

lactal, was fractionally recrystallized it proved to be a mixture of at least two sugars, one having a final $[\alpha]_D$ less than 30° and the other a greater value. Many repetitions of the work gave the same result. The mixture of sugars was dissolved in the minimum amount of water and allowed to crystallize slowly after the addition of methyl alcohol, thus separating the product into two fractions. After five such fractionations the extreme values for the high and low fractions were $[\alpha]_D$ 34.6 and 26.9 (stable aqueous solutions). It is evident therefore that a review of Bergmann's data for 4-galactosido-mannose is required. We suppose that this sugar predominates in the lower-rotating fraction. What then is the identity of the higher-rotating sugar? It is apparently not lactose because it shows upward mutarotation and is very soluble in cold water. The separation of the sugars by fractional crystallization is tedious and considerable time will probably be required for the completion of the work. We are accordingly publishing this record of our year's studies on the subject. The experiments will be resumed in the fall of 1930, and it is also planned to make a similar study of the oxidation of cellobial and similar substances.

NATIONAL INSTITUTE OF HEALTH
WASHINGTON, D. C.
RECEIVED JULY 9, 1930
PUBLISHED AUGUST 5, 1930

ANDREW J. WATERS
C. S. HUDSON

NEW BOOKS

The Analytical Expression of the Results of the Theory of Space Groups. By RALPH W. G. WYCKOFF. Second edition. Carnegie Institution of Washington, Washington, D. C., 1930. 239 pp. 222 figs. 17.5×25.5 cm.

The tabulation of the special positions of the space groups has been useful in facilitating the determinations of atomic arrangements in crystals. The second edition of this work has been modified to include a graphical presentation of the symmetry elements of the space groups together with statements of the symmetry properties of the special positions. C. Hermann's recently proposed nomenclature is included in the outline of the derivation of the space groups. The majority of the errors in the tables of the first edition have been corrected.

STERLING B. HENDRICKS

Trattato di Chimica Organica. (Treatise on Organic Chemistry.) By GIUSEPPE ODDO, Professor of Chemistry at the University of Palermo. Casa Editrice Remo Sandron, Palermo, Italy, 1930. xv + 949 pp. 101 figs. 17.5×25 cm. Price, L. 90.

It is doubtful whether or not an elementary textbook of organic chemistry can be expected to serve at the same time as a reference work for the advanced student. Most American textbook writers have contented themselves with a brief survey of the subject and have placed much

emphasis on making it attractive to the beginner. These books are unsuitable for the advanced student. This is undoubtedly one reason for the great popularity of the more comprehensive textbooks which have been translated from German. Professor Oddo's treatise is of the latter type. It is one of the most complete treatments of the subject which has appeared in a single volume.

The book offers little that is novel either in the subject matter or the manner in which it is organized. The order of topics is the traditional one and the material is handled in a very conservative manner. The writer has concentrated his attention rather upon making the work terse, accurate and readable. In this he has succeeded admirably. Despite the vast amount of information included, the book is so attractively written that when one examines it for a particular bit of information he is likely to find himself continuing to read far beyond the point at which his immediate interest ceased.

It is to be regretted that the author has not seen fit to take advantage of certain recent developments in our ideas of valence. In the treatment of the "onium" compounds, at least, one might expect to find the electron theory used. Yet the nitrogen atom in ammonium compounds is still written as pentavalent.

But for this exception the work is thoroughly up to date. Especial care has been taken to mention recent industrial developments. The reviewer knows of no volume on the subject which is better adapted than this one to the needs of the advanced student.

REYNOLD C. FUSON

Outlines of Biochemistry. The Organic Chemistry and the Physico-Chemical Reactions of Biologically Important Compounds and Systems. BY ROSS AIKEN GORTNER, Professor of Agricultural Biochemistry in the University of Minnesota. John Wiley and Sons, Inc., New York, 1929. xv + 793 pp. 133 figs. 15.5 × 23.5 cm. Price, \$6.00.

