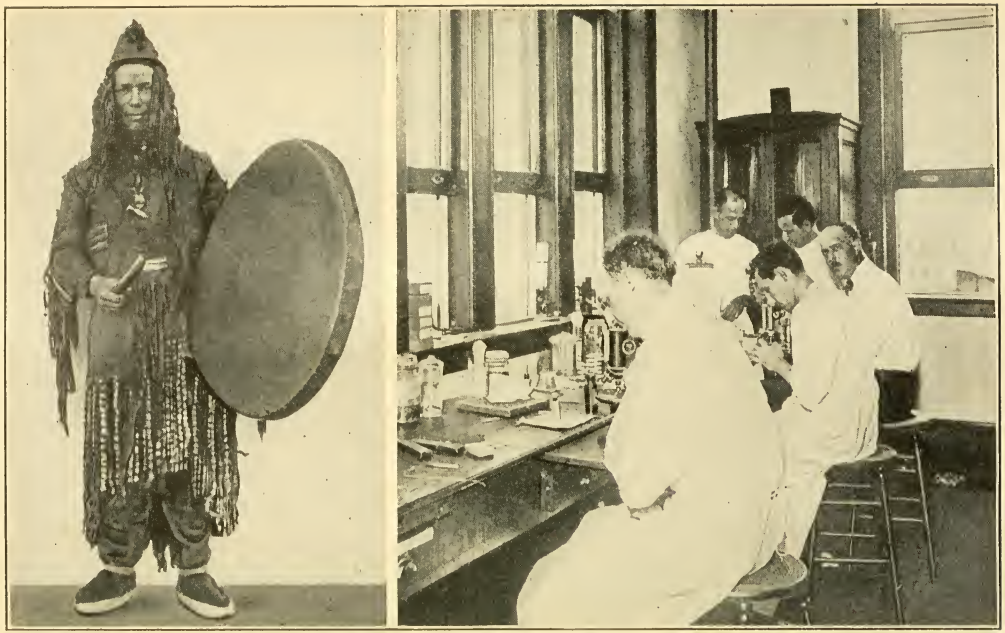
BIOLOGY AND HUMAN LIFE

GRUENBERG



Two ways of dealing with sickness

A Shaman, or medicine man, of the Yukaghir tribe in northern Siberia healing the sick by driving out devils with appropriate noises. In contrast with this, scientists in a laboratory in New Orleans searching for bacteria of plague with the help of microscopes. (Courtesy of the American Museum of Natural History)

BIOLOGY AND HUMAN LIFE

BY

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PREFACE

The report of the National Education Association committee on the "Reorganization of Science in Secondary Schools" lays down the principle of a synthetic treatment of biology. In some quarters the change appears to have gone no farther than the substitution of "plant biology" for botany, "animal biology" for zoölogy, and so on. The present book assumes that the tendency toward a unified treatment of more comprehensive principles, which is paralleled in other departments of instruction, represents the most fruitful adjustment of schooling to the rapidly growing body of scientific knowledge.

It takes account further of another tendency in our current life, namely, the rapid extension of secondary-school opportunities to new population groups. The high schools now receive increasing numbers of boys and girls whose interests and aspirations are radically different from those of earlier generations of pupils. The high school is no longer primarily or chiefly a college-preparatory institution. More and more of our students are concerned with the concrete and the practical rather than with the abstract and theoretical. Boys and girls who look forward to an early entrance upon occupational activities and the responsibilities of earning and spending money have as much need for the study of biology as have those who plan to go to college or the professional schools. Even among these last there are very many for whom the subject can be most interestingly and most profitably developed in terms of our everyday affairs rather than in terms of academic analysis.

The division of this book into three main parts ("Getting Acquainted with Life," "Biology of Health," and "Biology of Wealth") is intended to emphasize applications of science to human affairs, and at the same time to suggest that we have to get knowledge before we can apply it. Each chapter is preceded

by a few questions that are designed to represent the pupil's point of view. The questions at the ends of the chapters, together with the outlines and summaries, represent rather the teacher's point of view; they do not call for a mere reproduction of the matter in the text, but are intended to stimulate the pupil to resurvey the subject matter, to reorganize it, and to reorient it for himself. The organization of the text, the questions, and the outlines carry for the teacher implicit suggestions as to what procedure will best furnish the concrete observation, experimentation, demonstration, etc. needed for an understanding of the ideas treated; and for the pupils they carry something more than explicit suggestions as to the meaning of reliable method in the solving of various problems. The reference readings are mostly from materials readily obtained from government agencies.

