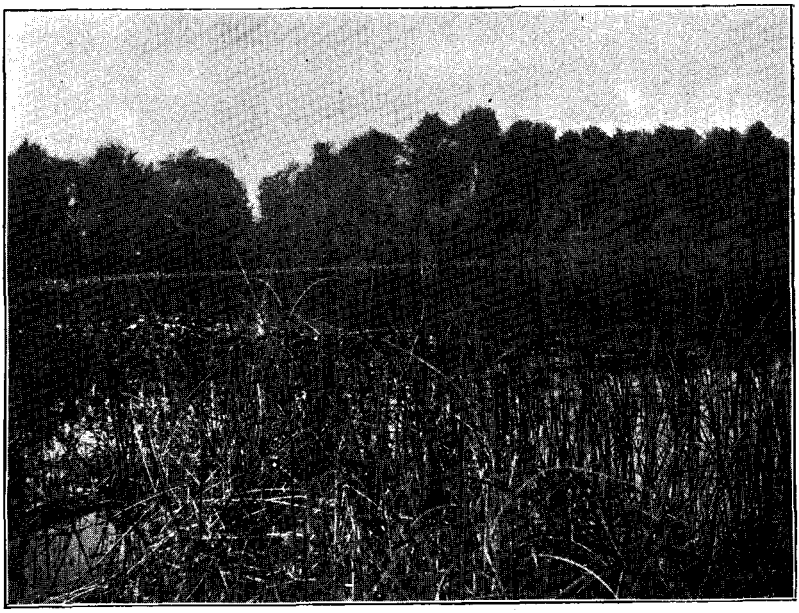
PLATE 1.

a

b



VIEWS SHOWING ENCROACHMENT OF VEGETATION ON WATER AREA OF LAKES.

(a) Lower end of Mabie, one of the Barbee lakes, Kosciusko County.
(b) Corner of West Cedar Lake, Whitley County.

(See Page 38.)

INDIANA.

DEPARTMENT

OF

Geology and Natural Resources.

TWENTY-FIFTH ANNUAL REPORT.

W. S. BLATCHLEY,
STATE GEOLOGIST.

1900

INDIANAPOLIS:
WM. B. BURFORD, CONTRACTOR FOR STATE PRINTING AND BINDING.
1901.

THE STATE OF INDIANA,
EXECUTIVE DEPARTMENT,
INDIANAPOLIS, February 1, 1901.

Received by the Governor, examined and referred to the Auditor of State for verification of the financial statement.

OFFICE OF AUDITOR OF STATE,
INDIANAPOLIS, February 1, 1901.

The within report, so far as the same relates to moneys drawn from the State Treasury, has been examined and found correct.

W. H. HART,
Auditor of State.

FEBRUARY 1, 1901.

Returned by the Auditor of State, with above certificate, and transmitted to Secretary of State for publication, upon the order of the Board of Commissioners of Public Printing and Binding.

CHAS. E. WILSON,
Private Secretary.

Filed in the office of the Secretary of State of the State of Indiana, February 1, 1901.

UNION B. HUNT,
Secretary of State.

Received the within report and delivered to the printer this 1st day of February, 1901.

THOS. J. CARTER,
Clerk Printing Bureau.

State of Indiana, Department of Geology and Natural Resources.

INDIANAPOLIS, IND., February 1, 1901.

HON. W. T. DURBIN, *Governor of Indiana:*

DEAR SIR—I have the honor to submit to you herewith the manuscript of the Twenty-Fifth Annual Report of the Department of Geology. It comprises, in the main, papers of economic importance relating to the resources of the State suitable for the manufacture of Portland and Hydraulic Cements, together with the reports of the chiefs of the different divisions of the Department for the calendar year 1900.

Yours very truly,

W. S. BLATCHLEY,
State Geologist.

ASSISTANTS.

GEO. H. ASHLEY*.. .....Chief Assistant.
E. M. KINDLE, Franklin, Ind.....Paleontologist.
C. E. SIEBENTHAL, Bloomington, Ind.....Assistant.
J. T. SCOVELL, Terre Haute, Ind.....Assistant.
W. A. NOYES, Terre Haute, Ind .....Chemist.
W. C. ZARING, Indianapolis, Ind.....Supervisor of Oil Inspection.
J. C. LEACH, Kokomo, Ind.....Supervisor of Natural Gas.
JAMES EPPERSON, Linton, Ind.....Inspector of Mines.
CHAS. LONG, Coal Bluff, Ind.....Assistant Inspector of Mines.
ISADORE KESSLER, Indianapolis, Ind.....Stenographer.

*Resigned October 1st, 1900, to accept the Chair of Biology and Geology in Charleston University, Charleston, South Carolina.

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DEPARTMENT OF GEOLOGY AND NATURAL RESOURCES.

INDIANAPOLIS, IND.

W. S. BLATCHLEY, State Geologist.

PLEASE ACKNOWLEDGE RECEIPT OF THIS VOLUME.

In return, Scientific Books, Fossils, etc., and Implements of the "Stone Age" are acceptable.

