sols prepared from concentrated reagents had always been found to be negative, presumably because of the pentathionate ion produced in the chemical reaction, which becomes strongly bound to the particles (*7*). Our investigations have demonstrated that the fundamental reason for the existence of positively charged particles in the dilute sols is the absence of a significant concentration of pentathionate ion. Under these circumstances hydrogen ion can become the charging species. The positive charge decreases with increasing pH. The particles are isoelectric at pH of approximately 4, and negative at higher pH values. When extremely small amounts of sodium pentathionate were added to the dilute monodisperse sols (final concentration of $Na_2S_5O_6 = 1\text{–}2 \times 10^{-5}$ *M*), the positive charge was immediately reduced considerably or completely reversed. Such experiments indicate that the concentration of pentathionate in the original dilute sols is always less than 1×10^{-5} *M* many hours after mixing the reagents.

In a recent paper Dinegar, Smellie, and LaMer drew the same conclusions concerning the pentathionate ion concentration in these dilute sols from the results of chemical measurements (*8*).

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Book Reviews

Carbon Dioxide Fixation and Photosynthesis. Symposia of the Society for Experimental Biology, No. V. New York: Academic Press, 1951. 342 pp. $6.80.

The papers read at the Sheffield meetings of the Society for Experimental Biology in 1950 are now available in book form. They attest to a carefully planned program in which various phases of the general problem of photosynthesis have been ably presented by persons whose efforts have contributed materially to a better understanding of this complicated process. Included are discussions of the most important physical, chemical, comparative-biochemical, and biological aspects. On the whole, the material has been very well integrated.

The first four chapters, by H. A. Krebs, H. G. Wood, S. Ochoa, and D. Herbert, set forth the development of our comprehension of carbon dioxide assimilation by nonphotosynthesizing organisms. They show how, from the discovery of this phenomenon, now some 15 years ago, detailed investigations have resulted in a definition of several of the specific reactions involved, including the isolation and characterization of enzymes and coenzymes that play a role in CO_2 fixation by animal tissues and microorganisms. Herbert's paper, especially—containing much otherwise unpublished material and a penetrating critical analysis of existing discrepancies—is a fine contribution.

Three succeeding chapters are concerned with aspects of the metabolism of higher plants. M. Thomas discusses crassulacean acid metabolism; because of the emphasis in the first four chapters on the mechanism of formation of certain di- and tricarboxylic acids, it provides a link with the first part of the book. The subject matter treated by Thomas, however, is, from the point of view of a biochemical analysis, still in a rudimentary state. The papers by O. V. S. Heath, and by H. L. Penman and R. K. Schofield, dealing, respectively, with assimilation by leaves with stomatal control eliminated, and with some physical aspects of assimilation and transpiration, conclude this "biological interlude." The three chapters provide many examples of the complications attending studies with higher plants.

The next three chapters are an excellent introduction to the photochemical basis of the photosynthesis problem. The photochemical formation and reactions of atoms and radicals in aqueous systems are discussed by M. G. Evans and N. Uri; photochemical oxidation-reduction processes, also in aqueous systems, by Jos. Weiss; and the resonance transfer of energy between molecules by E. J. Bowen. The general treatment of these aspects is so admirable, and the implications for a better understanding of the mechanism of photosynthesis are so clearly evident and so well presented, that a careful study of these chapters cannot be too strongly recommended.

James Franck's paper on the physical background of photosynthesis summarizes the application of physical principles to the formulation of an integrated picture of a general mechanism. The section on physical aspects is concluded with a chapter by M. S. Nishimura, C. P. Whittingham, and Robert Emerson on the maximum efficiency of photosynthesis, representing a critical evaluation of this much debated and controversial field, and one by B. Kok on photo-

induced interactions in the metabolism of green plant cells, with additional remarks on quantum efficiency.

