

**GEOLOGICAL SURVEY OF OHIO: PART I.
REPORT OF PROGRESS IN 1869; PART II.
REPORT OF PROGRESS IN THE SECOND
DISTRICT; PART III. REPORT ON
GEOLOGY OF MONTGOMERY COUNTY**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649523351

Geological Survey of Ohio: Part I. Report of Progress in 1869; Part II. Report of Progress in the Second District; Part III. Report on Geology of Montgomery County by J. S. Newberry & E. B. Andrews & Edward Orton

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Edited by Trieste Publishing Pty Ltd.
Cover @ 2017

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J. S. NEWBERRY & E. B. ANDREWS & EDWARD ORTON

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GEOLOGICAL SURVEY OF OHIO.

PART I.

REPORT OF PROGRESS IN 1869,

By J. S. NEWBERRY,
CHIEF GEOLOGIST.

PART II.

REPORT OF PROGRESS IN THE SECOND DISTRICT

By E. B. ANDREWS,
ASSIST. GEOLOGIST.

PART III.

REPORT ON GEOLOGY OF MONTGOMERY COUNTY,

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COLUMBUS:
COLUMBUS PRINTING COMPANY, STATE PRINTERS.
1870.

297381

COLUMBUS, O., March 25, 1870

To His Excellency RUTHERFORD B HAYES, Governor:

In compliance with a resolution passed by the Senate, directing that certain portions of our geological report heretofore submitted should not await the engraving of the plates, but be published immediately, I have made the selection of the materials called for by the resolution, and transmit them herewith. They consist of—

- I. A sketch of the progress of the Geological Survey, in 1869, by myself.
 - II. A Report on the Straitsville Coal Field, by Prof. E. B. Andrews.
 - III. A Report on the Geology of Montgomery County, by Prof. Edward Orton.
- All of which are respectfully submitted.

Your obedient servant,

J. S. NEWBERRY,
Chief Geologist.

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PART I.

REPORT ON THE PROGRESS OF THE GEOLOGICAL
SURVEY OF OHIO IN 1869.

BY J. S. NEWBERRY.

CHIEF GEOLOGIST.

HISTORICAL SKETCH.

The first information obtained by the citizens of Ohio in regard to the geological structure and mineral resources of the State, was derived from the report of a committee appointed under a resolution of the Legislature, passed the 14th day of March, 1836, "To report to the next Legislature the best method of obtaining a complete geological survey of the State, and an estimate of the probable cost of the same." This committee consisted of Dr. S. P. Hildreth, chairman, Dr. John Locke, Prof. J. H. Riddell, and Mr. I. A. Lapham.

In the execution of the task assigned to this committee, geological reconnoissances were made during the succeeding summer, of the Coal Measures of South-Eastern Ohio, by Dr. Hildreth, and of the western and northern portions of the State, by Prof. Riddell and Mr. Lapham; while chemical analyses of various iron ores and limestones were made by Dr. Locke. The observations and conclusions of this committee were embodied in reports from all the members, which reports were submitted to the Legislature at their succeeding session, and were published by State authority. At this time the science of geology had nowhere attained anything like its present perfection, and very little was known by any one in regard to the structure of our own country. The geological survey of New York was then in progress, but the splendid results accomplished by it had not yet been announced. As a consequence, the gentlemen who formed this committee prosecuted their investigations, not only in an untried field, but with little that could serve to guide them in observations made elsewhere by other geologists. At that time almost nothing was known in this country of palæontology. No one had learned what are the characteristic fossils of our formations, and, consequently, the relative positions of the different strata met with were

to be painfully worked out by a careful examination of the rare exposures of their lines of contact. It was not easy nor even possible, in all instances, to identify any of the formations by their lithological characters alone, for these are proverbially unreliable, and they are often found to change completely in going from county to county. It is now well understood, not only that fossils are safe and convenient guides in studying the relations and distribution of fossiliferous rocks, but that their assistance is indispensable, and that no conclusions can be regarded as accurate and trustworthy unless confirmed by their evidence. The well-read paleontologist finds in every characteristic fossil an infallible record of the age of the rock that contains it, so that, when he can read the language, the fossiliferous rocks are all ticketed to his hand. Nothing can better illustrate the truth of these statements than the laborious and painful efforts of our pioneer geologists to determine, without paleontological data, the age and relations of our formations. After spending a summer in the study of the group of limestones which underlie the western part of the State, Dr. Riddell, with considerable hesitation and diffidence, announces the opinion that the blue limestone of Cincinnati underlies and is older than the buff limestone of Columbus. Even, two years afterward, when the Geological Board, subsequently created, had devoted two seasons of field work to the study of our geology, the exact geological ages of these formations were still undecided.