State Museum, Room 126, Third Floor, State House.
Open to the public from 8 A. M. to 5 P. M. except on Sundays and legal holidays.
Admission free.

Office of State Geologist, Room 89, Third Floor, State House.

INTRODUCTORY.

The present volume is the twenty-fifth in the series of annual reports issued by the Department of Geology of the State of Indiana, and the sixth issued under the auspices of the writer. In those portions of these six reports written by the State Geologist himself, he has ever tried to keep in mind the interests of the citizens of the State who pay the taxes to support the Department rather than the interests of professional geologists. In other words, he has attempted to prepare reports which the common people can, for the most part, readily understand. Believing that the advertising of the natural resources of the State was the primary object held in view by the founders of the Department, he has made economic geology the main feature of his work. At the same time he has noted with pleasure the growing interest among teachers and pupils in the plants and animals about them and has attempted to add to this interest by publishing papers by well-known investigators on the flora and fauna of the State. With the exception of scientific names, which can readily be passed over by all to whom they are unintelligible, as little technical matter as possible has been introduced in these papers bearing upon economic resources and natural history. Attempt has been made to verify, whenever it could be done, the statements given; to print the truth in the simplest language possible.

The present report includes the results of the principal field work carried on by the State Geologist and chief assistant in the autumn of 1899 and the season of 1900. This was the exploration of the lakes and marshes of northern Indiana in search of deposits of marl of suitable size and purity to justify the erection of factories for the manufacture of Portland cement. Under the present advanced methods of manufacture of this valuable commodity, capitalists do not care to invest the large sum necessary for the erection of a modern factory unless raw material enough is at hand to keep the factory running for 30 or more years. Careful estimates go to show that a factory with an output of 500 barrels of Portland cement each 24 hours will use in 30 years a body of marl 160 acres in area and 10 feet

thick.* Such a deposit is, in this report, termed a "workable deposit." The paper entitled "The Lakes of Northern Indiana and Their Associated Marl Deposits," gives full details concerning 32 such deposits of marl, which were found in the three northern tiers of counties of the State. The location of these workable deposits by counties, and the pages on which they are described in this report, are as follows:

STEUBEN COUNTY.

LAGRANGE COUNTY.

NOBLE COUNTY.

WHITLEY COUNTY.

ELKHART COUNTY.

KOSCIUSKO COUNTY.

*See page 52 of this volume.

FULTON COUNTY.

MARSHALL COUNTY.

ST. JOSEPH COUNTY.

LAPORTE COUNTY.

STARKE COUNTY.

Besides the above mentioned 32 deposits, 15 others were found, presumably of workable size, but with the larger portion of their area beneath 10 feet or more of water, and therefore not available under the present conditions of securing marl. There is little doubt but that appliances will soon be devised for raising marl from beneath any depth of water, and then these deposits can be classed with those already mentioned.

The details given relative to the area, depth, shape and aquatic flora and fauna of many of the lakes, together with the accompanying maps, will also, it is thought, be of interest and value to the large number of fishermen and sportsmen who annually visit their waters, as well as to the many cottagers who spend the summer months in their vicinity.

The paper on the "Silver Creek Hydraulic Limestone," by Mr. C. E. Siebenthal, contains full details regarding the location and stratigraphy of the stone so largely used in southern Indiana for the manufacture of natural rock cement, as well as an historic, descriptive and statistical account of the industry. It is accompanied by a map showing the exact distribution of the cement rock.

Mr. Siebenthal has also gathered for this report statistics relative to the oolitic stone industry in Indiana for the year 1900. These have been incorporated in a special paper which shows that there was quar-

ried during the year, 7,035,000 cubic feet, or approximately 23,000 car-loads of the oolitic stone, the value of which at the quarries was $1,699,649.

The annual reports of the State Supervisor of Natural Gas, Inspector of Mines, and Supervisor of Oil Inspection are included in the order mentioned. The report of the Supervisor of Natural Gas shows that the center of production, or that territory not invaded by pipe lines, in 1898 comprised 250 square miles in Grant, Madison, Blackford and Delaware counties. On the first day of January, 1901, it had been reduced to less than 50 square miles in the northwest corner of Delaware County. The main Indiana gas field, which comprised originally 2,850 square miles, is divided into three zones, viz.: (1) An outer zone, varying greatly in width, which has been abandoned by the pipe lines and supplies only a small amount of gas for local domestic use; (2) A middle zone, comprising at present probably 900 square miles, which is the main territory supplying the pipe lines and almost all of the factories; (3) The heart of the field or center of production above mentioned. In December, 1899, the average rock pressure of the middle and center zones only was 155 pounds. In December, 1900, the average in the same two zones was but 115 pounds. This drop of 40 pounds is more than twice as great a decrease as has occurred in any other year since natural gas was discovered in Indiana, and is an excellent index of the rapidity with which the supply is being exhausted.

The factories in the gas belt have many of them begun the use of other fuels and there is little doubt but that the great majority of them will remain where they are now located, gradually adopting that form of fuel best adapted to the production of their respective wares. To those that wish to remove to localities where cheap fuel exists in abundance, the coal-bearing counties of western Indiana offer, and will continue to offer, good sites, excellent railway facilities and an abundance of the finest grades of bituminous coal.

