butterflies and Diptera the thoracic segments seem to be reduced to two, etc., when three segments are easily observed. Vestigial mandibles are attributed to the sphinx, though the structures so called have been shown by Walter not to be such.

The chapter on the Protochordata is well prepared and illustrated. Why, however, Rhabdopleura and Cephalodiscus are, without apparent hesitation, regarded as belonging in this type, should, we think, be carefully explained, the chordate features being so slight compared with those of the Enteropneusta. One also is somewhat startled to find Amphioxus included in a work on invertebrate morphology when its structure and embryology associate it so intimately with the Chordata; and why it should be regarded as a lower or more generalized type than the Tunicata we do not understand. It has been the nearly universal opinion of anatomists that the lancelet is nearer to vertebrates than are the ascidians.

The figures are mostly diagramatic, and carefully drawn, though often coarsely so. We should have preferred, in many cases, exact and not schematic representations. The figures of *Buccinum undatum*, as regards the shell, reminds us more of a Strombus; and the figure of Nautilus should have been credited to Owen; several of the figures are credited to Leunis, and not to the original author or artist. The style cannot always be said to be simple and clear; the tendency being towards the use of long words requiring close attention in the beginner. The typography is fair and there is a praiseworthy absence of typographical errors. But whatever we have said by way of criticism, we desire to commend the book as excellent in its general plan and treatment, usually reliable, and forming a useful manual of the subject.

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The Land-Birds and Game-Birds of New England. By H. D. MINOT. 2d edition, edited by William Brewster. Houghton, Mifflin & Co., April, 1895, 8°, pp. xxiv + 492, outline figures. Price, $3.50.

Eighteen years have passed since the first appearance of Minot's 'Land-Birds and Game-Birds' (published in February, 1877). It had a good sale and was soon out of print. Practically the whole book was original—the descriptions of the birds, nests and eggs, and the biographies. The latter are based on the author's own field experience and are interesting, truthful, and in the main well written.

The body of the work is followed by an appendix comprising a bird calendar for eastern Massachusetts, and keys to the Land Birds of New England and the eggs of Massachusetts birds. These keys are based primarily on color and are not likely to prove of much value.

The personality of the author deserves a word. When only a boy of seventeen he had amassed a large quantity of field notes and had written the book now under review. As the editor of the new edition says in his preface: "The author had a clear head, a true heart, and a well-defined purpose, combined with an amount of literary taste and ability very rare in one so young. He was deeply in earnest, full of warm yet reverential love of nature, wholly unconscious of or indifferent to certain conventional methods of investigation and expression, yet in the main careful in observation, temperate of statement, and singularly logical and dispassionate in argument." In his thirtieth year he was chosen President of the Eastern Railroad in Minnesota, and soon after lost his life in an accident on another road.

The new edition is accompanied by a portrait of the author and is an attractive, well-printed volume. The editor, William Brewster, tells us that his 'editorial touches have been of the lightest.' He has substi-

tuted current nomenclature for the old, and has added numerous foot-notes, always over his own initials, amplifying or correcting statements made in the body of the work, which has been allowed to stand essentially as in the original edition. Mr. Brewster has also added an appendix comprising additions to Minot's list and containing an abstract of the results of his study of the gyrfalcons—a most perplexing group. He agrees with Ridgway in the number and nomenclature of the forms, and records the authentic New England specimens of each.

It is a great compliment to the worth of Minot's book that one of the most eminent of American ornithologists, and one who could ill spare the time from his own important work, was willing to edit it.

C. H. M.

The Central Nervous System of Desmognathus fusca. By Pierre A. Fish. Reprinted from Journal of Morphology, x, 1, 1895.

Mr. Fish has made an important contribution to our knowledge of the brain of salamaders. His preliminary remarks embrace two statements of interest: (1) That the adult *Desmognathus fusca* lives equally well in the open air or wholly under water, even where no trace of lungs exists; and (2) that the mouth cavity and esophagus are lined with ciliated columnar epithelium. During arial respiration the floor of the mouth is alternately raised and lowered very rapidly, while when the animal was kept under water it was raised and held in that position a long time; the inference being that the blood is oxygenated by means of the epithelium of the mouth.

The simplicity of the amphibian brain renders it, as the author states, "a most admirable object for the study of morphological relations; its general absence of flexure, its successive segmental arrangement and the degree of exposure and differentiation of these segments, give it a great advantage over most other generalized forms." It was found to be remarkable for the large number of 'embryological' features preserved.

About 40 pages are devoted to the brain and cranial nerves, and the paper is accompanied by a bibliography and four plates. C. H. M.

Introduction to Botany. By Volney M. Spalding, Professor of Botany in the University of Michigan. Boston, D. C. Heath & Co. 1895. Pp. 287.

Professor Spalding has added to his valuable book that which was needed to make it complete, namely, a full glossary, an index, a brief chapter on the organs of flowerless plants, and a chapter on fungi. These added chapters are in keeping with the general plan of the book. The material required is briefly indicated and directions given for its care. Laboratory directions, brief notes directing the student's attention to prominent features, follow. These are extremely good, and it is hoped this feature of Spalding's method of studying plants, corresponding, as it does, with Dodge's method in biology, will be pursued by future makers of text-books, and that we have seen the last of full accounts of what is to be seen, requiring on the part of the student very little thought, and only the attention necessary for the verification of the statements. It is remarkable, when one stops to think of it, how little the inductive method is used in the study of biology. After the directions, comes a little review or summary, giving information not likely to be attained from laboratory practice. This is a very marked feature of the volume and is especially valuable because the information given is so up to date. A very slight examination of the foot-notes will reveal the fact that the very latest research work has been consulted in the preparation of this text-book.