Much valuable information was, however, contained in the reports of the special committee, especially in that of Dr. Hildreth, where the first glimpse is given to the public of the structure and richness of the southern iron district—lying between Marietta and Portsmouth—where the Coal Measure ores exhibit a development equalled in no other part of our country, and where the iron industry of Ohio has, till lately, been mainly centered.

In obedience to their instructions, the committee submitted a plan for a general geological survey of the State, with an estimate of the necessary expenditure. The Legislature of 1836-37 at once acted on the recommendation of the committee, and passed a bill on the 27th of March, 1837, providing for a geological survey, appointing a corps of geologists, and voting an appropriation of \$12,000 for the prosecution of the work during one year.

The board then organized consisted of the following members:

W. W. MATHER, State Geologist.	} Assistants.
DR. S. P. HILDRETH,	
DR. JOHN LOCKE,	
PROF. J. P. KIRTLAND,	
J. W. FOSTER,	
CHARLES WHITLESEY,	
C. BRIGGS, JR.	

These gentlemen entered upon their duties during the following spring, and the results of their summer's work were embodied in the "First Annual Report on the Geology of Ohio" (8vo. pp. 134), presented to the Legislature at the ensuing session, and immediately published.

This report includes records of geological reconnoissances by Prof. Mather, Dr. Hildreth and Mr. Briggs, and preliminary reports on zoology by Prof. Kirtland, and on topography by Col. Whittlesey. Prof. Locke, having spent the summer in Europe, took no part in the geological work of the corps during the first year, and made no report.

In the succeeding summer the work of the Geological Survey was continued under the same organization. The observations made during this season were presented, and published in a report of 286 8vo. pages, entitled "The Second Annual Report of the Geological Survey of the State of Ohio, Columbus, Ohio, 1837." This volume includes reports of W. W. Mather, pp. 30, Col. Whittlesey, pp. 32, Mr. Foster, pp. 36, Prof. Briggs, pp. 47, Prof. Kirtland, pp. 46, and Dr. Locke, pp. 86; and contains much valuable information in regard to the geological structure and mineral resources of the State.

In consequence of the financial panic of 1837, and the paralysis of business that followed, it was considered necessary to diminish in every possible way the public expenditure, and, accordingly, the Legislature of 1838-9 made no appropriation for the continuation of the Geological Survey, and it was at once suspended. However plausible the arguments in favor of such a step may have appeared, there are comparatively few of our citizens who do not now feel that it was dictated by a short-sighted policy. The benefit derived by the State from the geological reconnoissance—for it was little more—made by the State Board, conclusively demonstrated that the Geological Survey was a producer and not a consumer; that it added far more than it took from the public treasury, and therefore deserved special encouragement and support, as a wealth-producing agency, in our darkest financial hour.

By the arrest of the work of the Geological Corps, the development of our mineral resources was not entirely stopped, but it was greatly retarded and thrown from public into private hands. During the thirty years that elapsed, before a new Geological Survey was organized, much was done by private parties in the investigation of the geology and economic value of certain tracts and districts of the State. Careful surveys of mining properties, elaborate analysis of coal, iron, &c., &c., were made at private cost, and there is very little doubt that for such investigations, in the long interval of time I have designated, more money was paid than would have sufficed to complete the public survey begun in 1837. All the information thus gained was, however, monopolized by those who paid for it, and instead of enlightening the landholder as to the abundance and value of the minerals his farm or tracts contained, it oftener served the

purposes of the speculator only, guiding him in his purchases and placing the farmer quite at his mercy. There are many who think the development of the mineral resources of our State should be altogether left to time and private enterprise; but no one who has watched with any care the progress of events during the last twenty-five years, in this and other States, will have failed to notice that it very rarely happens that the owner of a farm containing coal, iron, clay, or any other useful mineral, will, of his own accord and at his own expense, have any or all of his subterranean treasures so far investigated as to learn with accuracy their value. To do this, he must invoke the aid of the geologist and chemist, personages with whom he is not only unacquainted—since they are probably residents of a distant city—but of whose professions he has in all probability only a dim and shadowy idea. He therefore holds his land at its agricultural value, and sells it at such valuation to the first speculator who suspects, tests, and then discovers its hidden wealth.

