

REPORT
OF THE
GEOLOGICAL SURVEY OF OHIO.

VOLUME IV.

ZOOLOGY AND BOTANY.

PART I. ZOOLOGY.

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PREFACE.

The plan for the publication of the reports of the Geological Survey, submitted to and adopted by the Geological Board, contemplated the publication of two volumes on Geology, two on Paleontology, one on Zoology and Botany, one on Economic Geology, and a Geological Map of the State.

The Geological Corps were required by the organic law of the Survey to investigate the general geological structure of the State; to collect, study, and describe the fossils contained in the rocks, and to make surveys and reports upon the Geology and resources of each one of its eighty-eight counties. As the material was gathered in obedience to these instructions, it was soon found that the report would exceed in dimensions the estimate made for it. The preparation of a third volume on Geology, and a third on Paleontology was, therefore, authorized by the Geological Board.

Of the series of publications enumerated above, two volumes on Geology and two on Paleontology only had been finished when the appropriations for the continuance of the work of the Geological Corps were suspended by the Legislature. Since that date Vol. III, Part I, Geology, and the Geological Map of the State have been finished by the gratuitous labor of the Corps, and with an expenditure of several hundred dollars from the private resources of the Chief Geologist. They also have been published by the authority of the Legislature.

The volume on Zoology and Botany was also prepared, and its publication was authorized in 1878. The reports written for this volume were as follows: On Mammals, by Prof. A. W. Brayton; on Fishes, by Dr. D. S. Jordan; on Birds, by Dr. J. M. Wheaton; on Mollusks, by Dr. R. M. Byrnes; on Reptiles and Amphibians, by Dr. W. H. Smith; and a catalogue of the plants of the State was compiled by Dr. H. C. Beardslee. The manuscripts of some of these reports, recalled by their authors for changes or additions, were retained by them so long that the publication of the volume has been much delayed. They also have been expanded to such a degree that it has been found impossible to include them all in one cover. In the hope of doing this, however, the volume was enlarged to somewhat undesirable dimensions. Of the manuscripts prepared, those on the Plants of the State by Dr. Beardslee, and on the

Mollusca by Dr. Byrnes, have not been included, but are left to form, with such additions as may be made to the Zoological and Botanical material, a second part of this volume, of which it is to be hoped the preparation and publication will be accomplished at an early date.

In order to make the review of the Botany and Zoology of the State complete, Part II of the volume should contain, in addition to those already written on Botany and Conchology, a report on the lower forms of plant life, especially the Fungi, and others on the Articulatés—Crustacea, Insects, etc.—including descriptions of all those which are injurious or beneficial to man. These, if properly prepared, will have much scientific value, and especially those on Economic Botany and on Economic Entomology, will be of great and immediate practical value.

Some impatience has been expressed at the slow progress of the preparation of the volume on Zoology and Botany, and the late appearance of the part now issued. But it should be remembered that all time and thought which have been expended upon these thorough and voluminous reports, destined to be so creditable and useful to the State, have been gratuitously bestowed. Not a dollar has been paid to the authors for the years they have spent in this work, and justice as well as courtesy demands that the invaluable gifts now made to the people of Ohio by the eminent naturalists who have prepared these reports, should be gratefully acknowledged. Probably no where in the history of scientific publication can be found more honorable examples of the gratuitous consecration of time and learning by men of science to the higher interests of the public.

It is possible also that there are some who will fail to appreciate the value of these detailed reports on the Natural History of the State; but with the exception of some scattered newspaper or magazine articles, nothing has been published in regard to the Zoology of Ohio since the catalogue prepared by Dr. Kirtland was issued in 1838, and in that interval there has been felt a constant want in every town, village, hamlet, and farmhouse of a better knowledge of the surrounding objects of nature. In every district school questions are constantly arising, inspired by the natural curiosity of the child, which the teacher has not been able to answer, from the want of means of information in regard to the animals and plants of the State. An interest in nature is almost universal, and its development wholesome and happifying. Hence, the distribution of documents that will enable every one to learn the character and history of the objects that surround him, will prove not only a gratification but a benefit to a great multitude. All this for the educational influence of such reports. Their bearing upon the practical life of our people is not less real, since a knowledge of the habits of the animals that contribute to the support of man, the birds of the air, the beasts of the field, the fishes of the waters,

will be of great service as a guide in all efforts to increase the productiveness of these sources of aliment. So a knowledge of the plants that serve for beauty or use will make a man a better farmer, a happier and more useful citizen. These considerations are so obvious that no labored argument should be necessary to demonstrate the utility of volumes like this now presented to the public, and the economy of the expenditure of the small sum which it has cost. The avidity with which it will be sought by thousands of our citizens will soon attest their high estimate of its value.

For the care and accuracy with which the volume has been edited, credit is to be given to Dr. J. M. Wheaton, who, in addition to the preparation of the most voluminous report contained in it, assumed the onerous position of editor, has read all the proof, and has decided all the difficult questions of typography. For the mechanical execution of the book we are indebted to the courtesy and cooperation of the Supervisor of Public Printing, Col. J. K. Brown, and to the technical skill of the Public Printers, Messrs. Nevins & Myers.

Of the other volumes contemplated in the original plan of publication of the results of the Geological Survey, only the Second Part of Vol. III, on Paleontology, and Vol. V, on Economic Geology, yet remain unpublished; but the work has progressed slowly, since it has been done without aid from the State. It would before this have been presented to the Legislature for publication, but the opinion has been expressed by the friends of the Geological Survey that it was not at present wise to request appropriations for a volume regarded by some as ornamental rather than useful, and that it should wait the completion of the volume long half done, on Economic Geology. The delay in the publication of this latter volume has been dependent upon a failure to make the appropriation of the small sum necessary to finish the field work and the maps that should accompany it. For this money was absolutely necessary, and the sum of \$5,000 was asked some years ago. During the last session the Legislature appropriated the desired sum, placed the work in charge of Prof. Orton, and it is in a fair way to be completed. When that volume shall have been issued it is to be hoped that measures will be taken to secure the publication of the two half volumes, one on Botany, etc.; the other on Paleontology, which will render the series symmetrical and complete.

Enough has been said in regard to the Botanical and Entomological reports to show their utility and the importance of having them published and distributed. This is not the place to advocate the completion of the reports on the Paleontology of the State; but it is permissible to say that the prejudice that opposes the publication of figures and descriptions of the fossils contained in our rocks is a narrow and unwise one. Aside from the wide-spread interest felt in these extinct forms of animal and plant life, their practical value is undeniable and great. Every geologist knows that fossils constitute his most

reliable guides. They are the criteria by which he judges of the ages and relative positions of the rocks containing them, and thus are labels written upon these rocks, which to one who has learned the language are easily read, and are infallible. All over the world governments, societies, and individuals are spending large sums of money for the diffusion of just such knowledge as is contained in our paleontological reports, and there is little doubt that sooner or later the extremely interesting material which has been gathered for the third volume on Paleontology will be asked for and given to the public by the authorities of the State.

J. S. N.