The report of the State Mine Inspector shows that 6,357,976 tons of coal were mined in Indiana in 1900. This was an increase of 492,853 tons over the output of 1899, which was the largest in the history of the State. This increase was due to the absence of the usual strikes on the part of the miners in the leading coal districts in the State, and to a steadily increasing demand for Indiana coal throughout the year. This demand was largely brought about by the gradual lessening of the supply of natural gas. There is no doubt but that the demand for Indiana coal will continue to increase as the supply of gas grows less, and the output will doubtless reach 10,000,000 tons per annum before the year 1910.

According to the report of Mr. Epperson, the relative rank of the fifteen coal producing counties for the year 1900, together with the output of each in tons and the amount of wages paid to miners, was as follows:*

TONS OF COAL PRODUCED AND WAGES PAID TO MINERS IN INDIANA IN 1900, BY COUNTIES.

	Number of Tons Produced.	*Wages Paid.*
Clay County	1,497,677	$1,111,832 44
Vigo County	809,884	723,977 37
Vermillion County	751,349	495,361 20
Sullivan County	748,678	558,620 98
Greene County	746,483	484,084 72
Parke County	679,024	611,119 45
Daviess County	254,030	201,482 65
Pike County	249,804	207,891 37
Warrick County	181,384	111,851 63
Vanderburgh County	172,562	191,293 53
Gibson County	59,420	43,663 50
Knox County	59,382	50,695 01
Fountain County	41,640	37,386 95
Perry County	23,480	11,259 05
Martin County	8,266	6,823 41
Total	6,283,063	$4,843,343 26
Total number of tons produced in small mines	74,913	39,680 92
Grand total	6,357,976	$4,883,024 18

The number of miners employed in mines operating 10 or more men was 8,858. In the smaller mines about 1,000 additional men were at work, so that nearly 10,000 coal miners are employed in the State.

Of the coal produced, 1,512,098 tons were block coal, and the remainder bituminous. Clay and Parke counties alone yielded block coal; Clay County producing 1,190,406 tons and Parke County the remainder, or 321,692 tons. The report of Mr. Epperson is very complete, containing several tables of statistics of different phases of the industry which have not been embraced in former reports of the State Mine Inspector.

A paper entitled "The Petroleum Industry in Indiana in 1900" follows the report of the State Mine Inspector. It gives in detail the

*The output given is only from mines working ten or more men.

developments and statistics of the industry in the Trenton rock oil fields during the year, as well as a full history of the productive areas recently opened up in the Corniferous rock at Loogootee, Martin County, and near Medarysville, Jasper County. An accurate map of the main Indiana oil field, brought up to January 1, 1901, also accompanies the paper.

The final paper in the volume is largely devoted to the fossil faunas of the Devonian rocks of the State, and will doubtless be especially interesting to paleontologists. In the last six reports issued by the Department, but one other, that for 1897, has had a portion devoted to paleontology. Not wishing to depart entirely from the custom of his predecessors, the writer has had the paper in question prepared by Dr. E. M. Kindle, who has for years made a specialty of this subject. A number of the species described and figured therein are new to science. Keys to the different species will help the beginner to properly classify any fossil which he is liable to find in the Devonian rocks of the State. The drawings, more than 300 in number, of the 31 plates accompanying the paper, were made especially for it by Dr. J. C. McConnell, of Washington, D. C. They represent, much better than words, the smaller details of the species described.

The clay manufacturing industry of Indiana has been growing very rapidly in the last three years. The reports issued by this Department in 1896 and 1898 contained special papers giving full details concerning the location, area and thickness of the valuable beds of shale and clay in the coal-bearing counties, as well as in the counties of the northwestern part of the State. Chemical analyses of many of the clays were also incorporated, and the uses for which the different deposits were best fitted were mentioned. As a result of this advertising much capital has been invested in the manufacture of clay products. At Brazil, the chief center of the industry, 15 factories have been or are being erected. A large factory which, for two or three years, has been months behind in its orders, is in operation just west of Terre Haute, and another is now being built a mile south to utilize a most valuable deposit to which attention was called in the 1896 report. Near Montezuma, two large factories have been erected since 1897 and some of the best deposits of fire-clay and shale north of Hillsdale have recently changed hands, the new owners proposing to erect factories during the coming year.

The demand for pressed front and ordinary brick, hollow brick, vitrified brick, sewer pipe, conduits, etc., is constantly increasing, and no place in the United States furnishes better facilities for the manufacture of such articles than does western Indiana. There raw ma-

terial of the best quality is plentiful and overlies the fuel necessary for its burning. Transportation facilities are excellent. These three factors present, competition can be defied.

Some of the best deposits, notably those near Mecca, Parke County, Clinton, Vermillion County, and several in the vicinity of Terrre Haute, Vigo County, are as yet undeveloped and offer most excellent opportunities to capitalists in search of investment. A large deposit of shale near Martinsville, Morgan County, has, by practical tests, been proven to make the best of pressed front brick and is well worthy of early development for that purpose, as the city of Indianapolis alone would absorb all the product.