

Columbia University Biological Series.

EDITED BY

HENRY FAIRFIELD OSBORN,

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AND

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This series is founded upon a course of popular University lectures given during the winter of 1892-3, in connection with the opening of the new department of Biology in Columbia College. The lectures are in a measure consecutive in character, illustrating phases in the discovery and application of the theory of Evolution. Thus the first course outlined the development of the Descent theory; the second, the application of this theory to the problem of the ancestry of the Vertebrates, largely based upon embryological data; the third, the application of the Descent theory to the interpretation of the structure and phylogeny of the Fishes or lowest Vertebrates, chiefly based upon comparative anatomy; the fourth, upon the problems of individual development and Inheritance, chiefly based upon the structure and functions of the cell.

Since their original delivery the lectures have been carefully rewritten and illustrated so as to adapt them to the use of College and University students and of general readers. The volumes as at present arranged for include:

- I. From the Greeks to Darwin.** By HENRY FAIRFIELD OSBORN.
 - II. Amphioxus and the Ancestry of the Vertebrates.**
By ARTHUR WILLEY.
 - III. Fishes, Living and Fossil.** By BASHFORD DEAN.
 - IV. The Cell in Development and Inheritance.** By EDMUND B. WILSON.
 - V. The Foundations of Zoology.** By WILLIAM KEITH BROOKS.
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THE MACMILLAN COMPANY,
66 FIFTH AVENUE, NEW YORK.

I. FROM THE GREEKS TO DARWIN.

THE DEVELOPMENT OF THE EVOLUTION IDEA.

BY

HENRY FAIRFIELD OSBORN, Sc.D., PRINCETON,

De Costa Professor of Zoology in Columbia University.

8vo. Cloth. \$2.00, net.

This opening volume, "From the Greeks to Darwin," is an outline of the development from the earliest times of the idea of the origin of life by evolution. It brings together in a continuous treatment the progress of this idea from the Greek philosopher Thales (640 B.C.) to Darwin and Wallace. It is based partly upon critical studies of the original authorities, partly upon the studies of Zeller, Perrier, Quatrefages, Martin, and other writers less known to English readers.

This history differs from the outlines which have been previously published, in attempting to establish a complete continuity of thought in the growth of the various elements in the Evolution idea, and especially in the more critical and exact study of the pre-Darwinian writers, such as Buffon, Goethe, Erasmus Darwin, Treviranus, Lamarck, and St. Hilaire, about whose actual share in the establishment of the Evolution theory vague ideas are still current.

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- I. THE ANTICIPATION AND INTERPRETATION OF NATURE.
- II. AMONG THE GREEKS.
- III. THE THEOLOGIANS AND NATURAL PHILOSOPHERS.
- IV. THE EVOLUTIONISTS OF THE EIGHTEENTH CENTURY.
- V. FROM LAMARCK TO ST. HILAIRE.
- VI. THE FIRST HALF-CENTURY AND DARWIN.

In the opening chapter the elements and environment of the Evolution idea are discussed, and in the second chapter the remarkable parallelism between the growth of this idea in Greece and in modern times is pointed out. In the succeeding chapters the various periods of European thought on the subject are covered, concluding with the first half of the present century, especially with the development of the Evolution idea in the mind of Darwin.

II. AMPHIOXUS AND THE ANCESTRY OF THE VERTEBRATES.

BY

ARTHUR WILLEY, B.Sc. LOND.,

*Tutor in Biology, Columbia University; Balfour Student of the
University of Cambridge.*

8vo. Cloth. \$2.50, net.

The purpose of this volume is to consider the problem of the ancestry of the Vertebrates from the standpoint of the anatomy and development of Amphioxus and other members of the group Protochordata. The work opens with an Introduction, in which is given a brief historical sketch of the speculations of the celebrated anatomists and embryologists, from Étienne Geoffroy St. Hilaire down to our own day, upon this problem. The remainder of the first and the whole of the second chapter is devoted to a detailed account of the anatomy of Amphioxus as compared with that of higher Vertebrates. The third chapter deals with the embryonic and larval development of Amphioxus, while the fourth deals more briefly with the anatomy, embryology, and relationships of the Ascidians; then the other allied forms, Balanoglossus, Cephalodiscus, are described.

