Showing structure and effects of weathering in the upper sandstone of the Huron formation. Young growth of trees and shrubs getting a foothold in the new made soil. Near center of Sec. 33 just north of Tobinsport, Perry County, Ind. See p. 304.

Work of trees in tearing up sandstone. Many pieces of rock are deeply imbedded in base and roots of tree. Small soil heap below in which weeds are beginning to grow. Location a few feet northwest of the upper view.
THE STATE OF INDIANA,
EXECUTIVE DEPARTMENT,
February 27, 1909.

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

OFFICE OF AUDITOR OF STATE,
INDIANAPOLIS, April 28, 1909.

The within report has been examined and found correct.

J. C. BILLHEIMER,
Auditor of State.

April 28, 1909.

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.

MARK THISTLETHWAITE,
Secretary to the Governor.

Filed in the office of the Secretary of State of the State of Indiana.

FRED A. SIMS,
Secretary of State.

Received the within report and delivered to the printer April 30, 1909.

A. E. BUTLER,
Clerk Printing Bureau.
State of Indiana,
Department of Geology and Natural Resources,
Indianapolis, Ind., February 27, 1909.

Hon. Thomas R. Marshall, Governor of Indiana:

Dear Sir—I have the honor to transmit to you herewith the manuscript of the Thirty-third Annual Report of the Department of Geology and Natural Resources. It comprises in the main papers of economic importance relating to the coal fields and soils of southern Indiana, together with an extended paper on the Mammals of Indiana, which is something that has long been needed for use in our public schools. It also embraces the reports of the State Mine Inspector and the State Supervisor of Natural Gas for the calendar year 1908.

Yours very truly,

W. S. Blatchley,
State Geologist.
ASSISTANTS.

George H. Ashley..................................Chief Field Assistant
Edward F. Lines...................................Field Assistant
Chas. W. Shannon................................Field Assistant
L. C. Snider........................................Field Assistant
R. E. Lyons..........................................Chemist
Walter L. Hahn......................................Zoologist
James Efferson....................................Inspector of Mines
Jonathan Thomas.................................Assistant Inspector of Mines
Robert Irving......................................Assistant Inspector of Mines
Wellington O'Connor.............................Assistant Inspector of Mines
Albert Sams........................................Assistant Inspector of Mines
B. A. Kinney........................................Supervisor of Natural Gas
Isadore Kessler....................................Clerk
Millard Gilliam.................................Messenger and Janitor
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DEPARTMENT OF GEOLOGY AND NATURAL RESOURCES,
INDIANAPOLIS, INDIANA.

W. S. BLATCHLEY, State Geologist.

Please Acknowledge Receipt of this Volume.

In return, Scientific Books, Fossils 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 principal paper in the present volume is the one which embodies the results of the field work carried on during the summer of 1908 in co-operation with the United States Geological Survey on the coal fields of western Indiana. The paper was prepared by Dr. George H. Ashley, of Washington, D. C., now one of the coal experts of the United States Survey. Dr. Ashley was the author of the large volume on Indiana coal issued as the Twenty-third (1898) volume of the Indiana Department of Geology. It was that volume of 1,740 pages which first showed in detail by text, maps and charts, the full extent and value of the great coal veins of western Indiana and which led to such development that the output of coal increased from 5,146,920 tons in 1898 to 13,250,715 tons in 1907.

Since the former volume was issued hundreds of bores have been sunk to test the thickness and character of the coal in different parts of the area, and many new mines have been opened up in the development of the industry. Much new data was, therefore, available which has been gathered and compiled by Dr. Ashley and his assistants for the paper in mention. New maps and charts have been prepared and the nomenclature of the different veins corrected where necessary on account of the more available and enlightening data. The paper as presented therefore shows with accuracy the location, character and extent of each of the great workable veins of the State's chief mineral resource. Taken in connection with the former volume, to which it is offered as a supplement, it furnishes to investors, operators and users a fund of available information regarding the coals of Indiana, such as is possessed by few states and excelled by none.

