ergotism, and of Denys, who performed transfusion of the blood in Paris in 1667. Descartes, who was chiefly known in other scientific connections, did some useful work on visual accommodation, and Lavoisier made a contribution to the chemistry of respiration. He spoke next of Laënnec, of Magendie, who was probably the first experimental pharmacologist; of Le Gallois, who worked on the vagus nerve; of Flourens, who first used chloroform in experiments on animals; of Claude Bernard, who studied the action of the pancreas in diabetes and worked also on the nervous system, and of Paul Bert, his pupil, who organized the teaching of natural sciences in France; of Duchenne, the originator of electrotherapy; of Broca, Charcot, Achard, Dastre, Carrel and others. The work of Pasteur was dealt with in a previous lecture. In concluding, the lecturer referred to the cordial exchange between British and French science which had been maintained for three centuries, save for the interruption of the Napoleonic wars, and said that whenever French scientists had been persecuted by religious bigots they had always found a refuge in England.—*British Medical Journal.*

SCIENTIFIC BOOKS

Medical Contributions to the Study of Evolution. By J. G. ADAMI. New York, The Macmillan Co. 1918.

Professor Adami has brought together in this volume his Croonian Lectures delivered in 1917 and a number of more or less cognate articles and addresses written or delivered at various times from 1892 onwards. The Croonian Lectures, entitled "Adaptation and Disease," form the *pièce de resistance* of the volume and present evidence drawn from bacteriological and medical sources, which, in the lecturer's opinion, indicate that variation in organisms is something "primarily acquired, proceeding from without," rather than something "primarily inherent, proceeding from within." The evidence submitted consists (1) of the effect of changed environment in producing structural or, more especially, physiological modifications in unicellular organisms, such as bacteria and (2) the effects of immunization in producing physiological modifications of organisms, shown by their increased powers of resistence. In both these classes of cases definite conditions primarily external produce definite modifications and these may therefore be regarded as acquired.

In collating data on the origin of variation from sources that are not always familiar to those whose studies lie in other fields Professor Adami has done good service, but unfortunately he combines with this a vigorous criticism of biologists in general for having failed to recognize the direct action of toxic substances on the germ cells or that of the environment on unicellular organisms. Far from being "shocked" at the suggestion of such ideas biologists have all along accepted them, even Weismann, who seems to be regarded as the *fons et origo* of "academic" biology; indeed, Professor Adami in an address of 1892, reprinted in the present volume, cites from Weismann a statement as to the effect of the environment on protozoa, which might well have been repeated in the lectures. Nor should the implication that zoologists have established a conspiracy of silence regarding Professor Gaskell's theories as to the origin of vertebrates be allowed to pass undisputed. Dr. Adami has apparently forgotten that a symposium upon these theories was held as one of the regular meetings of the Linnean Society, Professor Gaskell's work being thus accorded a recognition and an honor granted but rarely. Zoologists have been by no means unappreciative of the merits of Gaskell's observations even though they may have declined, for reasons that seemed to them sufficient, to accept his theories, and the insinuation that they acted the part of the Levite because Gaskell was a physiologist intruding in their territory is as unjust as it is incorrect.

A chapter on the significance of immunization as an example of a direct adaptation contains much that is of interest to biologists in general and this is followed by a chapter

on the inheritance of acquired conditions in the higher animals in which it is claimed that, notwithstanding Weismann to the contrary, there is distinct evidence of the inheritance of such conditions. This evidence is found in Stockard's experiments of breeding from alcoholized guinea-pigs. Here we are confronted by the resurrection of a time-worn discussion, which had its origin, to a large extent, in a failure to understand the meaning attached by Weismann and biologists in general to the terms "congenital" and "acquired." A congenital variation is for them one directly due to a modification of the constitution of the germ cell, while one that was acquired had its origin independently of the germ cell and could be supposed to affect it only secondarily and indefinitely, if at all. Stockard's cases are manifestly examples of a direct intoxication of the germ cells, whereby these were impaired, the impairment being passed on through successive generations, just as changes due to the environment may be transmitted through several generations of bacteria. These cases do not therefore bear on the question of the inheritance of acquired variations, using that expression in the Weismannian sense, but they do show most admirably the cumulative effects resulting from the conjugation in successive generations of vitiated germ cells.

Dr. Adami does not, however, direct all his energies towards the discomfiture of biologists. In the concluding chapters of the lectures he assumes a constructive rôle and outlines a theory of variation and differentiation which is worthy of serious consideration. It assumes as the structural units of the cell the complex protein molecules, each with numerous lightly linked side-chains and capable, therefore, of ready modification under changed conditions. The details of the theory can not be discussed here and those interested must be referred to the lectures and other contributions in which Professor Adami elaborates them, considering in a suggestive manner the phenomena of enzyme and hormone action and of immunity in the light of this chemico-physical hypothesis. The theory can not yet be taken as more than a suggestion, but if it can serve to diagrammatize for us other complicated phenomena as clearly as it has those of fertilization at the hands of Lillie it will become a useful working hypothesis.

The second part of the book consists for the most part of earlier articles and addresses containing the substance of the ideas that have been worked up into the Croonian Lectures, but to these some additional chapters are added, one for instance on the myelins and potential fluid crystalline bodies of the organism, another on the dominance of the nucleus (both reprints of lectures delivered twelve years ago) and another on adaptation and inflammation. The third and concluding section of the volume is entitled "Growth and Overgrowth" and is a collection of addresses and articles dealing with the causation, characteristics and classification of tumors.

J. P. McM.

SPECIAL ARTICLES

STYLONICHIA IMPALED UPON A FUNGAL FILAMENT

The following observations of the curious result of the overzealous feeding activities of a protozoon were made during July, 1918, while the writer was giving the summer session courses in zoology at the State University of New Jersey and Rutgers Scientific School. The material which furnished the organisms here described was obtained from the spray filter bed of a sewage disposal plant near Dunellen, New Jersey. The particular sample of this material in which the organisms were observed had stood over night in a test-tube and, for examination, a small amount was transferred with a pipette from the surface of the fluid in the test-tube to an ordinary microscopic slide. At the first glance through the microscope the material was seen to be swarming with *Stylonichia*, propably *S. vorax* Stokes. Upon moving the slide about, a mass of zoogloeal material was observed and from it some slender branching filaments were projecting into the surrounding fluid.