Dubois county, Indiana, is bounded on the north by Daviess and Martin counties, on the east by Orange and Crawford, on the south by Perry, Spencer and Warrick, and on the west by Pike; embracing an area of four hundred and thirty-two square miles.

Of this area, about one-tenth is river and creek bottoms, occasionally subject to inundation; one-half modified drift and alluvion of ancient lakes and rivers, the remainder bold hills and elevated plateaus and knolls, underlaid by the conglomerate sandstone.

The surface varies from high hills, on the east, to gently rolling or level plateaus in the southern, southwestern and northwestern parts.

The county is abundantly supplied with water. The east fork of White river chiefly forms the northern boundary, and Patoka river flows from east to west through the center. These, with their numerous branches, ramify into all parts. Many springs flow out at the junction of the alluvium and recent drift with the older deposits, and at outcrops of impervious strata accompanying coal seams.
The surface deposits of Dubois county consist of clays, slightly intermixed with gravel, or pure, of the glacial drift, and loess with the subsequent lacustrine and alluvial deposits.

The alluvium of the river and creek bottoms is an accumulation due to causes now in action, and it is formed from the decomposition and intermixture of sedimentary material from all the older rocks; hence its friability and great fertility.

At a height of from one hundred and ten to one hundred and twenty-three feet above the present low water of White river, on alternate sides and opposite to great curvatures in the general trend of the valley, other ancient alluvial deposits are found—"sand-bars," dating back to the long past, yet as easily identified as the "bars" which mark the "bends" of the present river. Conspicuous examples may be seen east of Haysville, on "Harbison" farm, west of Haysville, at Portersville and many other points in Daviess and Pike counties. It is evident that the ancient river was subject to the present laws of flowing water. Gravel and boulders torn from the most obdurate rocks toward its source formed shallows and obstructions (rapids) then as to-day. One of these ancient ripples, represented by a bed of geodes from the mountain limestone of Orange and Lawrence counties, is seen on the hill in the west part of Haysville. A similar bed was noticed on the road to Jasper, south of Portersville, both indicating the wide range traversed by this stream before the present valley was excavated.

Lacustrine deposits are found when digging wells in the level plateau in the northwest part of the county, between Ireland and Otwell. They consist of clays and impalpable interclosures of silicious material, occasionally interrupted by thin layers of quicksand. Near the base of these beds are found remains of shrubs and grape vines of enormous growth, indicating, perhaps, the luxuriance of a warmer clime.

The Loess caps the highest hills of the county. Where
undisturbed it is a brown loamy sand, imperfectly stratified, twenty to thirty feet in thickness. Rich in plant-food, it is noted as the "walnut level." We here find on the highest hill-tops, a growth of timber and plants usually limited to the warm loams of the bottoms; as Walnut, Sugartree, Wild Cherry, Spice Wood, Pawpaw and Bluegrass. Examples may be seen at Harbison's walnut grove, east of Haysville, and near Birdseye.

The greater portion of the loess has, in the course of ages been eroded or modified. The soluble ingredients have been removed, while the residual ash-gray sands and clays are left deposited like a sheet of snow covering the hill sides, and partially filling valleys formed previous to the glacial period. The Patoka river has the features* characteristic of streams flowing through loess deposits. The bluffs slope gently down to the valley "bottoms;" these are of much greater width (ranging from one to three miles wide) than would be expected from the present size of the stream. The soil is cold and impervious to moisture; hence very wet in winter and very dry in summer. The usual timber on these bottoms is Elm, Water Maple and Gum; occasionally a choice tract of sandy bottom, but rare indeed, will exhibit a fair growth of Beech, Sugar, Overcup Oak and Poplar.

The plastic nature of modified loess, covering all the older deposits, and hiding from view the ancient bluffs and valleys, renders difficult the work of the geologist, especially in a county like this where remoteness from lines of commercial transit gives no incentive to local mining.

*See White's Geology of Iowa.
a slight intermixture of gravel not exceeding half an inch in diameter. When exposed to the surface, the lower member of the drift is sometimes mistaken for a fire clay. It will furnish good potters’ clay for common crockery.

PALEOZOIC GEOLOGY.

The stratified rocks of this county belong mainly to the coal measures, with a limited exposure of subcarboniferous or mountain lime-stone, in the deep gorges of the head waters of the Patoka river. The entire area of the county is underlaid by coal, excepting only the highlands commencing a short distance north of Birdseye and extending to the northern boundary. Even in this area, occasional outliers will be found on the hill tops, but of no great extent.

The following general section taken at different points will give a connected exhibit of the coals and rocks.
# GENERAL SECTION.

**COMMENCING AT THE HILL NORTH OF JASPER.**

<table>
<thead>
<tr>
<th>Space</th>
<th>Ft.</th>
<th>In.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>2</td>
<td>10</td>
<td>Soil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shaly sandstone</td>
</tr>
<tr>
<td>1.4</td>
<td>1</td>
<td>4</td>
<td>Black slate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CUAL M.?</td>
</tr>
<tr>
<td>20.3</td>
<td>18</td>
<td></td>
<td>Siliceous shales, part sandstone</td>
</tr>
<tr>
<td>1.8</td>
<td>1</td>
<td>8</td>
<td>COAL L?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fire clay with iron nodules</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td></td>
<td>Siliceous shales and covered</td>
</tr>
<tr>
<td>67</td>
<td>1</td>
<td>10</td>
<td>Hard flinty limestone</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>Black slate with iron concretions</td>
</tr>
<tr>
<td>2.10</td>
<td>2</td>
<td>10</td>
<td>COAL K with 2 inches sulphur band</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Fire clay, plastic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>Fire clay, hard</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td></td>
<td>Laminated and ferruginous sand rock</td>
</tr>
</tbody>
</table>
**GENERAL SECTION—Continued.**

<table>
<thead>
<tr>
<th>Space</th>
<th>Ft.</th>
<th>In.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>48</td>
<td>110</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>73</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>339</td>
<td>Total</td>
</tr>
</tbody>
</table>

- Massive conglomerate.
- Gray siliceous shale.
- Calcareous shale.
- Bituminous shale.
- COAL A, part block coal.
- Dark bituminous clay.
- Blue clay shale.
- Siliceous shale with carbonaceous partings.
- Bituminous clay shale.
- COAL, rash.
- Shale fire clay.
- Clay shale with iron nodules.
- Archimedes limestone.
- Oolitic limestone.
## Recapitulation

<table>
<thead>
<tr>
<th>Space</th>
<th>Ft.</th>
<th>In.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>21</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>141</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>79</td>
<td>7</td>
</tr>
</tbody>
</table>

Space.

COAL M?

Space.

COAL L?

Space.

COAL K.

Space.

COAL A.

Space.

Total. 339
COAL L AND M.

The division in the foregoing section, from the shaly sandstone to the fire clay inclusive, includes the strata accompanying two small seams of coal on the hill in the northern part of Jasper, the county seat. Although isolated by surrounding valleys, they probably represent coals L and M, here thin and intermittent on account of proximity to the rim of the basin. These seams have been worked by stripping at this point, and thence westerly and northwesterly, toward the neighborhood of Ireland, they are seen at frequent outcrops at the hill tops, and near the surface in the table lands. In all this region, L and M do not attain a thickness sufficient to justify mining, and are of interest only as a horizon from which to estimate the distance, fifty to sixty feet, down to coal K. Observations made in Pike county indicate a probability that near the county line, a few miles southwest from Ireland, coal L may be found not far from the surface with a thickness of three and a half to four feet.

The silicious shales, number eight of the section, often change into flaggy sandstones, and are generally accompanied by a stratum of solid sand rock from two to five feet thick. Leaves and stems of the coal plants Neuropteris, Pecopteris, Alethopteris, Asterophyllites, Flabellaria (?) and Cordaites were found in the shales of this bed, in the rocky layers; trunks of Sigillaria, Calamites and Lepidodendron are often preserved as casts of wonderful beauty and exactness of detail. This layer furnishes good material for foundations and hammered masonry.

Coal K, of the general section, and the strata, which almost invariably accompany that seam, constitute a marked horizon. Commencing on White river at the north, these strata gradually but irregularly ascend to the summit of this ridge, dividing the waters of White river from those of the Patoka, and then descend to the trough through which flows the latter stream. Thence to the south and east, they mount the conglomerate ridges, often at the rate of 50 feet to the mile, and
after passing the summit of the divide, (now cut through by Hall’s creek, Strait creek and Hunley’s creek,) these strata again descend to near the level of the stream, flowing into the Ohio near the southern line of the county. Some of these companion deposits may be absent or not visible, but the appearance of one or more will generally enable the observer to determine with reasonable exactness the position or place of the missing series. Thus in the valleys or basins these rocks are generally all well developed in regular succession, but as we ascend the sandstone ridges, south, east and northeast from Jasper, and especially as we approach the rim of the coal basin, they become thinner. First the coal disappears, then the bituminous shale is no longer found, and finally, high on the hill tops, out-liers of K are seen, if we may use such a contradictory expression, represented the by notable fire clay and the flinty limestone roof, but all the carbonaceous material which usually lies between them entirely missing, never having been deposited at these points.

