political system. But it is not on the basis of an abstract doctrine of democracy that criticism of this one-man-power system rests. The position of a college professor, and even of the younger college teachers, should be a position of dignity, independence and the fullest measure of self-respect. In most of our colleges we have fallen into the habit of elevating coordination, discipline, "harmony" in the faculty, to a position of utterly factitious importance. What is wanted is not these things—or at least a very little of them is quite sufficient—but dignity, spontaneity, independence, intellectual self-assertion. In no way could President Foster more magnify his office than by belittling it. A college faculty does not need a boss; its efficiency is neither to be attained nor to be measured by the methods that apply to a factory or a department store. If what the college needs in its professors is men who are real men and true teachers, it must not treat them as wheels in a big machine. There is a vast difference in this regard between some of our colleges and others; but there is a fine opening for a new college to show what a college can be in which the idea of personal domination by the president is wholly abandoned, and that of a company of gentlemen and scholars working together, with the president simply as the efficient center of inspiration and cooperation, substituted in its stead.—*New York Evening Post.*

SCIENTIFIC BOOKS

General Biology. A Book of Outlines and Practical Studies for the General Student. By JAMES G. NEEDHAM. Ithaca, N. Y., The Comstock Publishing Co. 1910. Pp. xiv + 542; 287 figs. Price $2.

Dr. Needham's "General Biology" is not merely a treatise on botany and zoology, as are so many books of a similar title, but it is a work whose primary aim is to teach fundamental biological facts and principles, drawing upon both plant and animal kingdoms for the material best suited for this end. In the first chapter on The Interdependence of Organisms are discussed three typical cases of the interrelation of organisms: (1) the relations between flowers and insects, (2) galls and (3) the relations between ants and aphids. There are directions to guide the student in collecting material and making observations on each of these subjects. Enough of description of the structure of plants and insects is given to enable the student to appreciate the biological relations of these organisms. This done, the study of structure is discontinued.

After this introduction to the ways of the living world the author proceeds to give the student a general notion of what the living world is. In the second chapter on The Simpler Organisms there is a brief description of several types of lower plants and animals with some suggestions for their collection and study in the laboratory. The principal forms treated are *Closterium, Spirogyra, Nitella, Amœba, Paramœcium, Stentor, Vorticella,* yeasts, molds, bacteria, slime molds, flagellates and a gregarine, in the order named, and there are sections on protoplasm, the chemical constituents of the cell, nutrition, fission and sexual reproduction.

Chapter III., on Organic Evolution, comprises about one third of the volume. It begins by continuing the general survey of the organic world begun in the previous chapter, describing an ascending series of type forms of both kingdoms. These include *Conocephalus,* a fern, and some phanerogams in plants, and *Hydra,* the earthworm and the salamander in animals, with a brief account of the embryology of the last type. This very general survey is followed by a discussion of homologies, with practical exercises for the student in tracing out homologous parts, the paleontological record, the relation of ontogeny and phylogeny, and other topics which commonly fall under the rubric of "evidences for evolution." Natural and artificial selection, orthogenesis and segregation are treated in a final section on "attempted explanations."

The various forms of reproduction, metamorphosis, regeneration and grafting are treated in a chapter on the Life Cycle. Chapter VI., on The Adjustment of Organisms to their Environment, is one of the

most original and valuable in the book, and the student who does the work outlined in it can not fail to get a much better insight into many things in the world about him. The local distribution of plants and animals is first taken up and the student is set to study plant societies and the particular habitations and habits of the animals of a restricted locality. There is a section on pond life, with directions for the study of the animals found in the pond. Then comes a discussion of symbiosis, parasitism and pollen production as affected by its mode of distribution. The third section of the chapter is devoted to the adaptations of aquatic insects—forms admirably fitted to illustrate adaptation—and a consideration of animal coloration as cryptic, warning and mimetic.

The final chapter deals with the responsive life of organisms. Beginning with the behavior of the protozoa the author proceeds to consider reflex action, the general architecture of the nervous system, instinct and the simpler modes of learning through trial and error. The last part of the chapter is concerned with the natural history of man and various human institutions—a subject which naturally can be dealt with in only the briefest way, although the discussion may serve its purpose of giving a general notion of the relation of man and human society to the rest of the animal creation.

The course of instruction which Dr. Needham's book outlines is quite different from the usual introduction to biology. Morphology is given but a subordinate place. The student is not set to work on a series of forms to acquire a foundation of knowledge whose significance may appear some time in the future; he is plunged at once into a study of biological principles and introduced to the facts upon which they are based. It is a common practise to study several type forms and use them, so far as they are adapted to the purpose, for the inculcation of matters of general biological import. Dr. Needham, on the other hand, starts with the general subject or principle to be studied and rummages through the plant and animal kingdoms for good illustrative material. There is little gathering of irrelevant information. Selecting a number of the most fundamental and significant fields in biology, he sets the student at work in them on concrete facts. "Ecological and evolutionary phenomena," the author says, "are just as available for practical studies as are morphological types," and every teacher of biology can derive many useful suggestions from the way in which the studies of these subjects are outlined.

The relatively large amount of attention devoted to field work is one of the most salient characteristics of the book, and constitutes one of its chief merits. The selection of material for study, so far as the reviewer can judge, is judiciously made, and in the hands of a teacher who knows plants and animals in their natural environment the book will doubtless prove a valuable introduction to the study of animate nature.

The book is well printed on good paper, but very poorly bound. A considerable proportion of the figures are new and the portraits of several eminent biologists add to the general attractiveness of the volume.

S. J. HOLMES

Handbuch der Vergleichenden Physiologie, herausgegeben von HANS WINTERSTEIN in Rostock. Band II. (in part). Physiologie des Stoffwechsels. Jena, Gustav Fischer. 1910.

The day has passed when the study of comparative physiology requires a defense at the hands of its devotees. If one asks, however, why so little organized progress has been made in this field in comparison with related domains, the answer is perhaps to be found in the peculiar associations under which animal physiology and zoology have developed until quite recently. Physiology was long looked upon as a science which could only be fostered successfully in connection with a medical curriculum; as a result of this the more practical ends of the applied science always forced themselves to the front and led as a natural consequence to that splendid development of the study of mammalian functions which is well known. The activities of the lower forms