

THURSDAY, FEBRUARY 7, 1918.

BIOLOGY FROM AMERICA.

- (1) *The Organism as a Whole, from a Physico-chemical Viewpoint.* By Dr. Jacques Loeb. Pp. x+379. (New York and London: G. P. Putnam's Sons, 1916.) Price 2.50 dollars.
- (2) *Organic Evolution. A Text-book.* By Prof. R. S. Lull. Pp. xviii+729. (New York: The Macmillan Co.; London: Macmillan and Co., Ltd., 1917.) Price 3 dollars.
- (3) *Biology.* By Prof. Gary N. Calkins. Second edition, revised and enlarged. Pp. viii+255. (New York: Henry Holt and Co., 1917.)

(1) A BOOK by Dr. Jacques Loeb is always very welcome, for he bases new ideas on new facts, and these are often surprising. The central idea of this book is not new—that organisms are “chemical machines consisting chiefly of colloidal material and possessing the peculiarity of preserving and reproducing themselves”; but many of the facts illustrating this definition are new, and many of them are the rewards of the author's own industry and ingenuity.

What are the distinctive features of a living creature from Dr. Loeb's point of view? First, there is the constant synthesis of specific material from simple compounds of a non-specific character; secondly, there is the division of the cell when it reaches a certain limit; thirdly, there is the whole business of fertilisation and subsequent development. But when these features are carefully examined in the light of modern knowledge their apartness from inanimate phenomena tends to disappear. Is anything more specific than fertilisation, yet a strange spermatozoon may be got to enter an inappropriate ovum if the surface conditions of that ovum be modified by artificially altering the chemical concentration of the medium, and the manifold ways of artificially launching a non-fertilised ovum on the voyage of development are well known.

The generic characteristics of a type seem to depend on the specificity of the proteids in the ovum-cytoplasm; and the unity of the organism in development, and afterwards, depends on the unified organisation of the ovum-cytoplasm, which contains the organism “in the rough.” On this the Mendelian factors or genes (probably hormones in the nucleus) may impress varietal or stock characters in the course of development. Very interesting is the author's suggestion that special sex-determining chromosomes may hinder or favour the formation of specific internal secretions which have developmental potency, and, on the other hand, that an environmentally induced change in these internal secretions might even counteract the chromosomal sex-determination. It need scarcely be said that, according to Dr. Loeb, there is nothing in instincts to remove them from a mechanistic category; and we are likewise assured that “the mere laws of chance are ade-

quate to account for the fact of the apparently purposeful adaptations.”

Sometimes the author seems to us impetuous, as in his acceptance, in spite of Prof. Castle's work, for instance, of the conclusion that Darwin's small fluctuating variations are not heritable. But whether one agrees or not, the book is always stimulating, and in the majority of cases the author is ready with chapter and verse, *i.e.* with facts and experiments, in support of his contention.

Perhaps the author is not responsible for the statement on the wrapper that “Darwinism had reached the conclusion that the harmonious character of the organism as well as its adaptation to the environment was the result of chance,” but he is responsible for the erection of a “bogey” vitalism, the overthrowing of which does not tax his strength. In the genus vitalism there are several species, some of which are already extinct, while others are in process of elimination, but it is not of the essence of methodological vitalism to make an antithesis between the physico-chemical and the vital, between materiality and mind. Dr. Loeb considers the organism as the seat of a concatenated and correlated series of physico-chemical operations. So do all biologists. But to methodological vitalists it seems that the physico-chemical descriptions, invaluable as they are, do not exhaust the reality before us, do not adequately describe the living, growing, developing, varying, struggling, and sometimes companionable organisms that we know. We do not speak of more general grounds for finding it impossible to believe that from a physico-chemical viewpoint one can ever envisage the organism as a whole.

It is not perhaps of great importance, but we must direct attention to the curious statement in the preface that “the book is dedicated to that group of freethinkers, including d'Alembert, Diderot, Holbach, and Voltaire, who first dared to follow the consequences of a mechanical science—incomplete as it then was—to the rules of human conduct, and who thereby laid the foundation of that spirit of tolerance, justice, and gentleness which was the hope of our civilisation until it was buried under the wave of homicidal emotion which has swept through the world.” Wave of homicidal emotion, forsooth!

(2) Prof. R. S. Lull has written a useful text-book of organic evolution, compendious but clear, and very generously illustrated. The introductory part deals with what may be called the facts of life—the variety of types, their distribution in time and space, their interrelations, and so on. The treatment of the geological succession is particularly effective. The second part is entitled “The Mechanism [rather a question-begging term] of Evolution,” and the treatment is broad-minded and eclectic. The discussion of orthogenesis and kinetogenesis is interesting, and the balance of Nature is picturesquely illustrated. The author then passes to the evidences of evolution, and, after a brief discussion of recapitula-

tion, leaves the beaten track and gives the student a delightful account of adaptations to various modes of life—such as running, burrowing, swimming, climbing, and flying—and of adaptations to various haunts—such as deserts, caves, deep sea, and inside other animals. This section extends over about 200 pages, and it is very instructive. Prof. Lull gets the student to see that every fact of life that admits of genetic interpretation is an “evidence of evolution,” and he works successfully with the idea which Osborn called “adaptive radiation,” that around many a central or focal type we may group an often-repeated series of similar solutions of the problem of livelihood.