These facts in relation to coal K, and similar observations in relation to the final outcrop of other seams in the vicinity establish, as it seems to me, lines which limit the carbonaceous deposits of each particular seam—fixes an absolute margin to our coal measures, and bears damaging testimony against the theory heretofore advanced, that “the Indiana and Ohio coal fields were once connected by continuous deposits of coal over the central and eastern parts of this State, since removed by denudation.”

The internal evidence recorded by either the coal or the limestones considered separately is no less unorthodox, and shows facts which can scarcely be harmonized with the adopted “bog or swamp” theory for the deposition of coals and coal measure limestones. The latter, in the western part of the county, is generally bituminous, sometimes argillaceous, but often so pure as to admit of being burned for lime. Like other coal measure lime rocks it is filled with fossil shells and casts of animals, which are exclusively of marine origin. Prominent among these are the remains
of the gigantic fish *Edestus vorax* (Leidy), chambered shells as *Orthoceras*, *Nautilus*, etc., etc., of great size, *Spirifer*, *Pleurotomaria*, etc.; all of which, either from peculiar adaptation of form, as the chambered shells, or from delicacy of structure such as the minute ornamentation of the *Pleurotomaria* and the fragile tenderness of the spined *Productus*, indicate a home in the profound and quiet depths of a central ocean, remote from the influence of waves as well as from rocky or sandy bottoms, until some mighty current of disturbed and muddy waters impelled by earthquake action overwhelmed these animals—the impure water putting an end to their life, and burying them in the slimy bed deposited over the coal material. At Jasper, and easterly toward the rim of the basin, this limestone becomes more silicious, occasional fossils, battered and worn by long transportation, are found, which belong to the epoch of the subcarboniferous lime rocks, but coal measure fossils predominating.

Still further east, the silicious matter increases. Masses and bands of flints are found imbedded in this stratum until finally the flints predominate over or take the place of the former rock. Here are found some worn fossils belonging to the coal measures; but with many strictly characteristic of the subcarboniferous age, as *Pentremites* (worn) and their stems, Crinoid stems, plates and arms, and highly ornamented plates and spines of *Archaeocidaris*; these last so well preserved as to exhibit the minutest details of ornamentation. Now, these animals, whose home is known to be in the shallow seas which laid down the mountain limestone, could not have lived here. They must have been transported at the time of their death from areas suited to their mode of life, still further to the east, and leave the inference that the seas which sustained these animals of the subcarboniferous age existed within a distance of five to ten miles, at a higher level and cotemporaneously with the deposit of coal K. These facts I have not seen noticed elsewhere. I submit them for consideration, and am alone responsible for the heresy, if they prove heretical.

Again, coal K, in the valleys and basins of lower level, is
usually from two and a half to three feet thick. In the western part of the county, it is generally a caking coal. At the center, it is about one-third block coal, the balance caking or semi-block. At some localities, the block coal is in the middle of the seam, at others, within a distance of a few miles; the block coal may be either at the top or bottom, the caking stratum interchanging with it. While caking coals are generally referred to bogs and the peat of swamps for their origin, the accepted theory for the formation of cannel and splinty coals, is that the vegetation from which they are constituted, was first macerated for a long period in sea water, until pulpified and then cast down. This theory is reasonable, and is sustained by the fact that often in such cannels are found the most solid remains of marine animals, as scales, teeth and spines of *Petrodus* and other fishes. We can hardly conceive of a swamp of such versatility of character—so flexible in its nature, as to allow changes of level during the time necessary for the deposit of a single thin seam of coal, sufficient to make these phenomena accord with Lyell’s theories. The situation would demand dry land swamps, and sea water deep enough to float fishes from twenty to forty feet long, to interchange with bewildering frequency and with reckless disregard of their order of occurrence. I do not hesitate to question the correctness of Lyell’s plan and to believe that theories must be adopted, locating the area of coal deposit in the deep waters of a central ocean.

Returning to the general section, a coarse, black sulphurous slate, with pyritous iron balls, or "bowlders" as they are locally called, is a persistent companion to coal "K." It ranges in thickness from two to eight feet, and occasionally is highly bituminous and free from sulphur. The iron balls or pyritous bowlders are almost invariably present, wedged in the slate near its base. They are highly fossiliferous, containing a few fragments of coal plants, but more generally shells and marine animals. From one of these, broken up at Ingham’s bank, in the northeast corner of Warrick county, besides more than
twenty species of shell fish, Dr. Rust, of Holland, found a fish bone, some eight inches long, in which was inserted a row of large saw-edged teeth. This fossil has until lately been figured and described as the jaw and teeth of a fish of the shark family of great size, under the name of *Edestus Vorax*, Leidy. Professor Cope, who is an unquestioned authority, unhesitatingly unites with Professor Worthen, in the opinion, that this determination is a mistake; that it is not a jaw-bone and teeth, but that it is the dorsal or caudal armature of a ray fish. This would indicate an animal of great size. The bowlder itself was filled with shells, bones, teeth and sulphurous matter, exhibiting just such a preponderance of animal remains as is found to constitute the coprolites often seen in these shales. It is well known that such coprolites are often the nuclei around which the nodules* and iron balls in the coal measures are formed; but this bowlder, and its companions, were homogeneous in their texture. The whole rock must be referred to the same origin. If part was coprolitic, the whole was coprolitic as well. If so, we have in these bowlders a hint possibly pointing them out as the excreta of wonderful monsters endowed with power and capacity to destroy and digest the gigantic *Edestus* and similar animals. The survey is indebted to Dr. Rust, of Holland, the finder, and Dr. Wellman, of Jasper, for this unique specimen of *Edestus*. Figures pretty well representing it may be seen in Geological Survey of Illinois, vol. iv, page 350. Three other specimens have been found: one in Illinois, one in Posey county and another in Parke county, Indiana; all in the bituminous roof shales of coal.

Seam "K," of the general section, underlies near two-thirds of the western part of the county, it varies in thickness from two to four feet, averaging two feet and a half. Generally it is a caking coal; but, toward the eastern margin, it becomes more or less splinty, and at some localities wholly block coal. Sections hereafter given will show details of this seam in different parts of the county. The supply will be found abundant for home consumption with

*See Dana's Geology.*
considerable amounts for exportation if the railway facilities now proposed are ultimately supplied.

The under clays, lying immediately below the coal, are the ancient soil on which the plants rested and lived, which produced this mineral fuel, and whose rootlets (Stigmaria) are seen traversing the clay in every direction; it is generally silicious, and would furnish a fair to good article of fire clay. At other points, as the summit of the sandstone hills, a few miles southwest from Jasper, and at Beeler's hill near Huntingburg, this clay is more aluminous, offering a choice plastic clay, well adapted for queensware potteries. The soft laminated sandstone, number fourteen of the section, varies in thickness from ten to fifty feet, and averages about twenty-two feet. Sometimes it changes into a silicious soapstone as at Huntingburg, and occasionally into thin bedded quarry sand rock; but generally it is constant in its characteristics, with a strong tendency to disintegrate. On the higher levels, this stratum is the horizon at which a sheet of water percolated through the porous sandstone, or sand bed, dissolving and taking up the ferruginous constituents, which we now find deposited as iron ore on the brow and sides of the conglomerate hills. These sands probably formed at that era a bluff margin, either to a basin of ordinary water, or else to a basin of waters of a particular specific gravity near whose surface the mineral was deposited.

The massive conglomerate sandstone comes next in the section. It is a prominent feature in the eastern side of the county. Like a massive wall it encloses the true coal basin. From the sides of this wall several spurs are thrown out, one of which continues entirely across the county from east to west, south of Patoka river. This deposit may be characterized as a coarse-grained, ferruginous, massive or heavy bedded sandstone. Occasionally, the upper beds are filled with small pebbles of quartz, jasper, etc., relics of some older age of the ever changing earth's existence. Generally the pebbles, which give the name Conglomerate to the forma-
tion, are absent; and, at some rare stations the rock is soft and fine-grained.

Hills from two to four hundred feet in height, alternate with deep narrow valleys cut out by the wear of small creeks or springs, and which are often bounded by precipitous or overhanging sides. Crevices, now filled with clays and fragments from above, were seen piercing the rock from the top to a depth of more than one hundred and fifty feet, yet hardly exceeding one or two feet in width. Good examples of this kind were also seen at Shoals in Martin county, and at "High Rock" in Daviess county. For their origin we must look to oscillations in the earth's crust—a gentle earthquake parting. They were probably the primal agency which called into existence many of the valleys and gorges which so often cross the ridges and spurs of this rock in a straight line, utterly disregarding the level of the adjoining table lands.

From the coarseness of the materials (coarse sand and pebbles) we know that the Conglomerate was borne to its place of deposit by strong currents of water, and, from false bedding of the strata, that the current was subject to changes of direction, by erosive cross-currents. In these waters floated many of the coal plants. The leaves and delicate plants were worn or destroyed by the angry waves; but trunks of Sigillaria, Stigmaria, Lepidodendron and Ulodendron are common, the casts sometimes preserving their beautiful markings with wonderful delicacy. At some points balls, cylindrical rolls, and pellets of coal were observed near the base of this rock; showing that coal material, perhaps, torn from some regular seam while yet soft and plastic, had been rolled along with the moving water until moulded by its action into the forms most likely to be produced by such a state of affairs, then bedded down, to be changed to coal by pressure and time.

