

"Given a brave, fearless soldier marching with an army through a certain country for conquest and pleasure, it seems that the same stories must be told of his progress and exploits, whether he be Etana, Gilgamish, Nimrod, or Alexander. With the advance of time the first tolerably accurate descriptions of his life will be first distorted and then enlarged, and when he has become a mere memory his name will be made a peg on which to hang stories, legends, and myths. The details of the fabulous history of such an one will be modified to suit the country and ideas of the people among whom the writers live, and eventually it will become the popular expression of the national views of each country through which the history passes of what a hero should be. This is exactly what has happened to the Alexander story in the hands of Semitic and other writers. The Egyptians made Alexander the son of an Egyptian king, and a worshipper of Amen; the Greeks made him the type of the victorious Greek conqueror; the Persians made him a Persian; the Arabs made him a servant of Allah; the Syrians made him a Christian; and the Ethiopians depicted him as a believer in the Trinity and in the Christian doctrine of the resurrection of the dead."

FISHES, LIVING AND FOSSIL.

Fishes, Living and Fossil: an Outline of their Forms and Probable Relationships. By Bashford Dean, Ph.D.

Pp. xiv + 300. (New York and London: Macmillan and Co., 1895.)

DR. BASHFORD DEAN is known to zoologists, first, as the author of exhaustive and critical articles in the publications of the United States Fish Commission, on the systems of oyster culture pursued in Europe, and, secondly, as an embryologist who has lately been doing good work on the development of various Ganoid fishes and the comparison that may be instituted with Teleostei. His recent addition to the well-known "Columbia University Biological Series," now being brought out by Macmillan and Co., under the editorship of Prof. H. F. Osborn, is an interesting volume upon fishes, in which considerable prominence is given to the fossil forms, and the whole subject is presented to us from the point of view of the evolutionist. This is the characteristic feature of the book. From the very first page of the introduction to the last page in the volume, preceding the index, which is a table of the supposed descent of the groups of fishes, the book is full of the spirit and the language of evolution.

The fossil forms are introduced in their places amongst the living members of their group, and the plan of treatment of the groups in each chapter may be exemplified by No. vi., dealing with the Dipnoi, where we have first a short account of the lung-fishes, then the description of their structural characters, with an account of the fossil and of the living forms, and finally a discussion of their phylogeny and relationships with other groups. The figures in all parts are numerous and good, and many of them original.

The classification adopted is in the main that of Smith Woodward, in which the class Pisces excludes the Marsipobranchii (not that these are excluded from the book), and includes as sub-classes the Elasmobranchii, the Holocephali, the Dipnoi, and the Teleostomi. Our author considers then the Chimæroids as a distinct group

equivalent to Elasmobranchii and Dipnoi, but adds: "The kinships of the Chimæroids seem unquestionably nearer the stem of the sharks than that of other fishes." He considers that the lung-fishes (Dipnoi) as a group "may not unreasonably be looked upon as descended from the primitive Elasmobranch stem." They are "an advancing phylum from which the amphibians may early have diverged." The remarkable fossil *Arthrodira* (*Coccosteus*, &c.), he follows Smith Woodward in considering provisionally as an order of extinct and highly-specialised lung fishes. A fine figure of the head of the giant predatory member of the group *Dinichthys intermedius*, one-tenth of the natural size, forms the frontispiece. These forms are now dissociated from *Pterichthys* and other lowly Ostracoderms, and also from the Siluroids, with which at various times they have been compared, and are united with the Dipnoi. The author believes, however, that the Arthrodirans may almost as well be referred to the sharks as to the lung-fishes, and that they may, perhaps, ultimately come to be regarded as worthy to rank as a distinct class. Dr. Dean builds his phylogeny largely on the solid basis of Palæontology.

After the systemic part of the book comes a chapter on development, in which, in addition to general remarks on eggs and breeding habits, a brief but adequate account is given of the embryonic and larval development of the five types—Lamprey, Shark, Lung-fish, Ganoid, and Teleost, with the view of contrasting the groups of fishes. This section includes a summary of Semon's observations on *Ceratodus*, and is illustrated by useful figures.

Throughout, structure is treated largely from the developmental point of view, which adds to the value, interest and freshness of the book. The author sums up against Gegenbaur's archipterygium, and in favour of the derivation of paired fins from lateral fin-folds. This view is supported by the simple condition of the pectoral and pelvic fins in the ancient fossil shark *Cladoseleache*, the knowledge of whose archaic characters we owe to Dr. Dean himself. The vexed question of the precise function of the sense organs of the lateral line is still left undetermined. Beyond "feeling," in a broad sense, the author merely suggests "the sensory tracts along the sides of the body are certainly well situated to determine the direction of the approach of friend, enemy or prey." It is interesting—even if one can scarcely help feeling slightly disappointed—to read that: "It must for the present be concluded that the pineal structures of the true fishes do not tend to confirm the theory that the epiphysis of the ancestral vertebrates was connected with a median unpaired eye." He considers rather that the epiphysis was connected with the innervation of the sensory canals of the head.

At the end of the book we find a list of derivations of names, a good bibliography classified under groups and systems of organs, and, lastly, a series of tables giving in contrast form a statement of the comparative anatomy and embryology of the different groups of fishes, illustrated, like the rest of the work, by a series of clear figures drawn from the best sources, and many of them original. No doubt specialists on fossil fishes will be able to find defects and omissions, but for the ordinary student of the subject Bashford Dean's volume will prove useful and interesting.

W. A. H.