

Bradley & Barford, Lith. Ind.

VIEW of the MOUTH of the CAVE
at Indian Springs, Martin Co. Ind.

R E P O R T .

In the report on Sullivan county, Prof. Collett has shown that coal N, which, in the western part of Clay and the eastern part of Vigo counties, is of good quality, and from four to five feet thick, is only found in Sullivan county, over a small area along the Wabash river, and in the southern part of the county. The quality is, here, generally poor, and the seam too thin to be mined with profit, except where so situated that it may be worked by stripping. A specimen from the seam on Mr. Chambers' land, section 8, township 7, range 8, proved, on analysis, to be a very fair coal.

ANALYSIS OF CHAMBERS' COAL.

Specific gravity, 1.206 ; one cubic foot weighs 75.37 lbs.			
Coke, - -	50.50	{	Ash, light brown, - - -2.00
			Fixed Carbon, - - - 48.50
Volatile matter,	49.50	{	Water, - - - - 4.50
			Gas, - - - - - 45.00
100.00			100.00

The coke has a metallic lusture, and is so much swollen that the original shape of the coal is quite lost.

On the other hand, coal M, which only appears as a thin seam in the former counties, underlies nearly the entire area of the latter county, and attains to the grand dimensions of a nine foot seam on Pitt's farm, section 3, township 9, range 8.

The subjoining analyses of specimens from this coal seam, taken at various localities, indicate that it is a good caking coal, suitable, in some places, for gas and coke.

B. & L. BURK'S COAL.

Specific gravity, 1.210; one cubic foot weighs 75.62 lbs.

Coke, - -	52.50	{	Ash, white, - - -	1.50
			Fixed carbon, - - -	51.00
Volatile matter,	47.50	{	Water, - - -	3.50
			Gas, - - -	44.00
	<hr/>			<hr/>
	100.00			100.00

The coke is puffed, brilliant and porous.

This is a good white ash coal, contains a large amount of gas and will make fair coke.

DICKS COAL, six feet two inches thick, section 30, township 9, range 8. Upper part of the seam.

Specific gravity, 1.258; one cubic foot weighs 78.62 lbs.

Coke, - -	52.00	{	Ash, white, - - -	1.50
			Fixed carbon, - - -	50.50
Volatile matter,	48.00	{	Water, - - -	4.50
			Gas, - - -	43.50
	<hr/>			<hr/>
	100.00			100.00

The coke is puffed, amorphous, glossy, and somewhat swollen.

DICKS COAL, middle part of the seam.

Specific gravity, 1.252; one cubic foot weighs 78.25 lbs.

Coke, - -	55.30	{	Ash, white, - - -	0.50
			Fixed carbon, - - -	55.80
Volatile matter,	44.70	{	Water, - - -	4.50
			Gas, - - -	39.20
	<hr/>			<hr/>
	100.00			100.00

The coke is slightly swollen, amorphous, compact and glossy.

DICKS COAL, lower part of seam.
Specific gravity, 1.278 ; one cubic foot weighs 79.05 lbs.

Coke, - -	54.50	{	Ash, red brown, - -	2.50
			Fixed carbon, - -	52.00
Volatile matter,	45.50	{	Water, - - - -	3.50
			Gas, - - - -	42.00
	<u>100.00</u>			<u>100.00</u>

The coke has a metallic lustre, is slightly puffed, amorphous and compact.

The middle part of this coal is very free from earthy matter, contains only .5 per cent. of ash, yields a compact, glossy coke, and a fine quantity of quite pure gas.

The upper and lower portions, though very pure coal, are not nearly so good as that taken from the middle part of seam.

PIGG'S COAL, section 36, township 8, range 8.

Specific gravity, 1,271 ; one cubic foot weighs 79.43 lbs.

Coke, - -	51.50	{	Ash, red brown, - -	2.50
			Fixed carbon, - -	49.00
Volatile matter,	48.50	{	Water, - - - -	6.00
			Gas, - - - -	42.50
	<u>100.00</u>			<u>100.00</u>

The coke is very much swollen, amorphous and lustreless.

This seam is five feet two inches thick ; the quality of the coal, as shown by the analysis, is very good.

ST. JOHN'S, section 29, township 9, range 8.

Specific gravity, 1.287 ; one cubic foot weighs 80.43 lbs.