The last section of the book is palæontological. Selecting three great lines—molluscan, arthropod, and vertebrate—Prof. Lull sketches the probable evolution of the highest class of each, namely, cephalopods, insects, and mammals. With the aid of the abundant illustrations the reader gets some feeling of the movement, both progressive and retrogressive, of the evolutionary process. No student can fail to be impressed, for instance, with the case of the nautiloid *Lituities*, which “went through the orthoceran, cyrtoceran, gyroceran, and nautilian stages, and as it became adolescent left the close coil and reverted to the orthoceran stage.”

The part of the book that deals with the evolution of vertebrates seems to us the most distinctive; the author is there dealing with subjects around which most of his own investigations have centred. He is inclined to accept Prof. Chamberlin's hypothesis of the origin of vertebrate animals in flowing land water; he traces back terrestrial forms to a probable derivation from Crossopterygian fishes earlier than the Upper Devonian; Dinosaurs arose from a primitive Cotylosaurian Carboniferous stock; birds from a stock common to them and Ornithischian Dinosaurs; mammals from reptiles like Therapsids; and man from primitive anthropoids. Without ever pretending to finality, Prof. Lull balances various theories, and the student will appreciate the methodical questioning in regard to each important type: What was the probable ancestral stock? When and where did the emergence occur? What were the probable evolutionary factors? Most characteristic of the whole treatment is the correlation of organismal and environmental changes, which, even when tentative, is full of interest and suggestion. “The stream of life pulses irregularly as it flows. There are times of quickening, the expression points of evolution which are almost invariably coincident with some great geologic change. . . . The geologic changes and the pulse of life stand to each other in the relation of cause and effect.” In any case, climatic changes and organismal evolution are correlated.

(3) We have already had an opportunity (*NATURE*, vol. xciv., 1915, p. 504) of expressing our appreciation of the first edition of the fresh and stimulating introduction to biology which Prof. Calkins has worked out. It is an eminently

educative book, and the second edition is even better than the first. Galton is still called Dalton, but that is a microscopic fly in the ointment. We mention it, however, since we directed attention to it before.

J. A. T.

SCHOOL-LIFE IN THE SEVENTEENTH CENTURY.

About Winchester College. By A. K. Cook. To which is prefixed *De Collegio Wintoniensi*, by R. Mathew. Pp. xvii+583. (London: Macmillan and Co., Ltd., 1917.) Price 18s. net.

THAT a boy should have been moved to write an account of his school, in which he enumerates the warden, masters, chaplains, clerks and organist, the seventy “children,” the sixteen “quiristers,” their gowns and other garments, the servants and their several offices, the hours of rising, meals, and lessons, and to describe the food, the games and other occupations, is difficult of explanation. That Robert Mathew's 286 hexameter lines should have been preserved is most remarkable. His picture of life at Winchester in 1647—it is a machine drawing rather than a picture—can have had no interest for his contemporaries. They were too familiar with the details which he sets forth with the pedantic accuracy of a valuer's inventory. He had no provision of their interest to posterity. Documents of this kind are extremely rare. Students of sociology may search in vain such famous chronicles as the *Mahawanso*, in which a long succession of Buddhist priests recorded, from year to year, the current history of the Sinhalese from the first establishment of their kingdom, for evidence of the ways and occupations of the people. Does the *Times* describe a man's evening dress? The uniform and obvious calls for no description.

To a student of Wykehamical customs, or of the functioning of any other academic body, Mathew's poem is of surpassing interest. It is used by Mr. Cook as a fixed point from which he surveys the college life—backwards to its foundation, forwards to the present time. Since the days when he entered as a schoolboy to his retirement from a mastership, his life has been spent in the college precincts, save for the usual interval at New College, Oxford. The book is indispensable to Wykehamists. To others, who had not the privilege of education in the “best of all schools,” it is a delightful pastime to gaze at the moving views of the social life of five passing centuries. However enthusiastic the reader may be for the Newest Education, the reflection will give him pause that boys have, apparently, made progress under a system in which all his axioms were inverted.

Even the physiologist will find himself constrained to admit that the genus *Boy* is, or was, a more adaptable creature than he supposed. To take a few illustrations out of the many to which one would like to direct attention. “Surgite” was at 5 a.m., summer or winter. Having put on gowns, breeches, and shoes, the “children” sweep their chambers and make their beds; then