Just beneath the massive sand rock, the gray silicious shales, of the section, are found varying from two to twenty-four feet in thickness. Carbonaceous and pyrites partings, and plant remains abound. On
exposure, this shale decomposes, rendering the stratum friable, and forming soluble salts. This material is carried away by the creeks and winter torrents, while the massive rock above remains. Thus are formed the "rock houses," and "pot houses" so frequently seen in this region.

The calcareous shales sometimes changing into limestone, are pretty constant, but sometimes absent. Generally shaley and so unimportant as to scarcely merit notice, yet when hardened into lime rock they form a notable feature. On King's farm, near Birdseye, this limestone is largely thickened up, and underlying shales come in of considerable depth. This, and a few other exposures noticed near Schnellville, and in the southeast part of the county, are exceptions to the general rule.

Coal A, of the section, is almost invariably capped with a black, highly bituminous slate, generally closing some pyritous iron stones. Small developments of cannel coal were occasionally noticed in this slate; and, although not thick enough at any of the exposures to be of practical value, yet, from the existence of this kind of coal at neighboring localities in Daviess, Pike and Perry counties, we may expect its discovery hereafter in valuable bodies. Seam A, under-runs the whole county, except the highest conglomerate ridges on the eastern border. It varies in thickness from one to four feet, averaging about one foot and two inches. A reference to the Chemist's report will show that it is rich in carbon. This tends to equalize the fuel value of this with thicker seams; for it will be found more economical to mine the same amount of combustible material (carbon) from a thin seam than from one of much greater size. The coal is compact, generally splinty, of virtreous lustre, conchoidal fracture and so free from charcoal dust as to make it pleasant and desirable for parlor use, as well as for that of the iron master.

At a distance of from twelve to eighteen feet below, a thin seam of brash coal was seen at several exposures. It is not persistent, and was not found to exceed one inches in thickness, and often a mere trace. When materials
from the Blue clay shale to the clay shale with iron nodules inclusive, are absent, they have been eroded, by currents of sufficient power to transport the coarse sands which now replace these strata with heavy sand rock at a few localities, and form the base of the conglomerate.

The subcarboniferous or mountain limestone county is exposed in this county only along the streams. The head waters of Patoka have cut their deep, narrow valleys through the conglomerate, bringing to view the underlying rocks on Davidson's creek, Cane creek, Lick fork, and Patoka river. Quarries have not been opened in this bed, and the precipitous sides of the valleys are generally covered with fragmentary debris from above, so that good sections could not be obtained. No well preserved fossils were found, but the spirally-turned stems of Archimedes, with Pentremites of several species, were common in the upper member (number 27 of the section.) Below, some fifty feet of light colored oolitic stone was seen, which furnishes choice white lime. As usual, large springs burst out from these rocks, some of which are accompanied by a great volume of cold air, indicating a cavernous opening within the hill. A notable example on the Burton farm, section 22, township 1 north, range 3, is worthy of a special mention.

In the foregoing discussion of the general section, I have given a summary of the geology of this county sufficiently complete for the requirements of the student and general reader. To this will be added sub-sections from different parts, selected as most characteristic of each particular neighborhood, giving details for local information.

LOCAL DETAILS.

That part of the general section commencing at the sandstone, below coal K, and measuring up to the highest known strata, was taken in the town of Jasper, and on the hill to the north. A repetition is unnecessary. Coal K here averages two and a half feet in thickness, and is
fully one-half block coal. It has long been worked for local use, but, for want of transportation, to no greater extent. Samples comparing favorably with the Clay county coals were selected for the State Cabinet. The upper seams L? and M? have been worked by stripping. They are also found in the hills west of town, and north on the Portersville road. Along the road to, and at Ireland, several outcrops either of the coals or of their more enduring under-clays were observed. Near their final outcrop the coals are here thin, as well as impure, and will never probably be found to be of any practical value. Many of the under clays are highly plastic, and would furnish good potters' clay.

West of the thriving village of Ireland, for miles, a perfectly level plateau of ancient lacustrine alluvium is spread out, which covers the lower workable coals. This plateau, one hundred and twenty feet above White river, is walled, on the side towards the north by gentle bluffs, often of sand, from twenty to twenty-five feet above its level, analogous to the "coast" or levee embankment of the Mississippi, for the ancient river which once flowed here.

Going south, seam K is reported visible at low water on Egg's land, southwest quarter section 35, township 1 south, range 5, of a good quality, splinty fracture, and three to three and a half feet thick. The bank was not opened. This was also the case as to coals reported three feet thick on Kato's and Heif's land. South of Jasper, at Gerber's, near center of section 1, township 2 south, range 5, considerable coal has been mined for blacksmiths' use.
DUBOIS COUNTY.

SECTION AT GERBER’S.

Soil.................................................................
Sandstone................................................. 12 ft. 0 in.
Shaly sandstone................................. 4 ft. 0 in.
Limestone with flints..................... 2 to 3 ft. 0 in.
Calcareaous shale................................. 1 ft. 2 in.
Black bituminous shale................. 1 ft. 0 in.
Silicious and pyritous shale........... 2 ft. 6 in.
Coal K........................................ 2 to 3 ft. 6 in.
Fire clay.................................................

------------------------- 27 ft. 2 in.

The coal was not being worked, only weathered samples could be obtained; and these were rather too sulphurous for comfortable use. The limestone above K, is interrupted by layers of flint from two to five inches thick. Attempts to burn for lime have consequently failed.

Descending the Patoka, at Spaur’s mill, banks have been opened, and also on the land of A. Smith. This coal, judging from weathered specimens, is a fair caking coal, and is three feet ten inches thick.

At Keshner’s mill, northeast quarter, section 18, town-
ship 2 south, of range 5, the strata are thrown up, showing the heavy bedded sandstone above the conglomerate near the water level. Fifty feet above, the limestones accompanying K, are seen on the hillside in great blocks or heavy bands.

SECTION AT KESHER’S MILL.

Limestone with Productus semireticula-
tus, P. punctatus, Spirifer cameratus,
Athyris subtilita, Pinnae and Crinoid
stems.............................................. 8 ft. 0 in.
Covered..................................................... 20 ft. 0 in.
Coal K........................................... 21/2 to 1 ft. 0 in.
Fire clay............................................... 4 ft. 0 in.
Soapstone with iron nodules.............. 2 ft. 0 in.
Silicious shales and sandstone.......... 16 ft. 0 in.
Laminated and heavy bedded sandstone.12 ft. 0 in.
Patoka river........................................

------------------------- 63 ft. 0 in.

G. R.—14
Near by, in sections seven and eighteen, obscure outcrops of K were noticed in the beds of branches, but without opportunity of measurement. A very choice specimen of gas coal was picked up in a branch on the Green farm.

On Samuel Dillon’s farm, sections five and eight, same town and range, coal has been mined to supply demands for grate and blacksmiths’ use; and the well developed limestone has supplied the local market with lime, quantities of which was being used in building the new Catholic church at Jasper. With much difficulty the following section was obtained:

SECTION AT S. DILLON’S.

Covered...........................................50 ft. 0 in.
Sandstone and silicious shales.....20 to 30 ft. 0 in.
Limestone with Productus punctatus, P. semireticulatus, P. costatus, Spirifer cameratus, S. lineatus, Athyris subtilita, Myalina, Discina, Cyrtoceras, Nautilus, Conularia, Pleurotomaria, Macrocheilus, Pecten Indianensis, and Crinoid stems......................... 8 ft. 0 in.
Covered and sandstone...................15 ft. 0 in.
Gray and blue silicious shales...........12 ft. 0 in.
Coal K:
Semi-block.............................. 9 in.
Good block.............................. 8 in.
Caking.........................................1 ft. 4 in.

Dark fire clay............................ 5 ft. 0 in.

122 ft. 9 in.

Coal on section six, immediately west, Mr. Rothert reports as being two feet thick, and as burning entirely up, leaving but a small quantity of pure white ash.

Going north to White river, coal K has been worked at McCain’s and Alcorn’s in sections thirty-six, twenty-five, twenty-six, and at Lemmon’s, section twenty-four. It is of fair quality, but somewhat sulphurous.
**SECTION NEAR MCCANE'S, TOWNSHIP 1 NORTH, RANGE 6.**

<table>
<thead>
<tr>
<th>Layer</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cherty limestone</td>
<td>8 to 10 ft. 0 in.</td>
</tr>
<tr>
<td>Thin bedded sandstone</td>
<td>12 ft. 0 in.</td>
</tr>
<tr>
<td>Silicious shale</td>
<td>3 ft. 0 in.</td>
</tr>
<tr>
<td>Soft bituminous shale</td>
<td>0 ft. 8 in.</td>
</tr>
<tr>
<td>Coal K</td>
<td>4 to 3 ft. 1 in.</td>
</tr>
<tr>
<td>Fire clay</td>
<td>3 ft. 6 in.</td>
</tr>
</tbody>
</table>

90 ft. 3 in.

