wise insoluble problem of "shifting of the poles" and accompanying climatic changes.

Apart from all matters of controversy, this volume, with its accumulation of facts and literature, will be of great service to all who are interested in problems of distribution.

R. RUGGLES GATES

MARINE BIOLOGICAL LABORATORY,
WOODS HOLE, MASSACHUSETTS

ORGANIC CHEMISTRY OF SULFUR

The Organic Chemistry of Sulfur. Tetracovalent Sulfur Compounds. By CHESTER MERLE SUTER. 858 pp. 6 × 8½ in. Bound in dark green cloth. New York: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd. $10.00. 1944.

THE author states in the preface that this book is intended to serve as a reference work for those interested in the chemistry of those organic sulfur compounds which, broadly speaking, may be regarded as derivatives of sulfuric acid. The chapter headings are, therefore: I. Esters of Sulfuric Acid (94 pp.); II. Aliphatic Sulfonic Acids (101 pp.); III. The Preparation of Aromatic Sulfonic Acids (186 pp.); IV. The Properties and Reactions of Aromatic Sulfonic Acids (71 pp.); V. and VI. Derivatives of Aromatic Sulfonic Acids. 1. Sulfonyl Halides, Esters, and Anhydrides (121 pp.), 2. Sulfonamides and Related Compounds (85 pp.); and VII. Sulfones (117 pp.).

Encyclopedic in the field it covers, it is a veritable mine of information. References to all important literature on the subject, as recorded in *Chemical Abstracts* up to January 1, 1942, and totaling many thousands, are included. In recognition of the vast amount of time and labor which the author has expended in the preparation of a volume which makes all organic chemists his debtors, it is to be hoped that the welcome accorded it will be correspondingly cordial and that in due course of time we shall see from his pen other volumes treating with similar thoroughness and skill the remaining branches of the subject.

Each chapter opens with a detailed table of contents, showing the order in which the subject matter is classified and presented, and closes with a consolidated register of the references cited in the text. In addition to these references, there are innumerable tabular lists of compounds distributed throughout the text. Methods of preparation, general properties and reactions, derivatives of various kinds, industrial and medical applications, all are discussed in due course. A comprehensive index (83 pp.) is supplied.

In its chosen domain, the book is *facile princeps*, and is most heartily recommended. In paper, type, printing and binding, the book is fully up to the usual high Wiley standards.

MARSTON T. BOGERT

COLUMBIA UNIVERSITY

INDUSTRIAL CHEMISTRY

Industrial Chemistry. By WILLIAM THORNTON READ. 3rd edition. v + 631 pp. New York: John Wiley and Sons, Inc. 1943. $5.00.

THE third edition of Professor Read's well-known volume follows very closely the general plan and arrangement of previous editions.

A first section of six chapters discusses the approach to chemical engineering and serves as an excellent elementary introduction for readers who may be generally interested in the subject or who are approaching it for the first time.

The next four chapters discuss materials and equipment and are designed to give the general reader an introduction to the subjects of unit operations, materials of construction, power plant chemistry and related matter. The remaining seventeen chapters, 450 pages, are devoted to about twenty of the chemical industries of outstanding importance.

The volume represents a thorough revision of the previous editions and brings all the subjects treated up to date except for progress in the war interests. The author notes that the present world situation throws most statistical matter out of balance, and therefore, in general, bases economic data and so forth on the prewar figures.

About thirty pages of new matter have been added, including especially additions in the chapters on rubber, plastics and protective coatings; and, in fact, all the chapters represent much more than a revision of previous manuscript since in most cases the material is entirely rewritten.

The book is very readable, and the concise, entertaining style of the author is evident throughout, though the author has had the cooperation of recognized authorities in each field treated. The book should be welcomed by all those who have found the first and second editions useful and should reach a wide circle of new readers.

W. D. TURNER

COLUMBIA UNIVERSITY

PHYSICAL BIOCHEMISTRY

Physical Biochemistry. By HENRY B. BULL. New York: John Wiley and Sons. iv + 340 pp. $3.75. 1943.

THIS book is a short summary of many physicochemical principles and methods which have been applied in biochemical research. A noteworthy feature is the large number of references to the literature, particularly that of the last decade. More space is devoted to the presentation of principles than to the discussion of their application. While some of the equations are logically derived from fundamentals, many others must be accepted on faith. Particular

mention should be made of the author's discussions of dielectrics, electrokinetics, viscosity, diffusion and membranes, since these topics have been neglected in many elementary text-books.

In general the treatment is clear and accurate, but there are occasional lapses. The definition of the erg (p. 15) is grossly incorrect. The author implies (p. 108) that Harned and Ehlers did not use buffered solutions, while as a matter of fact their precise values for dissociation constants were obtained only by the use of buffer mixtures. A method for extrapolating electromotive force data (p. 110) is presented in a sadly garbled form. The name of the man who formulated the law of diffusion (p. 272) should not be identical with that of an American steel magnate. The method of obtaining partial specific volumes would be more intelligible if the words (p. 292, line 4) agreed with the symbols. However, most of the errors will be caught by a careful reader.

