The book contains many tables compiled from various sources. The data are generally given in the form of curves so that a large amount of information may be comprised in a single diagram. The clear and judicial discussion of the topics makes the book a model of its kind. Especially praiseworthy is the absence of the rash speculation so predominant in biological literature of recent years.

T. H. Morgan.

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General Physiology. By Professor Max Verworn. Translated and edited from the second edition (1897) by Professor F. S. Lee. New York, Macmillan & Co. 1899. Pp. xvi+616. 285 figures.

The subject-matter of this book is arranged in five chapters with headings as follows: The aims and methods of physiological research, living substance, elementary vital phenomena, the conditions of life, stimuli and their action, and the mechanism of life. The English edition is very happily rendered, and is characterized by an extremely small residuum of Teutonic idioms, while the privileges of the editor have been very skillfully but sparingly exercised.

The book is chiefly concerned with the cell as such and as organism, and it seems to the writer that it hardly justifies the resounding title of 'General Physiology, or the Science of Life.' It is usually unfair to pass judgment upon the nature of a work from any single paragraph which may be required in a review, but the closing sentences of the volume are fairly indicative of the author's conception of his subject. "The cell is the element of living substance. All living substance exists in cells, and all of the functions of living substance originate in the elementary vital phenomena of cells. Hence, if the task of the physiologist lies in the explanation of vital phenomena, general physiology can be only cell-physiology." These sentences are faultlessly rhetorical, but they do not exhibit an unassailable logic, at least from the point of view of the botanist, or the physiologist interested in the general properties of organisms.

The work of investigators upon the physiology and organization of the protoplasm of plants has been somewhat more uniformly developed, and the results attained have been given a wider interpretation than similar efforts in the animal world; hence the value of this volume as a reactionary protest against the minute and profitless specializations which have absorbed so much of the energy of the animal physiologist is not so apparent to the plant physiologist. The latter feels no need for a return to investigations in cell-physiology, since his researches upon all the more important activities of vegetal protoplasm have been extended to cover material of the widest range of morphological and physiological differentiation, and have been an investigation of principles rather than a study of the functions of special tissues.

Without reference to the above, the book is a very valuable and welcome addition to the library and laboratory accessories of the plant physiologist, not for what it contains about plants, for the paragraphs devoted to these organisms are teeming with errors and omissions, or are badly antiquated, but for its comprehensive treatment of the composition and elementary activities of protoplasm, and the metabolic and directive reactions to stimuli, and the sections devoted to these subjects are well executed. The historical sketch of the development and methods of physiological research, as well as the metaphysical discussions of the conditions of life properly belong here, although they do not constitute the most valuable or striking part of the book.

It appears to the reviewer that the physiological aspects of the form and size of the cell are but scantily touched upon; that the rôle and distribution of inorganic matter in the cell does not take into account the greater mass of the available information on that subject, while secretion, absorption and election of food do not receive deserved attention. The fatuous distinction of ferments into 'organized' and 'unorganized' bodies bids fair to be immortal, since it is continued here and in many other prominent texts recently issued, although yeast, the well-worn example of the 'organized ferments,' has been found to secrete definite enzymes, as is doubtless the case with all ferment organisms. It is certainly antiquated to quote Sachs to the effect that starch is the first 'visible product' of the

activity of the chlorophyllaceous cell in the sunlight. The curvature of twining stems is not thigmotaxis (p. 443). The use of the phrase 'conduction of a stimulus' to indicate the transmission of an impulse from the point of reception of the stimulus to a reaction zone is a mistake resulting from the literal translation of 'Reizleitung.' The German word 'Reiz' having a broad meaning which permits its use to designate both the stimulus and the stimulus-effect. 'Every change in the external conditions of an organism constitutes a stimulus;' but it is to be presumed that no one would mean that these changes in the intensity of external energy, rather than the shock of such change, are transmitted by nerves or other conducting mechanisms.

Perhaps the most remarkable omission in the entire work is that which occurs in the discussion of the history of death. No attention is given to the aging or senescence of cells, and there is no mention of any example of the plant cell in the histolytic processes, or metamorphic death, although this phenomenon is of such importance that all types of plants furnish dead cells from normal atrophies and degenerations, while in the higher types the greater bulk of the plant-body is made up of dead cells.

The greater number of the faults enumerated above would be due to the inaccessibility of the botanical literature to the animal physiologist, and are of such nature that they may be easily eliminated from future editions. The book has a long period of usefulness before it. It is stimulating and suggestive, and will do much to broaden investigation upon both the animal and vegetal organism; a purpose it would accomplish equally well under its proper title of 'The Physiology of the Cell.'

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GENERAL.

THE last Legislature of the State of Arkansas provided for the printing of the hitherto unpublished reports of Dr. J. C. Branner, formerly State Geologist of that State. There are five volumes of these reports, viz: (1) Coal; (2) Lower Coal Measures; (3) Clays, Kaolins and Bauxites; (4) Zinc and Lead; (5) Report on the general geology of the State. Provisions were also made for printing new editions of the reports already out.

THE sixth volume of Biological Lectures from the Wood's Holl Laboratory, in the press of Messrs. Ginn & Co., will contain:

'The Structure of Protoplasm,' E. B. Wilson.

'Cell-Lineage and Ancestral Reminiscence,' E. B. Wilson.

'Adaptation in Cleavage,' Frank R. Lillie.

'Protoplasmic Movement as a Factor of Differentiation,' Edwin G. Conklin.

'Equal and Unequal Cleavage,' A. L. Treadwell.

'Cell Origin of the Prototroch,' A. D. Mead.

'Relation of the Axis of the Embryo to the First Cleavage Plane,' Cornelia M. Clapp.

'Observations on Various Nucleolar Structures of the Cell,' Thomas H. Montgomery, Jr.

'Protoplasmic Contractility and Phosphorescence,' S. Watasé.

'Some Problems of Regeneration,' T. H. Morgan.

'The Elimination of the Unfit,' H. C. Bumpus.

'Heredity of Coloration in Fishes,' Jacques Loeb.

'Do the Reactions of Lower Animals, Due to Injury, Indicate Pain Sensations,' W. W. Norman.

'North American Ruminant-like Animals,' W. B. Scott.

'Caspar Friedrich Wolff and the Theoria Generationis,' W. M. Wheeler.

'Animal Behavior,' C. O. Whitman.

MM. GEORGES CARRÉ and C. Naud have begun the publication of a series of scientific monographs under the editorial direction of leading French men of science. MM. Appell, Cornu, d'Arsonval, Friedel, Lippmann, Moissan, Poincaré and Potter are responsible for the physical and mathematical sciences and MM. Balbiani, d'Arsonval, Filhol, Fouqué, Gaudry, Guignard, Marey and Milne-Edwards for the biological sciences. The numbers so far issued are as follows: 'Les Oscillations Électriques,' by M. Poincaré; 'La Specificite Cellulaire,' by M. Bard; 'La Sexualité,' by M. le Dantec.

SCIENTIFIC JOURNALS AND ARTICLES.

THE papers in the *American Journal of Science* for May are as follows:

'Some Experiments with Endothermic Gases,' by W. G. Mixter.

'Hypothesis to explain the partial non-explosive Combination of Explosive Gases and Gaseous Mixtures,' by W. G. Mixter.