Coal A is seen in the bed of White river, on section twenty-four, here brought up by a ridge or hill of the olden time. Across the river in Daviess county, one hundred and twenty feet above, are relics of the cherty limestone roof of K. Intermediate, a perpendicular or projecting wall of conglomerate overlooks the valley. Riven by a crevice from top to bottom, and bruised by storm and flood, it bears strong testimony to the good quality of the rock, and furnishes a section of great interest to the geologist. (See general section numbers 14 to 24, inclusive.) The fine sands within the heavy roofed "rock houses" were filled with small funnel shaped depressions. They were the trap like homes of the ant lion.

In the neighborhood of Portersville, coal K crops out on almost every hillside, and where not visible, its position is at once indicated by the cherty limestone, which so constantly accompanies it. It has been worked for years to supply the village mill, as well as for smiths' use throughout all the neighboring region. A portion of the seam is especially sought after for the latter purpose.

Outcrops or openings were visited on the lands of Snare, Osborn, Graham and the Steam Mill Company, on sections 19, 20 and 21, township 1 north, range 5, where the average thickness was about three feet. The quality was found satisfactory for steam and smiths' use.

The following measurements on John Harris' farm, east of Portersville, gives a fair exhibit of the rocks in this vicinity:
SECTION EAST OF PORTERSVILLE.

Silicious shales and covered........... ...........
Silicious lime rock with chunks and
layers of chert and "tripoli"....5 to 10 ft. 0 in.
Calcareo-magnesian shale, ferrugin-
ous........................................3 to 2 ft. 0 in.
Flinty limestone............................ 4 ft. 0 in.
Silicious shales............................ 12 ft. 0 in.
Bituminous slate............................ 3 ft. 0 in.
Coal K:
Rich gas coal............. 1 ft. 2 in.
Parting ....................0 to 4 in.
Semi-block............. 1 ft. 10 in.

Fire clay......................................... 2 ft. 0 in.
Sandstone and conglomerate............. 35 ft. 0 in.
Water level........................................

71 ft. 4 in.

For analysis of different parts of this seam I refer to the Chemist's report.

The limestone of the general section is here greatly thickened up, and becomes highly silicified, or changes more or less into chert, with cavities filled with silicious material, which has been used for the manufacture of an excellent polishing powder substituted for tripoli.

Bridenbaugh's coal, section twenty-seven, is also highly esteemed; it is overlaid with beds of black bituminous shale from three to eight feet thick. The adjoining stream, Mill creek, has cut a valley through the coal and these shales; hence a large admixture of bituminous matter in its alluvial bottoms. Decomposition sets free inflammable gases; combustion is produced on contact with the air and, according to the mode of escape, forms jets or balls of fire. Often two or more of the latter have been seen at one time traversing the valley with the uncertain motion of the wind, and with
a brilliancy reported as equaling the head-light of a locomotive. The superstitious believe them to be the wandering ghosts of persons who have been drowned in the stream.

The following measurements, taken on James Harbison's land, northwest section 26, township 1 north, of range 5, give another view of the space from K down to coal A:

**SECTION AT HARBISON FARM.**

Ancient alluvium..............................20 ft. 0 in.
Ancient riffle-flints and geodes..............30 ft. 0 in.
Coal K, block (reported)........................2 ft. 2 in.
Thin bedded sandstone.........................5 ft. 0 in.
Massive conglomerate.........................50 ft. 0 in.
Silicious and pyritous shale..................2 ft. 1 in.
Black bituminous shale with carbonaceous partings..................................................................1 ft. 2 in.
Coal A:
Choice cannel..................................0 ft. 3 in.
Choice bright coal...............................1 ft. 4 in.

Stigmarial fire clay............................4 ft. 8 in.
Silicious shale, bituminous partings..........15 ft. 6 in.
Silicious iron ore.............................2 in. to 8 in.
Silicious shale and flaggy sandstone.........5 ft. 6 in.
Low water of White river........................

128 ft. 3 in.

In this section, the alluvial sands one hundred and twenty-eight feet above White river are too coarse and pebbly for loess. We can only refer their origin to the high water line of the adjoining stream then flowing at a level nearly one hundred and ten feet above its present channel. As before mentioned, a bed of flints, pebbles and geodes, mostly derived from the mountain limestone of Orange and Lawrence counties, is found in this deposit immediately below the sand; other riffles containing like materials are seen south of Portersville, and on the hill in the western part of
the village of Haysville, at an average elevation of about one hundred and ten feet above the present level of White river. The sand bars are more continuous, following the river bluffs for miles, where not eroded by creeks cutting through to the river, at an elevation of one hundred and thirty feet above low water in the northeast part of the county, but, in traversing the county from east to west, approaching to within one hundred and eighteen feet of the river, and showing that the ancient stream had more fall than the present river, unless the channel was more tortuous.

The region about Haysville has been subject to severe denuding forces. Coal K has been principally removed. A is seen at the foot of all the hills beneath the massive sandstone. For local purposes, coal has been mined by Potts, near Wolf creek, reported to be of good thickness, near the mouth of this creek, at "Rock House" Ford of White river, Col. Edmonston, found part of a Mastodon skeleton. One of the teeth was presented to Dr. Owen when State Geologist, and is probably in the University cabinet.

Near Kellersville, coal K, near its eastern bounds, is thin or not present. The flinty limestone, with Spirifer camara tus, Productus semireticulatus, etc., etc., is met on the hill-tops, indicating the place of the coal, at an elevation of two hundred and fifty-five feet above White river. At Portersville, it is forty feet above the river. By subtraction, we find that K dips two hundred and fifteen feet or twenty-seven feet to the mile going west. Banks were formerly worked in sections 20, 22, 23 and 27, township 1 north, range 4, west, on the lands of Frederic Theruff, John Light and Washington Noble. The thickness was reported at from two to three feet, and the quality fair to choice for smiths' use.

At localities heretofore mentioned, the "conglomerate" is a massive, coarse, ferruginous sand rock. Here, for the first time, we find small pebbles, which become more numerous and of larger size to the east and north, and approach somewhat to the typical form, from which the name is derived. Iron ore was noticed on the hill-top west of Ludlow, some, although silicious, of good quality.
Davidson creek enters the northeast corner of the county, and, nearly in a straight line, flows in a southwesterly direction to a junction with Patoka river. On account of directness and easy grades, the banks of this creek have been selected as the route for the proposed "Rockport and Cincinnati Railway." The creek has cut a deep narrow valley down to the base of the conglomerate, and, near its sources, sixty feet below, into the solid limestone underlying.

Coal A has been formerly worked at the following localities, producing samples of compact heavy coal, with bright resinous lustre, and splinty fracture, and very rich in carbon:

Elkin's bank, southeast quarter, Sec. 29, T. 1 N., R. 3 W.
Burnham's bank, northeast quarter Sec. 28, T. 1 N., R. 3 W.
Burnham's bank, southwest quarter Sec. 21, T. 1 N., R. 3 W.
—— bank, north half Sec. 21, T. 1 N., R. 3 W.
Nicholson's bank, northwest quarter Sec. 23, T. 1 N., R. 3 W.
Harrison's bank, at southeast corner Sec. 14, T. 1 N., R. 3 W.

The openings were for local blacksmiths' use only, and were made by stripping. The coal where seen was from twelve to fourteen inches thick. Dr. E. H. Sabin who is one of the directors of the Rockport and Cincinnati Railroad, has been making explorations since my visit, and informs me that he has found at several points, coals ranging from three to four feet in thickness.

Iron ores were met at several localities marked on the map. The "pot" or "pipe ores" are very pure, and where found in sufficient quantity the quality will prove satisfactory. Ochreous and silicious ores are more plentiful, but leaner. The latter will only be useful to mix with the richer ores of Michigan and Missouri.

In this valley, silicious shales generally fill the space between coal A and the limestone. At some stations they are replaced by solid massive sandstone, resting unconformably upon the latter, and containing many stems and trunks of coal plants, nearly all worn beyond recognition by the friction of coarse material, excepting only Stigmaria, Calamites and a very few specimens of Lepidodendron.
The lime rock hollowed out by the creek is the upper member of the mountain limestone, but was so covered by the talus from the superimposed sandstone as to afford meager opportunity for study. The fossils were worn and broken. No good specimens were obtainable. The following were noticed: Pentremites (2 sp.,) Crinoid stems, plates and arms, Terebratula, Bryozoans (3 sp.,) and Archimedes. The lower oolitic member, fifty feet in thickness, is the lowest and oldest exposed formation in the county, and consists almost entirely of wave worn, crushed remains of shells, corals, crinoid stems, etc., pure and of a white "stone color;" this will prove desirable for quarry purposes as well as for burning into lime, when the projected railroads furnish transportation. In fact this valley abounds with choice building material which are especially wanted in the counties to the west and southwest. To the agriculturist, the ample and cheap supply of lime which may here be obtained will be a blessing.

A bed of choice glass sandstone was noticed on the land of Wm. Hoggett, northeast quarter northwest quarter, section 17, township 1 north, range 2 west, near the county line in Orange county. On exposure to the air, it disintegrates and becomes white and will prove an important article of trade.

