large task. The authors have simplified this task for the many by bringing together in condensed form the vast amount of information now extant on this subject. The fact that methods of analysis have not been presented critically may perhaps disappoint some. Inasmuch as the reviewer does not understand that this work was to be primarily a treatise of this kind, he is of the opinion that the project has not missed its mark; rather that it should prove to be an invaluable aid to the worker in these fields.

H. A. SCHUETTE

BOOKS RECEIVED

May 15, 1938-June 15, 1938

- MEYER BODANSKY. "Introduction to Physiological Chemistry." Fourth edition. John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 686 pp. \$4.00.
- ADOLF BRÄUER and JOSEF REITSTÖTTER. "Fortschritte des chemischen Apparatewesens. Werkstoffe." Lieferungen 1-2. Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 128 + 192 pp. RM. 56; to subscribers, RM. 40.
- STUART R. BRINKLEY. "Introductory General Chemistry." Revised edition. The Macmillan Company, 60 Fifth Ave., New York, N. Y. 731 pp. \$3.50.
- C. H. DOUGLAS CLARK. "The Fine Structure of Matter. Part II. Molecular Polarization." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 242 pp. \$4.50.
- C. H. DOUGLAS CLARK. "The Fine Structure of Matter. Part III. The Quantum Theory and Line Spectra." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 186 pp. \$4.50.
- FARRINGTON DANIELS. "Chemical Kinetics." Cornell University Press, 124 Roberts Placc, Ithaca N. Y. 273 pp. \$3.25.
- J. DUCLAUX. "Mouvement Brownien. I. Partie Expérimentale." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 96 pp. Fr. 25.
- THOS. H. DURRANS. "Solvents." Fourth edition. D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 238 pp. \$5.00.
- A. EUCKEN, Editor. "Der Chemie-Ingenieur. Band II. Chemische Operationen. Teil 2. Apparative Durchführung chemischer Operationen." Akademische Verlagsgesellschaft m. b. H., Sternwartenstrasse 8, Leipzig C 1, Germany. 523 pp. RM. 50; bound, RM. 52.
- C. FAULCONER FLINT. "The Chemistry and Technology of Rubber Latex." D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 715 pp. \$14.00.
- M. J.-A. GAUTIER. "La Pyridine. Étude de Quelques α -Pyridones." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 78 pp. Fr. 18.
- M. GUICHARD. "I. De la Sensation à la Méthode de Mesure." "II. Essai Historique sur les Mesures en Chimie. (a) Avant Lavoisier. (b) Avec Lavoisier." "(c) Après Lavoisier." Hermann et Cie., Éditeurs, 6 Rue de la Sorbonne, Paris, France. 120 pp. Fr. 10 + 10 + 10.
- MORRIS B. JACOBS. "The Chemical Analysis of Foods and Food Products." D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. 537 pp. \$6.00.
- I. KOPPEL, Editor. "Abeggs Handbuch der anorganischen Chemie. Vierter Band, dritte Abteilung, zweiter Teil, A, Lieferung 3. Eisen und seine Verbindungen." Verlag von S. Hirzel, Königstrasse 2, Leipzig C 1, Germany. 165 pp. RM. 20.
- P. LEBEAU and G. COURTOIS. "Traité de Pharmacie Chimique." Second edition, Vols. 1-2. Masson et Cie., Éditeurs, 120 Boulevard St.-Germain, Paris VI^e, France. 1206 + 2128 pp. 280 + 460 fr.
- BERNARD LEWIS and GUENTHER VON ELBE. "Combustion, Flames and Explosion of Gases." The Macmillan Company, 60 Fifth Ave., New York, N. Y. 415 pp. \$5.50.
- A. SMITS. "Die Theorie der Komplexität und der Allotropie." Verlag Chemie, G. m. b. H., Corneliusstrasse 3, Berlin W 35, Germany. 372 pp. RM. 19.50.
- EMIL STARKENSTEIN. "Lehrbuch der Pharmakologie, Toxikologie und Arzneiverordnung." Verlag Franz Deuticke, Hefnerstorferstrasse 4, Wien I, Germany. 758 pp. RM. 20; bound, RM. 23.
- JOHN ARREND TIMM. "An Introduction to Chemistry." McGraw-Hill Book Company, Inc., 330 West 42d St., New York, N. Y. 568 pp. \$3.50.
- HARRY BOYER WEISER. "Inorganic Colloid Chemistry. Vol. III. The Colloidal Salts." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 473 pp. \$6.00.
- JOHN H. YOE. "A Laboratory Manual of Qualitative Analysis." John Wiley and Sons, Inc., 440 Fourth Ave., New York, N. Y. 219 pp. \$2.50.
- "Annual Reports on the Progress of Chemistry for 1937. Vol. XXXIV." The Chemical Society, Burlington House, London W 1, England. 540 pp. 13s./0d.