The author has performed an important service in the preparation of this book. It covers much material not found in other texts, with which biochemists need become better acquainted, namely, a very full and modern treatment of the colloidal state, to which is devoted 290 pages (slightly more than the whole of Kruyt's well-known text); and has valuable chapters dealing with the following groups of substances, of especial interest in the chemistry of plant tissues, the pectic substances contributed by J. J. Willaman, tannins, plant pigments and essential oils. Besides these distinctive chapters, the treatment of proteins, carbohydrates, fats and lipides, vitamins and enzymes, which together makes up the remainder of the work, seems to the reviewer sound, accurate and, in many respects, admirable. The form of presentation is attractive and stimulating.

The sub-title of the book, "The organic chemistry and the physico-chemical reactions of biologically important compounds" correctly indicates its content and viewpoint. The volume is based upon a course of lectures, developed during a period of seventeen years, for students in the department of Agricultural Biochemistry at the University of Minnesota. The illustrative material is drawn naturally rather more from agriculture and inanimate phenomena than from animal biochemistry. It will probably be for some time a standard book in connection with plant physiology, a subject badly in need of development. Also for use as the chemical preparation for a thorough course in general physiology, Gortner's book would be admirable. Such a combined course would doubtless be a better preparation for later specialization in some division of biochemistry than most graduate students now receive. On the other hand, it may be questioned whether still better preparation may not be had by the study of colloidal phenomena in a special course as a topic of physical chemistry, leaving room for some consideration of chemical physiology as a part of the course in biochemistry. Especially to all students devoting themselves to biochemistry who lack sound preparation in colloid science and to all teachers of the subject, Gortner's book is warmly recommended. The numerous references, each with full title, to journal articles, and the selected list of monographs, constitute a valuable bibliography. Work from the author's laboratory is perhaps given disproportionate notice, but this attests a first-hand knowledge by the author of the material presented.

Illustrations are abundant; the type, printing and binding are very good.

A few minor errors have been noted. On page 107 it is stated that pH is *decreased* on adding base to a solution. A number of statements on page 106 should be qualified. On page 226 "carbohydrates are partially *burned*, giving rise to lactic acid" is misleading; and the statement that rigor mortis is hastened by an atmosphere of oxygen is erroneous. The reviewer is not acquainted with evidence for the statement on the same page that a "contracted muscle invariably has a higher water content than does a relaxed muscle." The statement on page 429 that "any appreciable quantities of these β -ketonic acids are indicative of a serious pathological condition" is, unless qualified, erroneous. The structure given on page 453 for glutathione is now known to be incorrect.

This work is not suitable for use as a text with classes of medical students or others interested mainly in animal biochemistry, unless supplemented by much other material covering the broad field of correlation of chemistry to function and metabolism. To cite an illustration, although the section on carbohydrates, so far as it goes, is excellent, including an interesting treatment of photosynthesis, the metabolism of carbohydrate is largely neglected. Only ten lines are devoted to glycogen. Insulin

is mentioned only once, to record the fact that glucose fails to relieve insulin convulsions. It is unfortunate that more material is not included from the field of animal metabolism and chemical correlation of function, not for its medical bearing but by reason of its purely scientific interest and importance as a part of biochemistry.

In his preface Professor Gortner expresses the following opinion: "In most of the Universities of America the development of the field of biochemistry has been left very largely to the group interested in the medical aspects. Accordingly, in a very large measure the biochemistry of the American Universities is not biochemistry in its strictest sense, but rather leans more and more toward the field of human pathology. Most medical school biochemistry could be more correctly designated as human pathological chemistry." Recognizing the need of departments of physiological chemistry in association with medical schools, he says, "It should likewise be recognized that there is a necessity for a study of the fundamental reactions underlying the broader field of biology, the primary object of which is to study and investigate the chemical and physicochemical reactions which take place in the normal biological organism, whether that organism be animal or plant." With the last quotation most biochemists will heartily agree, though many will also maintain that the point of view advocated has long been the attitude of a large number of American students even of "human pathological chemistry." The universality of knowledge and the interdependence of nearly all departments of biology upon nearly all divisions of physical science is perhaps more widely appreciated by biochemists in medical schools than Professor Gortner realizes. His book will nevertheless aid in spreading that important doctrine. The reviewer would suggest that phytochemistry also may profit from closer contact with both physiological and pathological chemistry.

PHILIP A. SHAFFER