

ideas. Bacon's aphorism, "Truth more easily comes out of error than out of confusion," may be applied to any honest attempt to express progress in knowledge by a re-adjustment of existing classifications. These words may seem to imply a disinclination to accept the views embodied in Dr. Scott's classification; they are quoted rather as an expression of gratitude for a contribution the value of which is to be measured, not by considerations of finality, but by the stimulus which it gives to wholesome criticism and to a broader survey of the facts at our disposal.

By the expansion of the "Studies," Dr. Scott has given a further incentive to students of plant evolution, and has produced a book which, in clearness of exposition, in scientific accuracy, and in soundness of judgment, it would be difficult to surpass.

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PISCINE MORPHOLOGY.

A Treatise on Zoology. Edited by Sir Ray Lankester, K.C.B., F.R.S. Part IX., Vertebrata Craniata. First Fascicle, Cyclostomes and Fishes. By E. S. Goodrich, F.R.S. Pp. xvi + 518. (London: A. and C. Black, 1909.) Price 20s. net.

BOTH the author of this book and the editor of the "Treatise on Zoology" are to be congratulated on this, the latest addition to the series. The author is dealing with a subject with which he is thoroughly familiar, and to which he has contributed a large amount of important research. The whole plan of the book is carefully conceived and carried out, and we can only regret that the necessity to keep the size of the book within certain limits has made great concentration inevitable in dealing with many parts of the subject. However, references to more than five hundred original papers afford a guide to the student who wishes to amplify Mr. Goodrich's text.

This book is less a mere compilation than are most text-books, and the personality of the author is constantly felt. One of the chief features is the great number of excellent new figures, largely semi-diagrammatic representations of dissections, showing the three dimensions of space. Readers will be deeply grateful for this, for we have all experienced the annoyance of turning up text-book after text-book in the attempt to clear up some doubtful point, and finding the same figure, taken from some time-honoured authority, reproduced in all. How little the book before us suffers from this common failing is evident when it is said that more than a hundred and fifty of the figures are of the author's own drawing.

The subject is considered from a purely morphological and evolutionary point of view, to the almost complete exclusion of the physiological side, and the references to function are extremely few. While it is necessary in a book of limited length to discriminate between what to put in and what to leave out, one feels, perhaps, that in this case the fact that organs are functional parts of living animals has been kept too much in the background.

It is natural, and also desirable, that an author should treat at most length those parts of his subject to which he himself has given most attention, even

at the expense of other portions. Here, many of the "soft-parts," for example, the nervous system, and the digestive organs receive rather scant attention. On the other hand, the supporting tissues, especially the exoskeleton and the skeleton of the median and paired fins, are admirably treated, and at considerable length.

The classification adopted differs in many respects from that found in contemporary text-books. The Pisces are divided into three great groups, the Chondrichthyes, Ostracodermi, and Osteichthyes. The Chondrichthyes include the Elasmobranchii (Selachii and Holocephali) and the extinct groups usually associated with them. The Osteichthyes are divided into two groups, the first including the Dipnoi and Coccosteomorphi, the second the Teleostomi. Useful phylogenetic trees are given at the beginning of the larger groups. In dealing with the Teleostei, use is freely made of subdivisions represented only by letters or numerals, thus saving the coining of new words—a most desirable proceeding in dealing with a provisional classification, such as that of the Teleosteans must at present be.

A few special points of minor importance call for criticism. On p. 11 we read that

"Stöhr showed that, in the Urodela, the 'vertebral region' is developed from three distinct centres—the parachordal, the mesotic cartilage of the auditory capsule, and an occipital segment resembling a vertebra."

This is a very confusing use of the terms, neither in accordance with Stöhr's original usage nor with that commonly accepted at present. Stöhr divided the post-trabecular elements of the skull into three, the "Balkenplatte," mesotic cartilage, and occipital portion, and identified the *last* of these with Huxley's parachordals. The custom now is to use the word parachordal as including all these three sections. The student will have difficulty in reconciling Mr. Goodrich's use of the term with either of the other two meanings.

On p. 116 we read, as one of the *primitive* characters of the Pisces (which group here does not include the Cyclostomes), that the pericardium may communicate with the abdominal coelome. In view of the fact that this communication in Elasmobranchs is formed secondarily in ontogeny after the two cavities have been completely separated from each other, it would have been better not to have included it in the list of characters "considered primitive" without a qualifying note.

"Occipital" (p. 239) hardly seems a happy name for the large dermal bone of the Dipnoi (Wiedersheim's fronto-parietal), which, indeed, roofs in the whole cranium in the Dipneumona.

Considering the book as a whole, we may say confidently that, in spite of the number of excellent text-books already available, Mr. Goodrich's work will be extremely welcome to the student of vertebrate morphology, as being both a trustworthy source of general information on the subject and in many points an epitome of recent research by one who has himself taken a most important part in it.

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