The publication of the reports of the First Geological Board did much to arrest the useless expenditures of money in the search for coal outside of the coal field, and in other mining enterprises equally fallacious, by which, through ignorance of the teachings of geology, parties are constantly led to squander their means. From the tendency which all mining schemes have to excite the imagination, it is scarcely less important to our people to know accurately what we have not, than what we have, among our mineral resources.

During the last twenty years, efforts have been made by members of the Legislature who appreciated the importance of a thorough investigation of our mineral wealth, to have the geological survey resumed. For this end recommendations were made in several of the messages of our Governors, and bills were introduced by Dr. Jewett, of Summit, and subsequently by General Garfield; but though the value of such investigations to the credit and industry of the State was generally confessed, and there was no considerable opposition to either bill originating in doubt of the intrinsic merit of the measure, yet, at one time because the State Treasurer had appropriated to his own uses half a million of the people's money, and subsequently because the treasury was long kept empty by the expenditures upon the State House, it was thought by the majority wiser to defer making appropriations for this, as well as various other confessedly desirable objects, till the finances of the State should be in a better condition. In all these years, however, the State was suffering a positive annual loss, felt in both its industry and credit, for the want of the knowledge a properly conducted geological survey could not fail to impart. Every financial agent of the State, located in or visiting the moneyed centres of our country or the world; agents going abroad to effect loans with which to construct our lines of railroad, all

took pains to gather information in reference to our geology, and all had to deplore the fact that this information was so meagre.

Finally, the great rebellion came upon us with all its horrors, and its waste of life and treasure. For five years all the thoughts and energies of the people were turned to the arts of war, and the arts of peace were well-nigh forgotten. When, however, the struggle was over, and the nation's life, so eagerly sought and strongly imperilled, was saved, our citizen soldiers laid down their arms to return to plow and workshop, and once more the processes of creation and conservation succeeded to those of destruction.

Among the methods suggested for repairing the breaches of war, and moving faster the retarded wheel of progress, was a geological survey; a thorough investigation of the quality, quantity and distribution of each of our mineral staples with a view to the expansion of all the wealth-producing industries based upon them.

This measure was recommended to the Legislature of 1869 in the annual message of Governor Hayes, and was made the subject of a bill introduced into the House of Representatives by Capt. Alfred E. Lee, of Delaware county. This bill was subsequently passed in March, 1869, by a large majority, irrespective of party, in both branches, and became a law, of which the following is a copy:

LAW PROVIDING FOR A GEOLOGICAL SURVEY OF OHIO.

SECTION 1. *Be it enacted by the General Assembly of the State of Ohio,* That the governor is hereby required to appoint, by and with the advice and consent of the senate, a chief geologist, who shall be a person of known integrity and competent practical and scientific knowledge of the sciences of geology and mineralogy; and upon consultation with said chief geologist and the like concurrence of the senate, the governor shall appoint one or more suitable assistants, not exceeding three in number, one of whom shall be a skillful analytical and agricultural chemist, the said chief geologist and assistants to constitute a geological corps, whose duty it shall be to make a complete and thorough geological, agricultural and mineralogical survey of each and every county in the state.

SEC. 2. The said survey shall have for its objects:

1st. An examination of the geological structure of the state, including the dip, magnitude, number, order and relative position of the several strata, their richness in coals, clays, ores, mineral waters and manures, building stone and other useful materials, the value of such materials for economical purposes, and their accessibility for mining or manufacture.

2d. An accurate chemical analysis and classification of the various soils of the state, with the view of discovering the best means of preserving and improving their fertility, and of pointing out the most beneficial and profitable modes of cultivation. Also a careful analysis of the different ores, rocks, peats, marls, clays, salines and all mineral waters within the state.

3d. To ascertain by meteorological observations the local causes which produce variations of climate in the different sections of the state. Also