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JOHN JAMES AUDUBON
1785-1851
From a portrait in oil by George P. A. Healy, London, 1838.
Courtesy of Mr. Ruthven Deane.

BIOLOGY IN AMERICA

R. T. YOUNG

WITH MORE THAN
TWO HUNDRED ILLUSTRATIONS

BOSTON
RICHARD G. BADGER
THE GORHAM PRESS

Made in the United States of America

Press of J. J. Little and Ives Company, New York, U. S. A.

To
THE MEMORY OF
MY MOTHER

PREFACE

To the "man in the street" the biologist, with his "bugs" or his "germs," frequently appears as a harmless but equally useless individual. Thus in an issue of the "New Republic," shortly after America's entrance into the world war, a serio-comic writer in criticizing the action of President Wilson in appointing a committee on national preparedness from the National Academy of Sciences says, "I doubt if any other nation ever responded to the prospect of war with a scheme of national defense which included a Committee on Zoölogy and Animal Morphology."

What excuse then has the biologist for his existence? What can he say for the "truth that is in him"?

When half a century ago the Austrian monk, Gregor Mendel, was "puttering" over his sweet peas in the garden of the monastery at Brünn in the Tyrol, the world took small notice of his work, little realizing that he was laying the foundation stones of a science which was to place animal and plant breeding on a scientific basis, and teach us how to build a better race of man himself. When the English army surgeon Ross in India in 1898 was studying a microscopic organism in the blood of the owl, he could not foresee that his work would in a few years' time virtually abolish malaria in Ismailia on the Suez Canal, where in 1902 there were 1548 cases in a population of about 6,000; that it would render possible the building of the Panama Canal, and convert Havana into a health resort.

Of what particular practical importance was Harrison's discovery that a bit of nerve cord transferred from a tadpole to a drop of frog's lymph would develop nerve fibres there? Yet Harrison's method of making that discovery has opened to science an entirely new field in the study of tissue growth, both benign and malignant, has enabled us to observe the growth of the cancer cell, and determine some of the conditions of that growth, and may some day lead us to a solution of the cancer problem.

When a fish embryo is developed in a solution of magnesium chloride it gives rise to various malformations, most conspicuous of which is the "cyclopean eye." Of what possible value to a workaday world is such a discovery? Very little in

itself. But if the young fish can be distorted into all sorts of monstrous shapes by chemical treatment, why may not the monstrosities observed in man, some of which are not necessarily fatal, but which entail on their victims sorrow and suffering, be due to a similar cause? And may not the discovery of the cause lead to its control?

But the primary aim of science is not utilitarianism. Were this so, it would still be wearing rompers instead of seven league boots. It is a commonplace to say that the aim of science is truth, regardless of what practical value such truth may have. But the "man in the street" frequently fails to realize the connection between purpose and accomplishment in science. Perhaps never has this relation been made more clear than in the recent war. The German Government, recognizing the value of science for its own sake, encouraged it with every means in its power, and the German university became a Mecca for scientific students throughout the world. England, on the contrary, was more interested in developing good cricketers and diplomatists than in training scientists, and when war came upon her "like a thief in the night" she found herself under a well-nigh fatal handicap.

It was farseeing statesmanship which led President Wilson to call for a council of national defense from the National Academy of Sciences on America's entrance into the war. It would have been still farther sighted had this council been established long years ago.

American biology, with the lusty vigor of youth, has advanced by leaps and bounds in recent years; and today a wonderful future opens before it. From the days when the early naturalists went hand in hand with the pioneer into the depths of our great forests, crossed the boundless prairie and pierced the trackless labyrinth of mountain peak and canyon, to the present, when the names of American biologists stand throughout the world as synonyms of biological progress, their record is one of which our nation and the world may well be proud.

It is in the hope of recording, in some small measure, the story of this progress that this book is written. Most of the facts herein recorded have already appeared in the many books dealing with the biological problems of the last few years, but nowhere, so far as I know, has a brief, comprehensive and simple story of the work of American biologists been told. It is in the hope of presenting such a story that this work has been undertaken. To give a comprehensive as well as simple account of so complex a field as biology is, however, far from easy. A full account of so wide a field would require many volumes, but I shall attempt to touch only

upon the more salient points. The avoidance of technical terms is in many cases impossible, but I have endeavored to reduce them to a minimum.

It is of course impossible in such a story to avoid referring to the work of biologists in other lands. Nor is it desirable. Science is not bounded by political and racial lines, and the work of American biologists can only be appreciated in the light of what their colleagues in other lands have been doing. The book is, however, a record of American biology, so that reference to the work of other biologists will be only incidental to the main trend of the story.

A zoölogist should perhaps apologize for the title, since the main emphasis will naturally fall on that branch of biology with which he is most familiar. The great principles of life, however, apply equally to plants and animals, and even though the examples which illustrate these principles have been drawn mainly from the animal world, nevertheless the title will be justified if the discoveries recorded are those which in the main illustrate the laws which govern plants and animals alike.

The writer is indebted to numerous sources for the illustrations and quotations found in this book. Due acknowledgment for each is made in connection with it.

To his wife, Ellen F. P. Young, and sister, Mary Farrar, grateful acknowledgment is due for assistance with the proof and index.

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