The lectures on which this book was based were probably a pretty stiff dose for the medical and biological students who heard them. The book should be particularly useful to future research workers who are willing to supplement it, as the author suggests, by a generous amount of outside reading.

DAVID I. HITCHCOCK
LABORATORY OF PHYSIOLOGY,
YALE UNIVERSITY SCHOOL OF MEDICINE

SPECIAL ARTICLES

SUPPRESSION OF GROWTH OF THE BROWN-PEARCE TUMOR BY A SPECIFIC ANTIBODY

THE cells of the Brown-Pearce carcinoma possess a distinctive constituent which can be identified *in vitro* through its reaction with an antibody that appears in the blood of certain rabbits implanted with the growth, as previous studies have shown.[1] This constituent is regularly present in large amounts in cell-free, saline extracts of the Brown-Pearce tumor, but it has not been detectable in similar extracts of other rabbit tissues, normal or neoplastic; it is readily sedimentable in the high-speed centrifuge, and certain of its properties suggest that it may be a protein.[1,2] Inquiry has now shown that the antibody which reacts specifically with the distinctive constituent has an influence on living Brown-Pearce tumor cells.

For *in vitro* experiments, serum specimens known from trial complement fixation tests[1] to contain the specific antibody in high titer were procured from "blue-cross" rabbits[4] in which the Brown-Pearce tumor had recently regressed. The sera were mixed with suspensions of living tumor cells, prepared by pressing "healthy" tumor tissue through a 40-mesh monel metal sieve into Locke's solution and allowing the clumps to settle out in a cylinder, the final preparations containing some 20 to 40 individually suspended tumor cells per microscopic field (×400). The mixtures were incubated 2 to 3 hours at 37° C. and then injected into the leg muscles of three or four normal rabbits. Control injections were made at corresponding situations in the same hosts with an equal quantity of incubated mixtures containing tumor cell suspensions and sera from normal rabbits or from rabbits carrying tumors of other kinds (V2 carcinoma;[5] Sarcoma I of Andrewes and Ahlström[6]). The control mixtures gave rise almost always to tumors that reached 2.0 to 3.5 cm in diameter within two to four weeks, whereas the tumor cells incubated with the antibody-containing sera usually failed to grow, though occasionally they formed small nodules.[7]

The effect was specific in that the antibody-containing sera had no influence on V2 carcinoma cells or those of Sarcoma I in concurrent tests. Yet the antisera did not lyse, agglutinate or alter the appearance of the Brown-Pearce tumor cells during 3 hours at 37° C.; and furthermore the proportion of tumor cells stainable with trypan blue (final concentration

[1] J. G. Kidd, *Proc. Soc. Exp. Biol. and Med.*, 38: 292, 1938; *Jour. Exp. Med.*, 71: 335, 351, 1940; *Jour. Bact.*, 39: 349, 1940. See also J. G. Kidd and W. F. Friedewald, *Jour. Exp. Med.*, 76: 543, 557, 1942.

[2] As bearing further on the nature of the distinctive constituent, recent experiments have shown that it is acted upon *in vitro* by purified proteolytic enzymes (chymotrypsin and trypsin), which rapidly render it unable to react with its specific antibody. In addition, Claude and I have found that the distinctive constituent seems to be associated with the "small particles" or cytoplasmic microsomes of the Brown-Pearce carcinoma cells—the finding having a greater interest since the filtrable agent responsible for Chicken Tumor I appears to be associated with the microsomes of fowl sarcoma cells.[3]

[3] A. Claude, *Proc. Soc. Exp. Biol. and Med.*, 39: 398, 1938; SCIENCE, 91: 77, 1940; J. Furth and E. A. Kabat, *Jour. Exp. Med.*, 74: 247, 257, 1941. See also L. Foulds, *Am. Jour. Cancer*, 31: 404, 1937; J. G. Kidd and W. F. Friedewald, *Jour. Exp. Med.*, 76: 543, 557, 1942; A. Claude, *Biological Symposia*, 10: 111, 1943.

[4] English × Lilac—Rockefeller Institute strain, inbred from fertile hybrids.

[5] J. G. Kidd and P. Rous, *Jour. Exp. Med.*, 71: 813, 1940.

[6] C. H. Andrewes and C. G. Ahlström, *Jour. Path. and Bact.*, 47: 87, 1938.

[7] It may be significant that the Brown-Pearce tumor cells do not "protect" the distinctive constituent from the action of the specific antibody, whereas many living cells, notably certain neoplastic ones, provide such protection for viruses.[8]

[8] P. Rous, P. D. McMaster and S. S. Hudack, *Jour. Exp. Med.*, 61: 657, 1935; J. G. Kidd, *Jour. Exp. Med.*, 75: 7, 1942.