

**FIRST BOOK
OF ZOÖLOGY**

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BY

EDWARD S. MORSE, Ph. D.,

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"As for your pretty little seed-cups, or vases, they are a sweet confirmation of the pleasure Nature seems to take in superadding an elegance of form to most of her works, wherever you find them. How poor and bungling are all the imitations of art! When I have the pleasure of seeing you next we will sit down—nay, kneel down if you will—and admire these things."
—[LUCARTUS *in a Letter to ELLIS*,



P R E F A C E .

THE "First Book of Zoölogy" is expressly prepared for the use of pupils who wish to gain a general knowledge of the structure, habits, modes of growth, and other leading features concerning the common animals of the country.

Particular attention has been given to the lower animals, as these are more often neglected in text-books. Directions for collecting, the preparation of specimens for the cabinet, and the haunts of the animals to be studied are given, and the pupil is expected to study, with the book in one hand, and the specimens in the other. The figures illustrating this work, with a few exceptions, have been drawn from Nature by the author, and have been prepared with especial reference to their being copied by the pupil. To facilitate this the figures are made in outline, with the shaded side of the figure indicated by darker lines.

The necessity of the pupils copying (however poorly) the figures, either upon the slate, or upon paper, cannot be too strongly urged.

From his own experience, the author has learned that a specimen or figure may oftentimes be carefully studied, and yet only an imperfect idea be formed of it; but, when it had been once copied, the new points gained repaid all the trouble spent in the task.

It makes but little difference whether the pupil is proficient in drawing or not; it should be strenuously insisted upon by the teacher that the pupils copy, as far as possible, the figures contained in each lesson.

To collect in the field, to make a cabinet, and then to examine and study the specimens collected, are the three stages that naturalists, with few exceptions, have passed through in their boyhood.

If one recalls the way in which boys first manifest their taste for such studies, he will remember that first a few examples were brought together; a collection was made. It may have been birds' eggs, insects, or shells; then little boxes, a case of drawers, or shelves, were secured to hold their treasures. In thus collecting and arranging and rearranging the cabinet, the eye becomes familiar with the outline and general character of the objects, and in this way the mind is finally prepared to comprehend the relations existing

between animals, and to appreciate the leading points upon which classification is founded.

Agassiz invariably placed before his students a single specimen, or a box full of specimens, and told them to look and see what they could find out.

It has seemed, therefore, that the way to commence the study of zoölogy is to follow the course one naturally pursues when he is led to the study by predisposition. Nor is it essential, at the outset, to present the entire range of the animal kingdom. Teach the characters of one or two great divisions first, and then the pupil is better prepared to grasp in turn the other divisions. The persistent attempt, in all textbooks of this kind, to give some attention to every large group in the animal kingdom, has often resulted in wearying and confusing the minds of those who take up the study for the first time.

A very serious difficulty is encountered in those books which give a more or less complete view of systematic zoölogy for beginners. In some, the authors commence with the lowest forms, and end with the highest. In others, the highest animals are dealt with first, and the lessons end with the lowest. The first mistake made is the attempt to teach systematic zoölogy, where the pupil is quite ignorant of the material to be classified; and proper familiarity with the objects, the author contends, can only be acquired

by collecting the specimens and forming a little cabinet of them.

The difficulty, however, arises in commencing the lessons with either the lowest or the highest animals. If the author commences with the lowest animals, he deals at the outset with creatures which the pupil in certain cases can never see, as many of the animals to be considered are microscopic, and most of them of such a nature that their soft parts cannot be preserved. On the other hand, if the author commence with the vertebrates, he presents, point-blank, some of the forms of structure most difficult to understand.

The main thing at the outset is to teach the pupil how to collect the objects for study; this leads him to observe them in Nature, and here the best part of the lesson is learned: methods of protection for the young, curious habits, modes of fabricating nests, and many little features are here observed, which can never be studied from an ordinary collection. Hence, collecting in the field is of paramount importance. Next, the forming of a little collection at home prompts the pupil to seek out certain resemblances among his objects, in order to bring those of a kind together. In this way he is prepared to understand and appreciate methods of classification. Finally, having grasped the leading features of a few groups, he is enabled to comprehend the character of cognate groups with less difficulty. Thus,

an inland student, having got the typical idea of an insect from the study of a common grasshopper, for example, is much better prepared to understand the general structure of the Crustacea, though he may never have seen the few forms peculiar to fresh water. In the same way after having studied the common earthworm, he can form a better idea of the complicated structure of many marine worms, though these he may never see. After long deliberation, and some hesitancy, the author is forced to depart from common usage, and present, in this first book, only a few of the leading groups in the animal kingdom.

From the abundance of material, and the comparative ease with which the specimens may be preserved for cabinet use, shells and insects have always formed the favorite collections of children. They are the most common objects in nearly all collections, and it has seemed to the author that here the pupil ought to commence his studies.

Having learned to collect and prepare specimens for the cabinet, and to observe the relations and differences existing among them, the pupil is then prepared to go on to forms less familiar, or to study in detail the material already gone over.

Great pains have been taken to present, in every case, drawings made from the animal, expressly for this book. They are all American, and, with few exceptions, are en-

tirely new. It is believed that teachers will appreciate the absence of those hackneyed illustrations which have too long done service in text-books on the subject.

To those especially interested in the study, many figures are given which have never before been published, even in scientific works, as, for example, the rare *Lymanea megalosoma*, *Lymanea ampla*, *Ptyelus lineatus*, and many others.

I desire here to express my thanks to Dr. A. S. Packard, for looking over the pages relating to insects, and to Dr. H. Hagen, Mr. Samuel H. Scudder, Prof. H. H. Straight, Prof. Theodore Gill, Prof. A. J. Cook, and Miss Maggie W. Brooks, for important specimens for illustration; and to the firm of Russell & Richardson, Boston, who, with the interest of personal friends, have attended to the proper engraving of my drawings. I am also deeply indebted to Prof. E. L. Youmans, Mr. John M. Gould, and Mr. Henry W. Swasey, for valuable suggestions and advice; and, finally, I have to express my gratitude to the publishers of this book, who have, with unbounded liberality, left the entire matter of illustration in my hands.

E. S. M.

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