Since it relates to the same subject, the report of the State Mine Inspector, James Epperson, of Linton, Indiana, follows next in order. Mr. Epperson and his four deputies have given careful attention to the duties which they are empowered to perform and have enforced impartially all laws relating to the mining industry. In his report are very full and complete tables of statistics relating to the coal industry for the year, from which have been compiled the following general summary showing the relative rank of the
fourteen coal-producing counties of the State, with the output of each in tons and the amount of wages paid in each.

**Tons of Coal Produced and Wages Paid to Miners in 1908 by Counties.**

<table>
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<tr>
<th>Counties</th>
<th>Tons Produced</th>
<th>Wages Paid</th>
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<tbody>
<tr>
<td>Vigo</td>
<td>2,617,915</td>
<td>$2,239,464</td>
</tr>
<tr>
<td>Sullivan</td>
<td>2,585,883</td>
<td>2,192,550</td>
</tr>
<tr>
<td>Greene</td>
<td>2,257,646</td>
<td>1,767,935</td>
</tr>
<tr>
<td>Vermillion</td>
<td>1,139,669</td>
<td>1,012,142</td>
</tr>
<tr>
<td>Clay</td>
<td>1,029,461</td>
<td>957,286</td>
</tr>
<tr>
<td>Parke</td>
<td>692,945</td>
<td>639,925</td>
</tr>
<tr>
<td>Knox</td>
<td>427,969</td>
<td>398,959</td>
</tr>
<tr>
<td>Pike</td>
<td>424,965</td>
<td>345,960</td>
</tr>
<tr>
<td>Warrick</td>
<td>424,063</td>
<td>299,063</td>
</tr>
<tr>
<td>Vanderburgh</td>
<td>453,774</td>
<td>266,235</td>
</tr>
<tr>
<td>Gibson</td>
<td>170,421</td>
<td>163,179</td>
</tr>
<tr>
<td>Daviess</td>
<td>43,185</td>
<td>58,073</td>
</tr>
<tr>
<td>Fountain</td>
<td>15,849</td>
<td>18,468</td>
</tr>
<tr>
<td>Perry</td>
<td>3,729</td>
<td>4,018</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>11,997,304</strong></td>
<td><strong>$10,304,869</strong></td>
</tr>
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</table>

The table shows a decrease in output for the year of 1,253,411 tons, or 9.4 per cent, under that of 1907. This decrease was due almost wholly to the commercial and manufacturing depression brought about by the monetary panic of 1907-08. Of the coal produced 852,960 tons were block coal and the remainder bituminous. The block coal, mined in Clay and Parke counties, is used almost wholly for domestic purposes and its output was not, therefore, much affected by the stringency in money matters. This is shown by the fact that there was a loss of but 22,273 tons in its output. The amount paid for the mining of the block coal was $1,035,947.

The third paper in the volume, a continuation of those in the preceding report on the Soils of Southern Indiana, is by Chas. W. Shannon and L. C. Snider. In it the soils of Dubois, Crawford, Perry and Daviess counties are classified and the area covered by each of the soil types shown on accompanying maps. The authors give the use to which each of these type soils is best adapted, the kind of fertilizer most needed and much other information which will doubtless be of value to the land owners of the counties mentioned.

The fourth paper is one entitled "The Petroleum Industry in Indiana in 1908," in which is given the principal facts and statistics relating to that industry for the year.

The closely-related but almost exhausted resource, Natural Gas.
is next treated briefly by B. A. Kinney, the State Natural Gas Supervisor, in his annual report.

Next in order is a short paleontological paper, by E. M. Kindle and V. H. Barnett, treating of the fossil forms occurring in the Silurian rocks of Waldron, Shelby County.

The final paper, as is the usual custom, is one relating to Natural History, being "A Descriptive Catalogue of the Mammals Occurring in Indiana in Recent Times," by Dr. Walter L. Hahn, an Indiana man now teaching in South Dakota. Mr. Hahn has for years made a special study of the shrews, moles, bats, squirrels, foxes and other furred and hairy animals of the State, and in his paper has given keys, full descriptions and an account of the habits of each of the species. This information should be of especial value not only to those students in the various schools and colleges who are interested in the natural history of the State, but also to farmers and residents of the country, who come in almost daily contact with these smaller fellow-creatures.