During my stay in this part of the county I was indebted for hospitality, information and guidance to the Hon. Leroy Cave. His intimate acquaintance with localities made his assistance especially valuable.

Other exposures by denudation of the mountain limestone are reported on the head waters of Patoka and its affluents, commencing near the east side of section 4, township 1 south, range 3 west, and extending thence easterly to the county line. Time did not admit of an examination of this locality, but undoubtedly the exposures seen in the Davidson creek valley are here repeated.

Township number one south, range three west, is underlaid by the massive conglomerate, the thickness here ranging from fifty to ninety feet. The surface is moulded
into mighty hills by erosion of branch and creek valleys. These ravines occasionally cut down to coal A, which has been worked to a small extent at Elm Lick Bank, on the land of E. McMillan, northwest quarter section 8, township 1 south, range 3 west, with a reported thickness of two and a half feet, and at Coal Lick Bank, on W. Williamson's land, west half northeast quarter section 6, township 1 south, range 3 west, where it is twelve to fifteen inches thick. Fair specimens of silicious and ochreous ore of iron was found on sections five, six, eight, nine and seventeen, same town and range.

At the east end of the mill-dam at Knoxville were noticed the following fossils, Lepidodendron (3 Sp.), Sigilaria (2 Sp.), Alethopteris Serlii, Cordaites borassifolia, and Calamites; in the bituminous lime rock, Spirifer cameratus, Athyris subtilita, Productus costatus, a Rhynchonella, and a Phillipsia.

In that part of township number one south, range number four, on the south and east side of Patoka, the conglomerate ores of iron are more abundant. Good to fair surface exposures were noticed on the following farms, viz.:

Stevenson, north half section number 16.
Dudine, southwest quarter section number 15.
Brochman, northwest quarter section number 22.
Brooemer, northwest quarter section number 22.
Breitweiser, northeast quarter section number 29.
Unaway, northwest quarter section number 28.

At many of these localities "pipe" or "pot" and ochreous ores were of rather superior quality, especially at the hill southeast of Riley's mill, locally known as the "Iron Mountain." At all these points the quantity of ore I fear is limited. This fact can be settled by excavation only.

Coal K has formerly been worked to a small extent at Fecher's, section 20, Herbig's and Krass', section 29, and at Snyder and Friedland's, section 31, all township 1 south, range 4. The banks had fallen in, and no opportunity of measurement was afforded. The thickness was
reported at two to two and a half feet. Powel and Stein's bank, section 23, same township and range, was visited under the guidance of Dr. Stevenson. The roof had fallen in; a few fragments found indicated a good smithing coal. In the compact under-clay, we saw casts of *Stigmaria, Fucoides*, showing the bark between the bud pits beautifully ornamented with lines arranged in concentric rings around the pits. The spirally twisted spines or rootlets were in good preservation.

At Jasper, coal K is seen at low water. Going east, the surface presents a succession of valleys and hills gradually increasing in height until at the east line of the county it attains an elevation of four hundred feet above Patoka river. The coal rising at the rate of fifty to seventy feet per mile soon mounts to the surface, and thence to the east the more persistent limestone roof can still be seen, indicating the place of the seam; the coal itself being no longer present.

These flints were common near V. Beitz's, sections 35 and 36, township 1 south, range 4 west, accompanied by a considerable quantity of ochres of many colors. Immediately below was seen the red sandstone, the level at which the silicious iron stones are found, supported by the massive conglomerate sixty to one hundred feet thick.

Near Celestine, coal A has been worked on the following lands, affording a fair article of steam coal, but generally with some sulphur present:

Schneider's, northeast quarter Sec. 35, T. 1 S., R. 4.
Kish's, northeast quarter Sec. 4, T. 2 S., R. 3.
A. Kish's, northwest quarter Sec. 4, T. 2 S., R. 3.
Hawhee's, northwest quarter Sec. 3, T. 2 S., R. 3.

These banks were not in work, and were reported to range from two to three feet in thickness.

Near the last mentioned banks a coarse, disintegrating white sand rock was noticed, which would furnish a fair article of glass stone. Going southward along Prechtel branch this stratum was seen at intervals, but frequently
the material was fine and well compacted, as on sections 15, 16, and 22, where the glass-rock and grits suitable for grindstones often change into a heavy bedded deposit of beautiful snow-white sand rock. This is valuable, and will be sought after for door and window caps, and ornamental coping and cornice work of first class city buildings. Having a capacity to withstand great heat, this stone will be found especially desirable in buildings sought to be made fire-proof.

The following section was taken on Mrs. Conly's land, east half southeast quarter section 16, township 2 south, range 3, near the foot of the hill:

SECTION AT CONLY'S.

<table>
<thead>
<tr>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope</td>
<td></td>
</tr>
<tr>
<td>Massive red conglomerate</td>
<td>47 ft. 0 in.</td>
</tr>
<tr>
<td>Coarse red sand rock, with many Sigillariae and Lepidodendra</td>
<td>8 ft. 0 in.</td>
</tr>
<tr>
<td>White sandstone</td>
<td>10 ft. 9 in.</td>
</tr>
<tr>
<td>Hard, fine snow-white grit and ornamental rock</td>
<td>7 ft. 0 in.</td>
</tr>
<tr>
<td>Limestone, coarse, silicious, with Disicina, Spirifer cameratus, Productus costatus, etc., etc.</td>
<td>10 to 4 ft. 0 in.</td>
</tr>
<tr>
<td>Covered</td>
<td>12 ft. 0 in.</td>
</tr>
<tr>
<td>Coal A</td>
<td>1 to 2 ft. 0 in.</td>
</tr>
<tr>
<td>Fire clay</td>
<td>2 to 4 ft. 0 in.</td>
</tr>
</tbody>
</table>

On Hall and Prechtel creeks strong springs (brackish) often break out at the foot of the hills. Almost invariably they may be taken as an indication of coal, as they flow out above or below impervious strata connected with seam A.

In the vicinity of Schnellville no mines were being worked. Outcrops were observed, or openings had been made, at the following localities, viz:
McIntyre, north half Sec. 18, T. 2 S., R. 3 W.
Burnham, southwest quarter Sec. 14, T. 2 S., R. 3 W.
Cooke, northeast quarter Sec. 14, T. 2 S., R. 3 W.
Hanger, northeast quarter Sec. 15, T. 2 S., R. 3 W.
McCarthy, east half Sec. 16, T. 2 S., R. 3 W.
Conly, S. E. quarter S. E. quarter Sec. 16, T. 2 S., R. 3 W.
Conly, south half Sec. 20, T. 2 S., R. 3 W.
Main’s, southeast quarter Sec. 21, T. 2 S., R. 3 W.
Shoulder, north half Sec. 21, T. 2 S., R. 3 W.
Atkins, north half Sec. 21, T. 2 S., R. 3 W.
Grant, west half Sec. 22, T. 2 S., R. 3 W.

The above coals are from one to two feet, rarely exceeding eighteen inches in thickness, and of fair quality. Kidney and ochreous iron stones occur on sections nine, fourteen, twenty and twenty-two; the ochres have been used for painting houses and barns, the colors prove brilliant and durable.

Two miles and a half south of Schnellville, and on the line of the proposed Louisville and St. Louis Railroad, coal A becomes of good thickness. J. D. Hays’ bank was being worked, affording a compact, splinty-cannel coal free from sulphur, of a bright vitreous lustre almost as clear as anthracite, and equal if not superior to any other western coal. For analysis I refer to the Chemist’s report:

SECTION AT J. D. HAYS’ BANK. (WEST HALF NORTHWEST QUARTER SECTION 33, TOWNSHIP 2 SOUTH, RANGE 3 WEST.)

Slope .............................................. 15 ft. 0 in.
Massive sand rock .................. 20 to 40 ft. 0 in.
Yellow ferruginous sand rock........... 15 ft. 0 in.
White sand rock .......................... 12 ft. 0 in.
Soapstone ................................. 2 to 15 ft. 0 in.
Argillaceous and Calcareous iron stones. 1 ft. 6 in.
Blue shale, pyritous ........................ 3 ft. 0 in.
Black shale ............................... 2 ft. 6 in.
Coal A:
Slatyannel. 0 ft. 3 in.
Bright splintyannel. 2 ft. 4 in.
Coarseblock. 0 ft. 8 in.

3 ft. 3 in.

Fire clay. 3 ft. 0 in.
Shaly sandstone. 10 to 15 ft. 0 in.

(Continued from a neighboring point)
Black and blue bituminous shales. 12 ft. 0 in.
Rash coal. 0 ft. 2 in.
Fire clay. 2 ft. 0 in.

139 ft. 5 in.

This seam is not thick, compared with those of other regions; yet, when the large proportion of carbon in a condensed form, the freedom from dust and other offensive admixtures, and the handsome appearance is taken into consideration, its value and importance becomes at once apparent. Desirable for parlor use, it will work not less satisfactorily in the blast furnace. An opening of the same seam on the Weidenboner farm, northeast quarter section 33, made by George Laughbemies, showed thirty-two inches of coal nearly equal to that of the Hays' bank.

LIST OF OPENINGS NEAR HAYS'.

