ZOÖLOGY, DESCRIPTIVE AND PRACTICAL, PART II. PRACTICAL

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Zoölogy, Descriptive and Practical, Part II. Practical by Buel P. Colton

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Trieste

ZOÖLOGY

DESCRIPTIVE AND PRACTICAL

BY

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Part II

PRACTICAL

BOSTON, U.S.A.
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"If you study Nature indoors, when you go outdoors you cannot find her." — *Agassiz.*

"He is a good naturalist who knows his own parish thoroughly." — *Kingsley.*

PREFACE.

THE principal change from the earlier edition consists in the addition of directions for field study and for the laboratory study of the live animals. In the nature of the work these directions must be somewhat general, and should be modified by the teacher to suit local conditions and the requirements of the class. Because of the fact that conditions greatly vary in different localities, it is not to be supposed that each teacher can accomplish all the work here outlined. It is hoped that there is variety enough to suit most localities. Other types may often serve the purpose better than these here presented. The work must also be adapted to the age and experience of the students and to the time allotted to the subject. The author's reasons for the order of study here presented are given in the preface of the descriptive part of the book.

For convenience, the practical part follows the descriptive text, but, of course, the actual study of the types should precede any assigned lesson or reading in reference books.

The "Suggestions to the Student" have been entirely rewritten.

The "Suggestions to the Teacher" have become so extended that they are no longer included in the book, but are printed in a separate pamphlet, which can be obtained of the publishers. In this pamphlet are hints as to laboratory equipment, classroom management, notes and drawings, supervision of dissection, collecting outfit, field work, preservation of material, etc.

A full-page cut of the microscope has been introduced to accompany the directions for its manipulation. The author takes this occasion to thank the firm of Bausch and Lomb for

their kindness in furnishing the electro for this cut. A few other cuts are added to illustrate the work of dissecting.

The importance of the actual study of types cannot be too strongly urged. Without some real knowledge derived from his own observation, the student has no foundation on which to build the structure of information that he gets from reading and from lectures. To a few fixed facts of experience he can firmly fasten that which he acquires through the experience of others, but which would otherwise be vague and fleeting.

The earlier edition of the author's "Practical Zoölogy" was corrected by the late Professor Alpheus Hyatt of the Boston Society of Natural History; President David Starr Jordan of Leland Stanford, Jr., University; Professor N. S. Shaler, Harvard University; Professor H. Garman, State College of Kentucky; Mr. B. H. Van Vleck; Mr. J. Y. Bergen, Jr., of the English High School, Boston; Professor R. E. Call; Mr. E. P. Jackson, Boston Latin School; and Professor L. M. Underwood, Columbia University.

The proofs of this edition have been critically read by Professors M. F. Arey, State Normal School, Cedar Falls, Ia.; A. C. Boyden, State Normal School, Bridgewater, Mass.; M. J. Elrod, University of Montana; J. W. Folsom, University of Illinois; H. Garman, State College of Kentucky; W. S. Jackman, University of Chicago; H. S. Jennings, University of Michigan; J. M. Johnson, Peter Cooper High School, New York; S. J. Hunter, University of Kansas; Louis Murbach, Detroit High School; Frank Smith, University of Illinois; H. B. Ward, University of Nebraska.

The directions for the study of the honey-bee were written by Mr. Charles H. Allen, Bloomington, Ill., High School.

To these gentlemen the author is deeply indebted, and offers them his most sincere thanks.

NORMAL, ILLINOIS,
May 23, 1903.

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INTRODUCTION.

TO THE STUDENT.

Class-room Notes. — You should make careful notes of all your observations and work, both in the class room and the field. The temporary notes may be written with a pencil in any convenient notebook. The following plan, however, is recommended. Get a pad of unruled paper, about six inches long and four inches wide. On this, the notes and temporary drawings are to be made, using only one side of the paper. Remove the sheets as they are filled. Keep them in a strong manilla paper envelope, half an inch wider and an inch shorter than the sheets. Label the envelope "Zoölogy"; or, better, have a number of envelopes labeled with any convenient subdivisions of the subject. As much or as little of the notes as desired may be carried. These envelopes can be carried in the pocket, and the notes are available at short notice, and can be consulted many times where a notebook, with all the notes of a term, would not be at hand. A still further advantage is that any notes or drawings on the same subject, made later, can be inserted at the right place, which could not well be done with a regular bound notebook. As the notes accumulate those not in immediate use may be stored in larger envelopes and kept as best suits your convenience. A part of the "pad" of note paper should be carried to all class-room exercises, whether it be a laboratory exercise or a recitation, to take any needed notes. Record should be made of all animals studied, whether those given to students for detailed examination or dissection, or the exhibition specimens brought in from day to day. Many statements made by teacher