The work concludes with a series of discussions touching the problem proposed in the Introduction, in which it is attempted to define certain general principles of Evolution by which the descent of the Vertebrates from Invertebrate ancestors may be supposed to have taken place.

The work contains an extensive bibliography, full notes, and 135 illustrations.

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INTRODUCTION.

CHAPTER I. ANATOMY OF AMPHIOXUS.

II. Ditto.

III. DEVELOPMENT OF AMPHIOXUS.

IV. THE ASCIDIANS.

V. THE PROTOCHORDATA IN THEIR RELATION TO THE PROBLEM OF VERTEBRATE DESCENT.

III. FISHES, LIVING AND FOSSIL.

AN INTRODUCTORY STUDY.

BY

BASHFORD DEAN, PH.D., COLUMBIA,

Instructor in Biology, Columbia University.

8vo. Cloth. \$2.50, net.

This work has been prepared to meet the needs of the general student for a concise knowledge of the Fishes. It contains a review of the four larger groups of the strictly fishlike forms, Sharks, Chimaeroids, Teleostomes, and the Dipnoans, and adds to this a chapter on the Lampreys. It presents in figures the prominent members, living and fossil, of each group; illustrates characteristic structures; adds notes upon the important phases of development, and formulates the views of investigators as to relationships and descent.

The recent contributions to the knowledge of extinct Fishes are taken into special account in the treatment of the entire subject, and restorations have been attempted, as of *Dinichthys*, *Ctenodus*, and *Cladoselache*.

The writer has also indicated diagrammatically, as far as generally accepted, the genetic relationships of fossil and living forms.

The aim of the book has been mainly to furnish the student with a well-marked ground-plan of Ichthyology, to enable him to better understand special works, such as those of Smith Woodward and Günther. The work is fully illustrated, mainly from the writer's original pen-drawings.

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CHAPTER

- I. FISHES. Their Essential Characters. Sharks, Chimaeroids, Teleostomes, and Lung-fishes. Their Appearance in Time and their Distribution.
- II. THE LAMPREYS. Their Position with Reference to Fishes. *Bdelostoma*, *Myxine*, *Petromyzon*, *Palaeospondylus*.
- III. THE SHARK GROUP. Anatomical Characters. Its Extinct Members, *Acauthodian*, *Cladoselachid*, *Xenacanthid*, *Cestraciants*.
- IV. CHIMAERIDS. Structures of *Callorhynchus* and *Chimaera*. *Squaloraja* and *Myriacanthus*. Life-habits and Probable Relationships.
- V. TELEOSTOMES. The Forms of Recent "Ganoids." Habits and Distribution. The Relations of Prominent Extinct Forms. *Crossopterygians*. Typical "Bony Fishes."
- VI. THE EVOLUTION OF THE GROUPS OF FISHES. Aquatic Metamerism. Numerical Lines. Evolution of Gill-cleft Characters, Paired and Unpaired Fins, Aquatic Sense-organs.
- VII. THE DEVELOPMENT OF FISHES. Prominent Features in Embryonic and Larval Development of Members of each Group. Summaries.

V. The Foundations of Zoölogy

By **WILLIAM KEITH BROOKS,**

Professor of Zoölogy, Johns Hopkins University.

8vo. Cloth. Price \$2.50 net.

EXTRACT FROM PREFACE.

"I shall try to show that life is response to the order of nature; in fact, this thesis is the text of most of the lectures: but if it be admitted, it follows that biology is the study of response, and that the study of that order of nature to which response is made is as well within its province as the study of the living organism which responds, for all the knowledge we can get of both these aspects of nature is needed as a preparation for the study of that relation between them which constitutes life. Our interest in all branches of science is vital interest. It is only as living things that we care to know. Life is that which, when joined to mind, is knowledge,—knowledge in use; and we may be sure that all living things with minds like ours are conscious of some part of the order of nature, for the response in which life consists is response to this order. The statement that physical phenomena are natural seems to mean little, but the phenomena of life are so wonderful that many hesitate, even at the present day, to believe that nature can be such a wonderful thing as it must be if the actions of all living things are natural; and, as I shall try to find out in this course of lectures what we mean by the assertion that living nature is natural, I shall now attempt, by a few illustrations, to give a broad outline of some of the most notable features of the nature of living things."

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II. Huxley and the Problem of the Naturalist.	IX. Natural Selection and the Antiquity of Life.
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