

REVIEWS

The Photochemistry of Gases. By W. A. Noyes (Jr.) and P. A. Leighton. American Chemical Society, Monograph Series. (Reinhold Publishing Corporation, New York), 1941. Pp. 475. Price \$10.00.

The mechanism of reactions in gaseous systems has not proved as simple as the pioneers in the field of chemical kinetics hoped. Energy of activation, chain reaction, accelerating and retarding influence of impurities, wall reactions—all these make difficult a correct interpretation of the course of a chemical process in homogeneous gaseous systems. Investigations during the last two decades have thrown considerable light on the subject, and we have now many well-established principles to guide us in this field.

The photochemistry of gases deals with a special branch of this subject where the atoms and molecules that start the reaction are activated by absorption of radiant energy. It is now clearly understood that semi-quantitative observations rarely supply data which are of much value in unravelling the hidden mechanism of a photochemical reaction. In Chapter II of the book, a clear exposition is given of the modern technique for experimental study of photochemical reactions. One cannot fail to be struck by the advance that has been made since the old days of Bunsen and Roscoe's actinometer. Chapter III deals with spectroscopy in relation to photochemistry. Spectroscopic study of many diatomic molecules has been rewarded with significant results. Energies of dissociation can now be calculated, and insight obtained into the states of the atoms formed by the dissociation of molecules. A photochemist must study absorption spectra, but unfortunately even now such studies tell him too little about the type of reaction which may be expected. Chapters IV and V deal with photochemical kinetics. The quantum theory provides a connection between energy absorbed and matter transformed, but its strict application is limited to a few simple reactions. The classic work of Polyani on chain reactions initiated by sodium atoms has motivated much of photochemical work in

which the reaction is induced by photo-excited atoms. Thus reactions sensitized by mercury, zinc, and cadmium atoms have been exhaustively discussed. But as the authors point out, even the mechanism of the mercury sensitized hydrogen oxygen reaction is not known with certainty. Chapter VI deals with the photochemistry of gases involving absorption of radiation by diatomic molecules. Here the gaps in our knowledge are being continually narrowed down. But it still happens, that the experimental observations of one worker are not substantiated by another. Thus in the photobromination of double bonds, the authors take it for granted, that the concentration of the acceptor organic molecule has no influence on the velocity of reaction which is not confirmed by observations in the reviewer's laboratory. Where facts are disputed, there cannot be much unanimity of opinion as regards their interpretation. But that is the way that all progress is made!

The appendices contain a very valuable collection of all important references on the subject. The reactions have been classified and tabulated, and the probable absorbing molecules indicated in italics. Short remarks about the quantum yield and the mechanism of each reaction and a complete bibliography of authors are features which will be very welcome to those who are interested in the study of the subject.

The authors are to be congratulated on a balanced and up-to-date review of a subject which is rapidly growing in importance. What is more, they have indicated in many cases, the directions in which more accurate quantitative data are to be collected in order that a unique solution of a photochemical mechanism may become possible.

J. C. G.

A Short History of the Plant Sciences. By Howard S. Reed. (Waltham, Mass.: the Chronica Botanica Co.; Calcutta: Macmillan & Co., Ltd), 1942. Pp. 320, 37 Figs. \$5.00.

"Work on the history of a subject is inevitably a reflection of the interest of the writer." Indeed, no botanist today can claim to keep abreast of the progress of the

plant sciences on all the expanding fronts. But in a book with this general title, even the warning uttered in the Preface fails to prepare the reader for the large gaps one actually finds. Here is a list of the subjects which the author leaves practically untouched: systematic botany (except in reference to the early systems of classification), phylogeny, genetics, plant breeding and evolution, palæobotany, the whole field of plant response, enzyme action and respiration, the water-soluble pigments, ecology, hormones, experimental morphology, forestry, vernalisation and the light requirements of plants. This is by no means a complete list,—and the book is intended for the guidance of the average graduate student in the universities.

These omissions would be considered serious enough to make the title of the book a misnomer, were it not that in the first half of the work the author traces the general trend of botany down to about the middle of the nineteenth century. In the second half the treatment is subject-wise and restricted to a few selected branches: gardens, plant geography, morphology, cytology, some aspects of metabolism, mycology and plant pathology. In these later chapters the emphasis is mainly upon recent work which in places is treated in far greater depth than the average graduate student would be able to fathom. The author too often retails a series of names and dates with brief statements of the results of individual investigations many of which, however important they may be as brick and mortar for building into the structure, by no means stand out as features in the edifice of botany. This mode of treatment is excellent for the specialist and research student; for the avowed purpose of this book it is disastrous.

In a short history of the plant sciences for the use of graduate students one expects a balanced and readable story of the main lines on which progress has been achieved during the centuries down to our own day. It would, therefore, have been preferable if the style of the first half of the work had been pursued to the end, indicating in broad sweeps how the last four or five decades have diverted enquiry into unexpected channels and opened up new vistas for research, transforming almost the whole trend of botany.

The first half of the book is distinctly better planned, and interestingly written. But in two fascinating chapters on the plant lore of the ancients, where Egypt and Assyria, Greece and Rome, China and early America are all adequately treated, one looks in vain for a bare mention of ancient India which was certainly well abreast of the times and gave much that the West has assimilated, though not always gracefully acknowledged. Through centuries of experience and cultivation the Hindus had accumulated a knowledge of plants, on the whole admittedly utilitarian but, even so, unsurpassed in their day; and they based upon it a system of dietetics and medicine which has stood the test of time. What Professor Reed calls, in Chapter IV, the Retrogressive Period was, of course, retrogressive only so far as the occidental nations were concerned. During this period, as he himself says, in China herbals and monographs of distinction were written, some of them comparing favourably with those of modern times. This period saw also the extraordinary spread of Muslim influence which preserved in translations much of what ancient Greece had discovered, developed and practised pharmacy to a high state of culture, and spread this knowledge into Europe itself. At Cordova the Moors laid out, as early as the 8th century, one of the oldest botanic gardens in the world. This same period also overlapped the heyday of Hindu civilisation when the Ayurvedic system of medicine was developed, from which numerous vegetable drugs indigenous to this country have been adopted by Western practitioners for centuries past. Is it fair to call this period a retrogressive period in the history of the plant sciences?

One cannot help feeling that the book, in spite of several useful features, suffers from a lack of proportion and of that width of outlook which should mark the responsible task of the historian.

The work is remarkably free from misprints, and several of the illustrations reproduced from classical works will enhance its interest. On page 150 a sentence in para 6 has been duplicated; on page 165, line 8, "Chrisman" should be "Christman".

B. SAHNI.