The more specifically biochemical phase of the subject is introduced by R. Hill, whose epoch-making researches in 1939 provided the first opportunity for approaching a study of the photosynthetic mechanism by means of enzyme-chemical methods. Hill's paper on reductions by chloroplasts, dealing with the most important biochemical consequences of his work, is followed by a chapter by C. S. French and H. W. Milner in which significant methodological developments in the preparation of photochemically active suspensions of fragmented chloroplasts are discussed. Wassink's paper on the reducing action of light in photosynthesis reviews a number of observations generally supporting the thesis that light absorption by photosynthesizing organisms generates reducing power. Two further chapters, by H. Gaffron, E. W. Fager, and J. L. Rosenberg, and by M. Calvin and collaborators, describe the exciting results of studies with carbon dioxide, labeled with C^{14}, and aimed at unraveling the stages by which CO_2 is transformed into organic matter during photosynthesis. The application of isotopes, combined with the use of refined analytical procedures, for the separation and identification of labeled products (ion-exchange columns, paper chromatography, radioautography) has yielded information that could not otherwise have been obtained. This phase is currently in so active a state of development, however, that the detailed interpretation of the results given in the present volume is rapidly being modified by subsequent studies.

An excellent feature of the book is the inclusion of three final chapters, two by O. Warburg, D. Burk, and A. L. Schade (with J. Hunter coauthor of the second), and one by H. A. Krebs. In these papers, recent innovations in the methodology for conducting photosynthesis experiments, for measuring light absorption, and for determinations of gas exchanges in photosynthesizing or respiring cells are described in sufficient detail to make them generally available. Anyone familiar with the limitations of earlier methods will realize the importance of these new techniques.

For persons interested in the general problems of carbon dioxide assimilation and photosynthesis, the book is obviously required reading. But specialists in other fields can also benefit from a study of its contents; they will find in it a great deal of important information, on the whole well written and ably presented. The book is a credit to the planners of the symposium and to the contributors.

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Pathology of the Fetus and the Newborn. Edith L. Potter. Chicago: Year Book Pub., 1952. 578 pp. and 601 figs. $19.00.

This large, important volume represents an exhaustive treatise on the morbid anatomy of all diseases affecting the fetus and the newborn. It is written by the leading authority on this subject and represents the results of 18 years of patient and accurate observation on the pathogenesis of fetal and neonatal death in a large maternity hospital. Its material has been drawn not only from the Chicago Lying-in Hospital and the Chicago Board of Health, but from the many physicians of that city and elsewhere in this country who recognize Dr. Potter's prominence in this field of human medicine. The author's credo is best expressed in her own words when she says, "The description of the body of a dead infant is of no value as an isolated piece of information, but if it is integrated with the various aspects of heredity, conception, development, intrauterine and extrauterine environment and behavior it becomes part of an important chronicle."

The material is well organized and arranged. Subjects of broad interest, such as causes of fetal and infant death, or prematurity, are appropriately grouped as chapters comprising the first third of the volume, and the specific organ systems and their diseases occupy the remaining chapters. The bibliography, although not exhaustive, is more than adequate for students in this field. The indexing is of high order.

The format is pleasing and the illustrations are numerous and of superb quality. The rare printer's error, such as the transposition of two lines on page 116, in no way detracts from the excellence of the printing.

This is the most modern and complete work on this vital phase of human disease. Although written by a pathologist as an authoritative compilation for her fellow-pathologists, it is a treasure house of correlated embryologic, anatomic, pathologic, and clinical data on the fetus and the newborn infant who has failed to survive.

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Scientific Book Register

Disease in Plants: An Introduction to Agricultural Phytopathology. Neil E. Stevens and Russell B. Stevens. Waltham, Mass.: Chronica Botanica; New York: Stechert-Hafner, 1952. 219 pp. $4.75.

Les Théories Électroniques de la Chimie Organique. Bernard Pullman and Alberte Pullman. Paris: Masson et Cie, 1952. 665 pp. 5800 fr.

Histopathological Technic: Including a Discussion of Botanical Microtechnic. 2nd ed. Aram A. Krajian and R. B. H. Gradwohl. St. Louis: Mosby, 1952. 362 pp. $6.75.

Diseases of Vegetable Crops. John Charles Walker. New York–London: McGraw-Hill, 1952. 529 pp. $7.50.

Surgery and the Endocrine System. Physiologic Response to Surgical Trauma—Operative Management of Endocrine Dysfunction. James L. Hardy. Philadelphia–London: Saunders, 1952. 153 pp. $5.00.

Limnology. 2nd ed. Paul S. Welch. New York–London: McGraw-Hill, 1952. 538 pp. $8.00.

Electrolytic Manganese and its Alloys. Reginald S. Dean. New York: Ronald Press, 1952. 257 pp. $12.00.