J. D Hays, northwest quarter Sec. 33, T. 2 S., R. 3 W.
Wash. Chandy, southwest quarter Sec. 33, T. 2 S., R. 3 W.
Dr. Railing, N.E. quar. N.W. quar. Sec. 33, T. 2 S., R. 3 W.
Joe. Weidenboner, N. E. quarter Sec. 33, T. 2 S., R. 3 W.
E. Able, jr., southwest quarter Sec. 28, T. 2 S., R. 3 W.
E. Able, sr., northwest quarter Sec. 34, T. 2 S., R. 3 W.

These mines will average about three feet of good coal.

Going east from the Hays bank, the highway passes over a succession of ridges from two hundred and fifty to three hundred feet above the Patoka at Jasper, and ascends at Birdseye to the most elevated point visited in the county,
four hundred feet above the Patoka and eight hundred and seventy-five feet above the ocean.

The "massive" band of sandstone is here very compact and widens to a thickness of from fifty to one hundred feet. In it are seen rolls and sporadic sheets of coal of small extent, while more regular seams, subject to currents strong enough to transport the coarse material of which the sandstone is composed, are frequently interrupted by erosion or paucity of material. Beneath the massive sand rock are well developed beds of pyritous shales, which, on exposure to the atmosphere, decompose and melt away, while the mighty stratum above still remains, forming "rock houses" under which droves of animals and whole tribes of Indians have been known to take shelter from the snows and storms of winter. From the precipitous face of this roof, large blocks of stones have fallen, which no doubt served to ward off winds and drifting snows, and at other times as seats and lounges for our barbaric predecessors. In these blocks cylindrical cavities, having a depth of from six to twenty inches and a diameter of about five inches, are found. Perfect in form and apparently showing design in their construction, they are locally known as "Indian mortars," for grinding corn and roots. They may possibly have been used for this purpose but their origin is probably due to natural causes.

Seeking shelter from a passing shower in one of these houses, I noticed a small stream of water falling upon the flat surface of the block of stone upon which I was seated. A few tiny pebbles from the conglomerate above were collected in small depressions and kept in constant motion by the dropping water. Thus drops of water and shot-like pebbles were drilling basins down into the solid rock. This experience was afterwards repeated at other localities.

Knolls of loess cap the highest hills, furnishing a rich loamy soil, which produces poplar, maple, spicewood, paw-paw, and other shrubs indicating an alluvial soil. This deposit is from twenty to forty feet thick in the north half section 25, township 2 south, range 3 west.

Near Birdseye, seam A has been opened at the following
places, furnishing a fair to good article of coal, in thickness varying from eighteen inches to three feet and averaging twenty inches, viz.:

D. Pruitt's, N. W. qr. S. W. qr. Sec. 24, T. 2 S., R. 3 W.  
T. King's, northwest quarter Sec. 25, T. 2 S., R. 3 W.  
J. King's, northeast quarter Sec. 25, T. 2 S., R. 3 W.  
Coal Spring, N. E. qr. N. W. qr. Sec. 26, T. 2 S., R. 3 W.  
Ab. Pruett's, northwest quarter Sec. 26, T. 2 S., R. 3 W.

A stratum of bituminous limestone eight to twelve feet thick was visited on southwest quarter of southwest quarter of section 24, and northeast quarter of section 21, township 2 south, range 3 west. It was about the level of coal A, but connection could not be seen. It contained Productus costatus, Spirifer cameratus, Athyris subtillita, and plant remains.

Good ores of iron were noticed on the farm of S. Pruett, southwest quarter section 23, township 2 south, range 3 west. Upon completion of the railroad near, this deposit will merit exploration.

In Crawford county, three to four miles northeast from Birdseye, coal A is found on the farms of P. Newton, Mr. Dewitt J. B. King and Lewis Morgan, reported to have an average thickness of two feet.

The north half of township 3 south, range 3, presents a succession of hills, sometimes rounded by circular ravines into the form of pretty regular cones. One of these was found on measurement to be two hundred and fifty feet high, and capped with loess loam. Half way down the side flinty limestones and ochreous and kidney iron ores indicate the place of seam K, here at its easterly margin not endowed with coal. Below are the different members of the conglomerate sandstone, with the massive division, at places widened up to a thickness of over one hundred feet. At the foot of the hills, many strong springs burst out, with waters impregnated with salt, sulphur and iron. They are regarded as a pretty sure indication of coal or of the imper-
GEOLOGICAL REPORT.

vious strata accompanying seam A. Wood is abundant. There is no demand for coal, and none dug or looked for.

Out-crops occur on sections number 2, 3, 6, 7, 16, 17 and 18. No work was being done. No measurements could be secured. The reported thickness ranged from two to four feet with an average over three feet.

Going westward from Schnellville, we find a heavy ridge of massive sand rock projected into the coal basin. It is cut across by Hall's creek, Strait creek and their branches, and divided into a succession of hills or peaks from two to three hundred feet high. The upper portion of these is often covered with loess, or, under clays and remnants of the flinty limestone roof of coal K. The soil of the lower knolls and valleys, composed of the pulverized debris quarried from the coal measures and mountain limestones by powerful currents flowing from the east at the close of the glacial period, is a sandy loam and often of a reddish tint from the presence of ferruginous matter derived from the subcarboniferous iron ores. Pears and other tender fruits may be grown here at great advantage. A fine grove of chestnut trees is found on sections 14 and 23, township 2 south, range 4 west. Another on section 13, laps over into section 18, township 2 south, range 3 west.

At St. Anthony, seam A is worked to supply A. Kesler's steam mill. It is here well developed, ranging in thickness from three to four and a half feet, and averaging three feet seven inches. The coal is of good quality; the middle division bright, lustrous, compact, splinty cannel, rich in carbon, and will probably answer for all purposes for which block coal is needed.

SECTIONS AT KESLER'S, ST. ANTHONY.

Slope covered................................. ........................
Ferruginous sandstone ..................... 20 ft. 0 in.
Massive conglomerate ..................... 20 to 40 ft. 0 in.
Sandy shale ................................. 8 to 10 ft. 0 in.
Black bituminous clay shale .......... 3 ft. 0 in.
### DUBOIS COUNTY.

<table>
<thead>
<tr>
<th>Coal Description</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyritous slaty coal</td>
<td>0 ft. 3 in.</td>
</tr>
<tr>
<td>Cubic coal</td>
<td>3 in.</td>
</tr>
<tr>
<td>Compact splinty coal</td>
<td>1 ft. 3 in.</td>
</tr>
<tr>
<td>Slaty cannel</td>
<td>5 in.</td>
</tr>
<tr>
<td>Caking coal</td>
<td>1 ft. 0 in.</td>
</tr>
<tr>
<td>Rash coal, sulph. balls</td>
<td>0 ft. 9 in.</td>
</tr>
<tr>
<td>Fire clay</td>
<td>4 ft. 0 in.</td>
</tr>
<tr>
<td>Ferruginous sandstone</td>
<td>5 ft. 0 in.</td>
</tr>
</tbody>
</table>

Total: 86 ft. 0 in.

Out-crops and old openings are seen at the following points, viz.:

- Reed's, northwest quarter Sec. 13, T. 2 S., R. 4 W.
- Klein, northwest quarter Sec. 24, T. 2 S., R. 4 W.
- Miller, northeast quarter Sec. 23, T. 2 S., R. 4 W.
- Kunkle, northwest quarter Sec. 25, T. 2 S., R. 4 W.
- Cox, northwest quarter Sec. 21, T. 2 S., R. 4 W.
- Cox, northeast quarter Sec. 21, T. 2 S., R. 4 W.
- Fleck, northwest quarter Sec. 16, T. 2 S., R. 4 W.
- Able, northwest quarter Sec. 20, T. 2 S., R. 4 W.

At Bretzville, Mr. W. Bretz finds coal in the bottom of a branch on the northwest quarter of section 32, one foot thick, having been thinned by erosion at this place. He has also mined coal for shop use on southeast quarter section 30, township 2 south, range 4 west, and has seen outcrops on that quarter section from three to four feet thick. After long trial he reports this as choice blacksmith's fuel. Coal has also been dug to in the well of David Abel, in the northeast quarter of same section.

A ready-made pass-way for the different railroads seeking a northern outlet is furnished by the valley of Hunley's Creek, which traverses the high ridge dividing the waters of the Patoka from those of the Ohio river, and thus offers a level gateway to the engineer through the massive sand.
rock. The upper division of the conglomerate here is but slightly compacted and easily disintegrates. The debris from this washed by the flood waters of the creeks yields a choice article of plasterers' sand. Good beds, which supply the home market, are seen on the Lukens' farm, southwest quarter section 16, township 3 south, range 4. In the same neighborhood is a stratum of clay filled with fragments of quartz and flint, unconformably deposited and probably of glacial or subsequent age.

Ferdinand is a thrifty village, surrounded by a fruitful soil and happy prosperous people. For the latter it is greatly indebted to their Catholic priest, who prudently and kindly cares for the temporal as well as for the spiritual interests of his charge.

 Seam K is seen at the top of the hills and knobs, here represented only by a thin stratum of bituminous shale, but with the flinty limestone roof and under-clay well developed. A is found near the water level, under the massive sand rock. The barren seam K is accompanied by other minerals which more than compensate for the absence of the usual carbonaceous deposit.

