REVIEW

Buchanan, R. E. and E. I. Fulmer. PHYSIOLOGY AHD BIOCHEMISTRY OF BACTERIA, Vol. I, 1-516, 1928; Vol. II, 1-710, 1930; and Vol. III, 1-575, 1930. Williams and Wilkins Company, Baltimore, U.S A.

The Literature on the life processes of micro-organisms is scattered in a large number of journals. To an investigator dealing with some phase or other of the physiological responses of these organisms, the task of hunting up all the references so as to judge adequately the work already done, is immense and when library facilities are scarce or inadequate, as it usually happens to those working in out of the way places, the value of any book which comprehensively summarises such literature is quite great.

Buchanan and Fulmer have undertaken such a task of summarising the literature on the physiology and biochemistry not only of bacteria but other related micro-organisms as well. The book is in three volumes, the first of which appeared in the summer of 1928 and the other two in June last year. While the paging in each volume is independent the chapters are continuously numbered.

The first volume has five chapters. The first chapter deals with introduction and scope of physiological bacteriology and the second with growth phases and growth rates. The seven phases in the growth of bacteria as determined by Buchanan himself are very well treated and the nomogram for the determination of generation time and velocity co-efficients for growth and death will be found useful.

The third chapter deals with chemical composition of bacterial, fungal and some algal cells, and the influence of 'bios' on their growth. The fourth chapter is the most important section of the book It deals rather extensively with Physical Chemistry. It may be asked whether it was necessary to treat physical chemistry in such detail in a book on the physiology and biochemistry of bacteria especially when there are other excellent manuals particularly written for investigators in biology. While these manuals have their relative value, it has to be admitted that in this book the particular significance of physico-chemical phenomena in relation to growth and death of micro-organisms have been specially dealt with. The physical chemistry of agglutination, the colloidal behavior of bacterial cells, and their conductivity relations have been well handled, while the treatment of the subject of hydrogen-ion concentration and oxidation-reduction potentials as related to bacterial growth and death is comprehensive and understandable. The chapter on energy relations, movements, etc., of micro-organisms concludes the volume.

The second volume treats of the effects of environment on micro-organisms. There are eight chapters, of which the first deals with recognition and measurement of the effects of environment The discussion on survivors and death curves will be found extremely interesting. Three chapters are devoted to the effect of physical environment such as temperature, rays, emanations and various other physical factors upon micro-organisms. The relation of

chemical environment such as inorganic compounds and their ions, non-nitrogenous and then nitrogenous organic compounds, and their influence on total crop yield, morphology of the cell, rate of metabolism etc. of micro organisms, are dealt with in the rest of the chapters.

The third and the last volume is devoted to the effects of micro-organisms upon environment and fermentative and other changes which they produce. Symbiosis is treated in full in the first chapter while enzymes and other catalysts produced by micro-organisms are exhaustively treated in the second. The rest of the chapters are devoted to chemical changes produced by micro-organisms in carbon compounds, in non-nitrogenous carbon compounds and then in nitrogenous carbon compounds. Among mycologists it is a routine practice to cultivate fungi on a variety of nitrogenous and non-nitrogenous carbon compounds. The *raison d'être* of such studies will become evident by a perusal of these chapters.

The book is a combined treatise on physical, colloidal, enzymatic, and biochemistry in addition to being a text on the physiology of micro-organisms. Its possession will place in the hands of investigators a valuable and a good book.

Each volume has its own bibliography, and author and subject index. The number of pages devoted to the bibliographies in the three volumes is over 275. These separate bibliographies which are repetitions in several cases and the separate author index to each volume, have considerably added to the bulk of the book and its cost of manufacture, which in Indian money is about Rs. 62 and which is beyond the slender financial resources of many an investigator.

B. B. M.

Recent Advances in Plants Physiology :—E. C. BARTON-WRIGHT, M.Sc. xii—352. 51 illustrations. J. & A. CHURCHILL, London. 1930.

Over sixteen years have elapsed since Atkin's Recent Advances in Plant Physiology was published and the intervening period has been one of great research in the plant sciences. A book like the one under review was therefore more than necessary. The author in his perface acknowledges the great advances made in plant physiology in America with its separate societies and journals, but a perusal of the work leaves an impression that sufficient attention has not been given by the author to that work or that of Russian investigators, while the investigations in the laboratories at Leeds, Cambridge, London and Dublin have received more than their due share.

The 352 pages of the book are divided into six chapters and the first is devoted to the soil and water relations of the plant. The sections are well treated, though one would have liked to see mention made of the work of Waksman on microbiological activities of the soil in relation to soil fertility and plant growth, the work of Tottingham and Shive on Physiological balance in nutrient media for plants, and Maximov's contributions to the water relations of plants. The section on antagonism could have been made a little fuller, particular attention being given to the work of Osterhout and Raber.

The second chapter is on transpiration, translocation and related phenomena. Bose's vitalistic theory of the ascent of sap is very fairly criticised, but McDougall's work on transpiration in trees could have

been also mentioned. The chapters on carbon and nitrogen assimilation are complete but why Schertz's work on Chlorophyll does not find a place is not understood. In the chapter on respiration the work of Kostychev and his associates is very briefly mentioned and the modern views on aerobiasis, anaerobiasis, oxidation-reduction potentials, and pH value do not find a place in the book.

The last chapter deals with the physiology of growth. In section on dormancy Denney's work with chemicals in relation to germination of potato and gladiolus tubers is ignored. Bottomley and Mockeridge's work on auximones is treated in detail but the work of Clark and his associates refuting it is dismissed in two or three lines. The section on heterothallism is good. The work of Kniep and Dickinson on heterothallism in smuts is mentioned but the important contributions of Buller, Stakman and Craigie on the same topic do not find a place. Hanna's paper on *Coprinus lagopus* published in a British journal is however reviewed.

Plant pathologists would have liked to see a chapter on the physiology of fungi, and physiology of disease due to fungi, as also the vast amount of work done on the biochemistry of virus diseases in U. S. A. While germination and growth of plants have received due credit, death and physiology of death and the work done in regard to it has not been reviewed. The work of Lepeschkin on protoplasm and of Small on hydrion concentration of plants could have been reviewed.

The book is well printed but a few mistakes due to the printers have crept in. On page 11, Caribou loam soil is printed as Caribon loam soil. On page 252, Subramaniam becomes Subramiam, and on page 323, Edgerton is printed as Egerton. The book on the whole is a valuable summary of the advances made in the knowledge of plant responses in recent years and it should find a place on the desk of all plant investigators.

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