The text has been carefully checked against Thorndike's word list for ninth-grade pupils. New words that do not have their meanings revealed by the context are defined, and the Index will serve as a pronouncing vocabulary as well as a reference to definitions or explanations. Many of the illustrations are taken from the author's "Elementary Biology," some of them with slight modifications; many, however, have been made especially for this book, and some are for the first time made accessible to high-school teachers and pupils, such as the Ancon type of sheep mutation and the arterial system of the arm as shown by the X rays. Acknowledgment for photographs and other materials is made in connection with the several illustrations, but the author wishes here to express his deep appreciation of the splendid coöperation received from the various scientists and institutions, as well as for the patient efforts of the artists who have assisted in developing many of the special drawings—Mr. F. Schuyler Mathews, Mr. Frank M. Wheat, Miss Marcelle Roigneau, and Mr. Carl A. Schwarze.

B.C.G.

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While the organization of the text is believed to be both logical and pedagogical the teacher will find no difficulty in departing from it as desired; we have long recognized that both in the development of our subject and in the assignment of lessons it is unnecessary to go from page to page through a textbook. Moreover, since it is necessary to base the pupil's study of his textbook upon concrete observations and experiences, the use of the book must be to some extent influenced by the material available from time to time.

The questions preceding the chapters offer suggestions for individual and joint projects of various kinds. Although they often take the form of a challenge to the teacher, we should proceed with our work on the assumption that we and our pupils are equally interested in discovering what is true and important. Where individuals can give us reliable and authoritative answers, the class, including the teacher, should be glad to receive them, although each individual, including the teacher, may reserve the right to ask the informant, "How do you know?" Often we shall find that the best knowledge we have is a more or less workable hypothesis; often we shall find that knowledge is still to be dug out of resistant reality; and at other times we shall find that the questions are not real questions at all, being based on assumptions contrary to fact.

When we come to the questions at the ends of the chapters, we may treat them frankly as teacher's questions. Yet these are all offered without prejudice; that is to say, they are offered without intent to impose any doctrine. Where we ask about the advantage of a process or a procedure, we must be ready to consider also the disadvantage; where we ask, in comparing, for similarities, we must consider also differences; and so on.

Many of the questions assume that the teacher and pupils have actually seen, handled, experimented with, tested, smelled, and taken apart or put together; they can be answered, if at all, only as a result of field or laboratory or museum study. In other cases the replies to questions must be in the form of inferences calling for further testing or verification. There are also suggestions for civic studies in terms of what is actually being done in the community—how we obtain our means of livelihood, how we manage our joint affairs, how we meet our common enemies. It is not to be expected that every pupil will obtain an acceptable answer for every question. On the other hand, many of the questions are of a type that permits endless variation in terms of local conditions or matters of current importance; it may not be sufficient, then, if the pupils can answer only the questions given. At best the questions are to be used as stimuli for thought and investigation.

The outlines, or summaries, at the ends of the chapters, often in combination with the questions, are intended to assist in the organization of ideas. They should show relationships of topics to one another within the subject of the lesson, but they should also suggest relationships between these topics and others previously studied, as well as others not yet touched upon. In other words, while a useful summary or outline must answer questions that arise in the course of the study, it should also raise new questions: there are no periods in these outlines.

Most of the reference readings are to government publications of various kinds. It would be well for each school to obtain from the Superintendent of Documents, Government Printing Office, Washington, D. C., a list of the price lists. From this list the various price lists can be ordered, and from these price lists we can learn what pamphlets and books are available. Every teacher should acquaint himself with the more important types of government publications and with the methods of obtaining them for the school with the least cost or effort. In many cases documents can be obtained with the coöperation of the congressman. Besides the pamphlets in the various price

lists, you should get, through your congressman, the yearbooks of the Department of Agriculture, the annual reports of the Surgeon-General of the Public Health Service, and the annual reports of the Smithsonian Institution. State agricultural experiment stations, state and local boards of health, state and other museums, and the larger insurance companies also issue publications of value to the students of biology. Several of the larger voluntary health organizations have in recent years come to coöperate in some of their administrative problems, and can all be reached at one address—370 Seventh Avenue, New York. Most of the following organizations have available literature of value in the teaching of biology: the American Child Health Association; American Heart Association; American Social Hygiene Association; American Society for the Control of Cancer; National Committee for Mental Hygiene; National Tuberculosis Association; American Association for Medical Progress; American Committee for the Prevention of Blindness. Some of the most helpful material is to be found in current magazines and newspapers, and pupils should be encouraged to find both problems and applications in the current record of the human life about them.

The classification of plants and animals appeals to individuals here and there, but we cannot afford to give it too much time as a branch of biology. Yet it is worth while to indicate briefly both the methods and principles of classification, and the practical uses of careful description and naming. The material in the text, it must be clearly understood, is not something to be learned, but a convenient scheme of reference. Every plant or animal that comes to the attention of the class should be placed within its phylum, or class, or order, as conditions permit; but no attempt should be made to get the pupils to memorize the definitions of the various groupings. With frequent reference to the scheme, however, it is certain that most children will get all they need of taxonomy.

There are no separate chapters on the chemical processes often presented in elementary studies as fundamental to phys-