The "Anderson Valley Mining Company"—J. B. Gohman, Dr. Kempf, Dr. Bindwald, and John Baunline, proprietors—after a thorough examination, opened their mines in the south half section 34, township 3 south, range 4. Here all the different minerals accompanying the place of seam K were found abundant, and are all utilized. Lime is burned from the roof rock; from cavities in the more flinty portions a soft silicious stone is obtained and used for the manufacture of a polishing powder, or "tripoli," of superior quality. The clay, iron stones, and decomposed nodules furnish ochreous paints of seven distinct natural shades. These ochres are free from silex, and after a test of three years by the Louisville and Nashville, the Louisville, Cincinnati and Lexington, the Evansville and Crawfordsville, and the Louisville, New Albany and Chicago railroad companies, and by other large manufacturing establishments, have been found in use profitable, durable, and
satisfactory. By combination of the seven distinct natural colors with white lead, almost any shade may be produced, as may be seen by the fourteen specimen colors deposited in sample jars at the cabinet in the rooms of the State Board of Agriculture.

SECTION AT THE MINES OF THE ANDERSON VALLEY MINING COMPANY.

Slope ........................................ 10 ft. 0 in.
Shaly soapstone "steatite" paint...... 3 ft. 0 in.
Dark and light "butternut" paint
Dark and light "Bismark brown"
Bituminous limestone, with Productus punctatus, P. longispinus, P. cora, Spirifer cameratus, S. lineatus, S. Kentuckensis, Nautilus decoratus, Cyrtoceras ———, Terebratula brevipes, Athyris subtilita, Hemi-pronites crassa, Aviculopecten providensis, Fusulina cylindrica........ 3 ft. 0 in.
Limestone, changing into "coral earth," with beautiful plates and spines of Archeocidarismucronatus, A. Wortheni, Crinoid stems, plates, and arms, stems and crushed plates of Pentremites and other mountain limestone animals............................. 0 ft. 8 in.
"Terra de Sienna" and yellow ochre.. 1 ft. 1 in.
Coal K........................................ ........................
Bituminous shale—"dark umber"..... 0 ft. 8 in.
"Yellow ochre"............................ 1 ft. 3 in.
Fire clay with stigmatic rootlets.... 3 ft. 0 in.
Potters' clay—"Dubois cream," or "stone color".......................... 4 ft. 0 in.
Bedded sandstone and covered to branch................................... 75 ft. 0 in.

103 ft. 0 in.
This locality was selected on account of yielding nearly every kind of mineral needed for the manufacture of these paints, and on account of the remarkable freedom from silica which makes washing unnecessary. The ores are roasted, ground, then graded by screens of different degrees of fineness and the product is ready for market.

Paint stones and ochres are found on almost every hill-top around Ferdinand. The supply is ample to employ an extensive factory continuously, and, to meet the wants of a continent. "Tripoli" found on the farm of Herbert Beike, northeast quarter northwest quarter section 26, township 3 south, range 4 west, is used for making polishing powder. It is a porous mass of silicious material, having the same specific gravity as European tripoli, and is derived from the flinty limestone roof of coal K. This stone was noticed at other points and may be obtained in considerable quantities. Two grades are prepared by the "Anderson Valley Mining Company," one an impalpable powder for polishing gold, silver, and metallic mirrors, another coarser for household and kitchen use. Specimens of the manufactured product were submitted to competent authority for determination. Dr. R. H. Ward, Microscopic editor of the American Naturalist, and S. A. Briggs editor of the "Lens," the Chicago Journal of Microscopy, after careful examination, report that the earth is not infusorial, and that its actual composition requires further examination.

Good quarry rock is found in the "massive beds," of the conglomerate, specimens of which, long in use, may be seen in the facings and copings of the Catholic church.

A few of the creeks have cut their valleys down to the level of coal A, ninety to one hundred and ten feet below the place of K.

Openings have been made at the following points, with coal from one and a half to two feet thick:

Leukens' southwest quarter Sec. 13, T. 3 S., R. 4 W.
Ebert, southwest quarter Sec. 11, T. 3 S., R. 4 W.
Hardwick, northwest quarter Sec. 9, T. 3 S., R. 4 W.
DUBOIS COUNTY.

Hoffman, southeast quarter Sec. 19, T. 3'S., R. 4 W.
Mehling, southeast quarter Sec. 35, T. 3 S, R. 4 W.

H. B. Kathman’s bank has been considerably worked just over the line in Spencer county, northwest quarter northeast quarter section 3, township 4 south, range 4 west. The exposures give the following exhibit:

SECTION AT KATHMAN’S.

Slope......................................................... 6 ft.
Silicious soapstone with plants........ 2 ft. 0 in.
Coal A:
Inferior coal.......................... 0 ft. 8 in.
Good bituminous coal.....1 ft. 2 in.

Fire clay, with *stigmaria* twisted and strangulated into different shapes with balls and tubers separate or connected ........................................ 4 ft. 0 in.
Bed of creek.............................................. 2 ft. 0 in.

7 ft. 10 in.

North of Henrysville, John Fest has opened seam A at several places on northeast quarter section 25, township 3 south, range 5 west, specimens were obtained for analysis. Mr. Fest reports that jack-o’-lantern is often seen of dark nights in the ravine near his coal bank, and would gladly connect the phenomena with hopes of silver ore instead of the true cause—carburetted gases.

The same seam outcrops on the line dividing sections 24 and 25, at the quarter section post, and gives this exposure:

J. FEST AND J. LINGER SECTION.

Slope with flints from roof of K.......12 ft. 0 in.
Laminated and massive sandstone.......30 ft. 0 in.
Thin bedded sandstone.................... 5 ft. 0 in.
Going west from this point, flints from the limestone roof of K were seen on sections 23 and 22, and a pretty thick bed of clay ironstones ("paintstone") on the Noemiller farm, section 21, all indicating the place of that seam, and forming a good horizon from which to measure down to coal A, which lies about ninety-three feet below.

Sandusky Williams, Esq., reports finding in a well near his residence, section 28, at a depth of seventeen feet, a bed of yellow ochre, three feet nine inches thick, underlaid by a four feet stratum, of ochreous soapstone. Specimens from this fine bed of natural paint were secured for the State Cabinet.

Continuing west, coal K becomes normal. No longer barren, it affords from two to three feet of tolerable coal, and was worked several years since on the Kemp farms, sections 31 and 32, township 3 south, range 5 west.

The limestone roof here loses in a great measure its flinty character, and is often seen in place or in detached blocks from one to three feet thick. At places it is profusely filled with fossils, viz.: Spirifer cameratus, Productus punctatus, P. semireticulatus, Bryozoans (3 Sp.), Coral pipes and Crinoid stems.

At Holland, seam K becomes still more persistent, and the accompanying ores of iron are abundant. Good beds of the latter were seen, apparently one and a half to two feet thick, on sections 22 and 23, township 3 south, range 6 west; also on Greenway's farm, northwest quarter section 27, township 3 south, range 6 west, a stratum eighteen inches thick was passed in digging a well, and reported to be of fine quality.

Openings have been made near Holland for local use, viz:
Rosamyer, S. E. qr. S. W. qr. Sec. 14, T. 3 S., R. 6 W.
Seaba, N. E. qr. N. E. qr. Sec. 15, T. 3 S., R. 6 W.
Otto, S. E. qr. S. E. qr. Sec. 15, T. 3 S., R. 6 W.
Schepman, N. W. qr. S. E. qr. Sec. 23, T. 3 S., R. 6 W.
Feldwich, N. E. qr. S. W. qr. Sec. 23, T. 3 S., R. 6 W.
Greenway, N. W. quarter Sec. 27, T. 3 S., R. 6 W.
Liebert, section 24, township 3 south, range 6 west.

At these places the coal was found to range from one to two and a half feet in thickness.

The section taken on the southeast quarter section 29, township 3 south, range 6 west, in Warrick, near southwest corner of Dubois County, shows an additional seam, and the stigmarial under-clay proves conclusively that it is independent.

