lution of Plants,' one of the most suggestive and readable of recent books on the philosophical aspects of botanical science. We may see the steps in the evolution of a leading botanist in the preceding books, especially when we add to the list the one which has just appeared, and which is here to be noticed.

The author brings to the task of preparing a book for university students long experience in teaching in the high school, as well as the university, and his many explorations in new fields of botanical research add greatly to his preparation. One might say that his earlier works have been preparatory to this, and that in their preparation he was laying the foundations upon which to build this compendium of the science. He has made this a book of reference, and it is very distinctly stated that it is not a laboratory manual. We have here an indication of a recession of the tide which at one time seemed likely to sweep away everything that was not of and for the laboratory or the field. The book is thus a contribution to the discussion of the methods of teaching botany, and as such we welcome it as an omen of better things than we have had. It is an 'all-round' book, and the student who is so fortunate as to be led through it by a competent teacher will not come out of the university with one-sided notions of the subject. It should represent the 'general botany' course in the university, as distinguished from the botanical work in the college. Upon what is contained in it the student who intends to become a professional botanist or who wishes to take up particular lines of work in restricted fields may build with safety.

The book is made up of fifteen chapters, as follows: I., 'Introduction' (in which certain generalities are discussed); II., 'The Plant-body' (which is general morphology); III., 'The Plant-cell'(cytology and histology); IV., 'Classification' (really devoted to the Flagellata, Myxomycetes, Schizomycetes, Schizophyceæ and Diatoms); V., 'The Algæ'; VI., 'Fungi'; VII., 'The Archegoniatæ (Bryophyta)'; VIII. and IX., 'Pteridophyta'; X., 'Spermatophyta (Gymnosperms)'; XI., 'Angiospermæ (Monocotyledones)'; XII., 'Dicotyledones'; XIII., 'Physiology'; XIV., 'Relation to Environment'; XV., 'Geological and Geographical Distribution.' There is thus a fair balance in the treatment of the different parts of the subject.

In looking over these chapters we are particularly pleased with those on the 'Plant-cell' (III.), the 'Bryophyta' (VII.), and the 'Pteridophyta' (VIII. and IX.). Here the author is quite at home, and the treatment is with a firmer hand than elsewhere. These chapters afford him the opportunity of applying his intimate knowledge of these groups in the presentation of the matter in pedagogical as well as scientific form. It is needless to say that the whole presentation is from the standpoint of modern evolution, and at every step the student is led to see that all forms are derived from similar antecedent forms. Yet the author is cautious, and does not assume to know all of the details of the evolution of present vegetation. It is a sound, scientific book, a credit to American botanical science.

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Text-book of Zoology Treated from a Biological Standpoint. By Dr. OTTO SCHMEIL. Translated from the German by RUDOLPH ROSENSTOCK. Edited by J. T. CUNNINGHAM. London, A. and C. Black. 1901. Pp. xvi + 493.

The first impression that this book is apt to make upon the morphologically trained zoologist is that it is somewhat crude and often deals with merely trivial matters. A more careful study of the book shows that the first impression is an inadequate one. Here we have a philosophical treatise of zoology: one of the first. Thus even the morphological reader will admit now that it is becoming clear that morphology demands a physiological interpretation. And that is what the author of this book attempts to give us. As an example of the method let us take the treatment of the European wild boar (*Sus scrofa*). First, a brief statement as to dimensions and weight (how important for structure!). Next, "The wild boar prefers for its habitat swampy forest thickets, which are avoided by all other

native mammals. Hence it is hardly surprising that in the structure of its body this animal exhibits marked differences from all the other habitants of the forest." Like the elephant, it forces its way through the thickets. It is consequently equipped with (1) a conical head; (2) short, powerful legs; (3) tough skin; (4) coat of bristles; (5) deep-set eyes. It lives in the marsh. The separating toes prevent sinking; the body is kept from cooling in the water by the thick layer of fat. The bristles dry quickly so that little heat is lost. The boar is omnivorous, hence such and such teeth, hearing, sight. It burrows, hence shape of head, snout, canine teeth, muscles of neck, spinous processes of cervical vertebræ, distribution. Finally the boar has certain relations to man.

This method is followed throughout the book. It is very illuminating. The great difficulty is that in the attempt to explain everything one cannot but feel that the author sometimes resorts to explanations that are merely possible and plausible.

On the whole, however, the book is to be strongly commended to the general reader and to the consideration of the teacher of zoology in secondary schools and colleges. This is the sort of zoology that is to be preferred to pure morphology as an introduction to the science. The selection of such heavy paper and large size of pages seems unfortunate for a text-book, for, because adding to the price of the book, they must restrict its use.

C. B. Davenport.

Handbook on Sanitation. A Manual of Theoretical and Practical Sanitation. By George M. Price, M.D. New York, John Wiley & Sons; London, Chapman & Hall, Ltd. 1901. 12mo. Pp. xii+317; figs. 31. Cloth, $1.50 *net.*

The book is of four parts, 'Sanitary Science,' 'Sanitary Practice,' 'Sanitary Inspection' and 'Sanitary Law.'

Part one is stated to be a 'condensed but comprehensive résumé of the best text-books.' It is vastly too condensed to be of use to 'students and physicians.' Thus the question of 'water and water-supply' is disposed of in seven and a half pages, and nine and a half are given to 'sewage and sewage disposal.'

Carbon dioxide should not be classed as a 'virulent poison,' and the statement that carbon monoxide 'may produce death when inhaled in large amounts' does not do justice to the highly poisonous qualities of that gas.

On page 21 it is written that 'as a rule the height of a room ought to be about one third of the cubic space.'

The error of such an expression is apparent. Possibly the author had in mind the 'cube root' rather than 'one third.'

The chapters on plumbing are good and well illustrated.

Considerable information of value, such as tables of measurements, elementary mensuration, extracts from civil service rules, and tenement-house law, is included in the last half of the volume. As a whole, the book contains material useful to a certain class of inspectors, but it is an error to entitle it 'a manual of theoretical and practical sanitation.'

SCIENTIFIC JOURNALS AND ARTICLES.

The Botanical Gazette for May contains the following articles: The third and last part of the paper by Frederick C. Newcombe on 'The Rheotropism of Roots' appears, and the paper as a whole embodies important results from several years of experimentation. Mr. Newcombe's first paper upon the subject was read before the American Association in 1896. The detailed results of the numerous well-devised experiments cannot be given, but the conclusion of the whole matter may be summed up as follows: Rheotropism is an obscure phenomenon manifested in the curving of roots against a stream of water. The author finds the response not general among plants, there being but twenty sensitive species out of thirty-four tested. Velocities of flow causing a response may range from 0.1 cm. to 500 cm. per minute, though the strongest curves are formed in velocities between 100 cm. and 500 cm. per minute. A remarkable discovery was made in finding the roots sensitive not only at the apex and throughout the elongating zone, but for some distance