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BIOLOGY AND ITS MAKERS

With Portraits and Other Illustrations

BY
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To
MY GRADUATE STUDENTS
Who have worked by my side in the Laboratory
Inspired by the belief that those who seek shall find
This account of the findings of some of
The great men of biological science
Is dedicated by
THE AUTHOR

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PREFACE

The writer is annually in receipt of letters from students, teachers, ministers, medical men, and others, asking for information on topics in general biology, and for references to the best reading on that subject. The increasing frequency of such inquiries, and the wide range of topics covered, have created the impression that an untechnical account of the rise and progress of biology would be of interest to a considerable audience. As might be surmised, the references most commonly asked for are those relating to different phases of the Evolution Theory; but the fact is usually overlooked by the inquirers that some knowledge of other features of biological research is essential even to an intelligent comprehension of that theory.

In this sketch I have attempted to bring under one view the broad features of biological progress, and to increase the human interest by writing the story around the lives of the great Leaders. The practical execution of the task resolved itself largely into the question of what to omit. The number of detailed researches upon which progress in biology rests made rigid selection necessary, and the difficulties of separating the essential from the less important, and of distinguishing between men of temporary notoriety and those of enduring fame, have given rise to no small perplexities.

The aim has been kept in mind to give a picture sufficiently diagrammatic not to confuse the general reader, and it is hoped that the omissions which have seemed necessary will, in a measure, be compensated for by the clearness of the picture. References to selected books and articles have

been given at the close of the volume, that will enable readers who wish fuller information to go to the best sources.

The book is divided into two sections. In the first are considered the sources of the ideas—except those of organic evolution—that dominate biology, and the steps by which they have been molded into a unified science. The Doctrine of Organic Evolution, on account of its importance, is reserved for special consideration in the second section. This is, of course, merely a division of convenience, since after its acceptance the doctrine of evolution has entered into all phases of biological progress.

The portraits with which the text is illustrated embrace those of nearly all the founders of biology. Some of the rarer ones are unfamiliar even to biologists, and have been discovered only after long search in the libraries of Europe and America.

An orderly account of the rise of biology can hardly fail to be of service to the class of inquirers mentioned in the opening paragraph. It is hoped that this sketch will also meet some of the needs of the increasing body of students who are doing practical work in biological laboratories. It is important that such students, in addition to the usual classroom instruction, should get a perspective view of the way in which biological science has come into its present form.

The chief purpose of the book will have been met if I have succeeded in indicating the sources of biological ideas and the main currents along which they have advanced, and if I have succeeded, furthermore, in making readers acquainted with those men of noble purpose whose work has created the epochs of biological history, and in showing that there has been continuity of development in biological thought.

Of biologists who may examine this work with a critical purpose, I beg that they will think of it merely as an outline

sketch which does not pretend to give a complete history of biological thought. The story has been developed almost entirely from the side of animal life; not that the botanical side has been underestimated, but that the story can be told from either side, and my first-hand acquaintance with botanical investigation is not sufficient to justify an attempt to estimate its particular achievements.

The writer is keenly aware of the many imperfections in the book. It is inevitable that biologists with interests in special fields will miss familiar names and the mention of special pieces of notable work, but I am drawn to think that such omissions will be viewed leniently, by the consideration that those best able to judge the shortcomings of this sketch will also best understand the difficulties involved.

The author wishes to acknowledge his indebtedness to several publishing houses and to individuals for permission to copy cuts and for assistance in obtaining portraits. He takes this opportunity to express his best thanks for these courtesies. The parties referred to are the director of the American Museum of Natural History; D. Appleton & Co.; P. Blakiston's Sons & Co.; The Macmillan Company; The Open Court Publishing Company; the editor of the *Popular Science Monthly*; Charles Scribner's Sons; Professors Bateson, of Cambridge, England; Conklin, of Philadelphia; Joubin, of Rennes, France; Nierstrasz, of Utrecht, Holland; Newcombe, of Ann Arbor, Michigan; Wheeler and E. B. Wilson, of New York City. The editor of the *Popular Science Monthly* has also given permission to reprint the substance of Chapters IV and X, which originally appeared in that publication.

W. A. L.

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