### SECTION AT INGHAM'S BANK, WARRICK COUNTY.

<table>
<thead>
<tr>
<th>Layer</th>
<th>Description</th>
<th>Thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slope or covered sandstone</td>
<td></td>
<td>50 ft. 0 in.</td>
</tr>
<tr>
<td>Thin bedded sandstone</td>
<td></td>
<td>10 ft. 0 in.</td>
</tr>
<tr>
<td>Silicious shale</td>
<td></td>
<td>4 ft. 6 in.</td>
</tr>
<tr>
<td>Black sheety slate</td>
<td></td>
<td>2 ft. 0 in.</td>
</tr>
<tr>
<td>Black sheety slate with pyritous boulders containing twenty species of fossils, including the gigantic fish <em>Edestus Vora</em></td>
<td></td>
<td>0 ft. 8 in.</td>
</tr>
<tr>
<td>Coal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pure cubic</td>
<td></td>
<td>0 ft. 8 in.</td>
</tr>
<tr>
<td>Hard splinty</td>
<td></td>
<td>0 ft. 8 in.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 ft. 4 in.</td>
</tr>
<tr>
<td>Stigmarial clay</td>
<td></td>
<td>3 ft. 1 in.</td>
</tr>
<tr>
<td>Rash coal</td>
<td></td>
<td>0 ft. 5 in.</td>
</tr>
<tr>
<td>Stigmarial clay</td>
<td></td>
<td>1 ft. 4 in.</td>
</tr>
<tr>
<td>Dark bituminous clay</td>
<td></td>
<td>1 ft. 3 in.</td>
</tr>
<tr>
<td>Coal, inferior</td>
<td></td>
<td>3 ft. to 2 ft. 0 in.</td>
</tr>
<tr>
<td>Fire clay</td>
<td></td>
<td>3 ft. 0 in.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>79 ft. 7 in.</td>
</tr>
</tbody>
</table>
North from Holland the ridge of sandstone soon becomes well developed. Rock houses are found under the "Massive" member of the conglomerate on section 34, township 2 south, range 6 west. They have been used as habitations by the Indians, and human bones have been found mixed with alkaline tufa upon the ancient hearthstones, by Dr. Rust, of Holland.

Coal has been worked on the Todrank farm, and from Rothert's bank, section 27, township 3 south, range 6 west, large quantities have been hauled to Huntingburg for blacksmiths' use, and found to be of superior quality. Beds of sand similar to those mentioned near Ferdinand, are found on sections 5 and 8, and at Rousher's west half section 4, township 3 south, range 5 west, considerable amounts are gathered and sold for plasterers' use. On the Miessner farm, east half of same section, a deposit of kidney and clay iron stones was noticed, apparently of considerable extent and of excellent quality.

Huntingburg is a thrifty village containing several steam mills, mechanical establishments, and extensive warehouses. Large amounts of tobacco are exported. The soil of the south part of Dubois is composed principally of the reddish brown loam famous for excellent "cigar leaf." The strata accompanying K, here barren, are found at the top of the hill north of the village. The calcarceo-magnesian roof, somewhat flinty, is quarried for pavements and foundations. The under-clay develops a thickness of from four to seven feet and is a superior potters' clay. Tested in a smith's forge it burns snowy white without change of form, and invites the attention of manufacturers of queensware and stoneware. Dr. Beeler informs me that it has been examined by experts, who pronounce it superior to any clay in this country, and fully equal to Scottish clay for the manufacture of white crockery. A practical test is needed.
DUBOIS COUNTY.

SECTION AT BEELER'S HILL, HUNTINGBURG, (NORTHWEST QUARTER SECTION 34, TOWNSHIP 2 SOUTH, RANGE 5 WEST.

Soil.................................................. 10 ft. 0 in.
Cherty limestone (magnesian) with silicious earths and Productus, Hemipronites, Bryozoa, Spirifera, etc...... 8 ft. 0 in.
Soft silicious shales......................... 4 to 10 ft. 0 in.
Coal K........................................ 2 in. to 0 ft. 6 in.
Potters clay, choice......................... 5 to 7 ft. 0 in.
Bituminous streak.............................. 0 ft. 4 in.
Ochre "sienna" color......................... 4 in to 0 ft. 6 in.
Dark shale.......................................... 7 ft. 3 in.

Ochreous concretions and iron nodules
in soapstone...................................... 12 ft. 0 in.
Light colored soapstone..................... 3 ft. 0 in.
Silicious and aluminous shale containing plant remains and silicified trunks of coal plants two and a half to three feet in diameter...... 20 ft. 0 in.
Shaly and compact sandstones covered. 58 ft. 6 in.
Massive quarry sandstone................... 10 ft. 0 in.
Argillaceous shale.............................. 4 ft. 0 in.
Coal A:
Compact lustrous coal................. 1 ft. 6 in.
Block................................. 0 ft. 4 in.

Fire clay.................................. 3 ft. 4 in.

136 ft. 3 in.

At John DeBeer's shaft in the eastern part of the village, and at several wells, coal A was found about eighteen feet below the surface, and under strata similar to those given in above section.

About twenty-five years ago, Mr. Geiger bored for water to supply a mill. Tradition of "old settlers" says that at a depth of seventy-five feet he passed through a seam of
coal five feet thick. No outcrop of such a seam is visible at other points, hence their report is probably unfounded.

The quarry sandstone at Huntingburg is heavy bedded, with bands one to two feet thick. To the northeast it soon becomes coarse and massive, and half way between this town and Jasper, attains a thickness of seventy feet, and forms a high ridge which is traversed by several creeks following north to the Patoka.

In concluding this report of details, it is proper to remark that the determination of the coal seams, seen at isolated stations and often with but slight exposures of accompanying strata, is given as the best that could be made with the time and opportunities then available. It is believed that they are generally correct, and I find nearly the same determinations adopted by Col. J. W. Foster and other geologists in employ of the different railway companies. With better exposures afforded by the large development hoped for hereafter, the future geologist may correct errors caused by meager material.

ECONOMICAL GEOLOGY.

Dubois county was organized A. D. 1817. The population in the middle and eastern parts is mostly of German descent. The Catholic religion prevails; large churches have been erected by this sect at Jasper, Celestine, St. Anthony, Henrysville and Ferdinand. Moravian Hollanders occupy the neighborhood of Portersville, Huntingburg and Holland. These branches of the German race form communities to some extent isolated from the balance of the State. The German and Dutch languages are generally spoken. Many of the old fashioned customs and habits of the "fatherland" are common. Fete days take the place of ordinary new world festivals. The men are noted for the frugal thrift characteristic of their race, while the women and girls often share the toil of the shop and the field.

The mining development of this county belongs to the future. With plenty of timber for fuel there has been no
demand for coal, except the small amount needed for smith's use. When part or all of the different railways now projected shall have been finished, means of outlet for the product will cause new mines to be opened; mechanical and manufacturing establishments and the spirit of progress will infuse new vigor into every artery of life.

The coal deposits of Dubois county, although thinner than those of more favored districts, will be found ample to supply all home demand for mills, glass works, potteries, etc., etc., and at the same time afford a generous allowance for export.

Extensive beds of iron ore occur in connection with the subcarboniferous sandstone. Highly silicious, they will be found most valuable to mix with the purer ores of Missouri and Michigan. Very considerable deposits of kidney ore as seen in the western and southern parts of the county, some of which will justify exploration. It is not probable, hardly possible, that the ores of any of the other useful metals will ever be found in quantities.

CLAY.

Material for the manufacture of bricks is abundant in all parts of the county. The under-clays accompanying seam A are generally silicious, and will prove suitable for the manufacture of fire brick. The under clay of seam K is usually plastic, and at some points in the southern part of the county seems to afford choice material for potters' use. A practical test, will, it is believed, develop qualities in the Huntingburg clay which will command the attention of manufacturers.

PAINTS.

The paint mill of the "Anderson Valley Mining Company" is located at the town of Ferdinand. The roasting furnaces, mill and stamps have a capacity for grinding and preparing 2,500 pounds a day. The supply of mineral at their mine and surrounding openings is unlimited. The quality of their paints is eminently satisfactory and chal-
lenges comparison with the best foreign competitor. The only want is cheap transportation which will soon be supplied by railroads now in process of construction.

STONE.

The "subcarboniferous" or "conglomerate" sand rock of this county is well developed, and will yield an unlimited amount of stone suitable for superstructures as well as foundations. Fresh from the quarry it is soft enough to work readily, but hardens on exposure. Noted for a capacity to resist the action of fire, it merits and will command the attention of city architects and the erectors of furnaces and forges.

TIMBER.

The forests are filled with the following varieties, viz.: White, black, chestnut and over-cup oak, yellow and white poplar, walnut, beech, sugar, elm, gum, and a large number of small trees. Mistletoe is found growing on elms and the black gum. Large rafts of poplar logs are floated down Patoka river.

SOIL.

The soil of the county is not of the best. Fair crops of corn, wheat, oats, and grass are produced. Underdraining, with a modern system of culture, will develop a high value for the flat bottoms near and along the Patoka. The southern part of the county is well adapted to the production of a superior quality of tobacco. Extensive warehouses for storing this product are erected at Huntingburg, Holland, and Ferdinand, and large amounts are exported.

FRUITS.

The climate and soil is well suited for the culture of the tender fruits. Here the pear and the peach is free from many disasters and diseases incident to a more northern situation. The quality of the fruit is excellent, and we hope that the people of this county may be induced to reap and enjoy the same luxuries and the same profits that accrue to citizens of counties east and west of them.
Acknowledgments are due to the following gentlemen for information and assistance, viz.: Col. B. B. Edmonston, Dr. Wellman, Dr. Stevenson, C. Doane, and the county officers at Jasper; Dr. Freeland, at Portersville; Hon. Leroy Cave, at Ludlow; Wm. King, at Birdseye; Dr. Kempf, John B. Gohman, and the Abbot of St. Meinrad, near Ferdinand; Dr. Rust and S. Williams, at Holland, and Mr. Rothert and Dr. Beeler, at Huntingburg.

Thanks are returned to the President and Directors of Jeffersonville and Indianapolis, and Evansville and Crawfordsville Railroads, for favors rendered with their usual courtesy.