Coke - -	51.50	{	Ash, white, - - -	2.50
			Fixed carbon, - -	49.00
Volatile matter,	48.50	{	Water, - - - -	3.50
			Gas, - - - -	45.00
	<u>100.00</u>			<u>100.00</u>

The coke is puffed and vitreous.

This coal is very similar to the above, but probably contains less sulphur.

HON. HENRY K. WILSON'S COAL, section 33, township 9, range 8.

Specific gravity, 1.228; one cubic foot weighs 76.75 lbs.			
Coke, - - -	52.40	{	Ash, white, - - - 0.80
			Fixed carbon, - - - 51.60
Volatile matter, 47.60		{	Water, - - - - 2.35
			Gas, - - - - 45.25
	<hr/>		<hr/>
	100.00		100.00

The coke is puffed, somewhat porous, and has a brilliant metallic lustre.

This is one of the best caking coals that has come under my notice in the State. In appearance it is of a glossy, jet black color, vitreous fracture, and will soil the hands little more than cannel coal. The ash is white, and does not amount to one per cent. The coke is of fair quality, and the gas is 6.1 per cent. greater than I found in a sample of the best gas coal from Pittsburg.

I understand that Mr. Wilson is making arrangements to build a railroad from this coal to Shelburn or Curryville, on the Evansville and Crawfordsville Railroad. There is but little doubt, when proper facilities are afforded for transportation, of its meeting with a ready market for manufacturing gas; such a character of coal being very much needed in the West, which is now almost entirely dependent on the Pittsburg district for coal suited to this important and growing branch of manufactures.

Mr. H. WILSON'S COAL (Cass township), section 15, township 8, range 8.

Specific gravity, 1.249; one cubic foot weighs 78.06 lbs.			
Coke, - - -	54.00	{	Ash, bluish white, - - 2.00
			Fixed carbon, - - - 52.00
Volatile matter, 46.00		{	Water, - - - - 3.00
			Gas, - - - - 43.00
	<hr/>		<hr/>
	100.00		100.00

The coke is puffed, glossy and amorphous. This coal is from the same seam as the above; is of very good quality, but contains considerable more ash, though not more than is commonly found in caking coal.

PIONEER SHAFT, Curryville, section 34, township 9, range 9, seam four feet thick; analysis of upper part.

Specific gravity, 1.282; one cubic foot weighs 80.12 lbs.						
Coke, - - - 52.50	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Ash, rust color, - - -</td> <td style="width: 30%; text-align: right;">1.00</td> </tr> <tr> <td>Fixed carbon, - - -</td> <td style="text-align: right;">51.50</td> </tr> </table>	Ash, rust color, - - -	1.00	Fixed carbon, - - -	51.50	
Ash, rust color, - - -	1.00					
Fixed carbon, - - -	51.50					
Volatile matter, 47.50	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Water, - - - -</td> <td style="width: 30%; text-align: right;">4.00</td> </tr> <tr> <td>Gas, - - - -</td> <td style="text-align: right;">43.50</td> </tr> </table>	Water, - - - -	4.00	Gas, - - - -	43.50	
Water, - - - -	4.00					
Gas, - - - -	43.50					
100.00	100.00					

The coke is much swollen, amorphous, and has a metallic lustre.

This is a good, strong coal, and is referred to L, of the vertical section. Has a bright black color; breaks into cubes more or less coated with thin scales of semi-transparent calc spar. A cubic foot of this coal will weigh as much as a cubic foot of Pittsburg coal, and gives a very fair coke and large quantity of gas.

STANDARD SHAFT, sunk by Judge J. M. Hanna, section 36, township 8, range 8; seam five feet thick; lower seam, L.

Specific gravity, 1.333; one cubic foot weighs 83.31 lbs.						
Coke, - - - 58.10	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Ash, white, - - -</td> <td style="width: 30%; text-align: right;">2.90</td> </tr> <tr> <td>Fixed carbon, - - -</td> <td style="text-align: right;">55.20</td> </tr> </table>	Ash, white, - - -	2.90	Fixed carbon, - - -	55.20	
Ash, white, - - -	2.90					
Fixed carbon, - - -	55.20					
Volatile matter, 41.90	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Water, - - - -</td> <td style="width: 30%; text-align: right;">1.80</td> </tr> <tr> <td>Gas, - - - -</td> <td style="text-align: right;">40.10</td> </tr> </table>	Water, - - - -	1.80	Gas, - - - -	40.10	
Water, - - - -	1.80					
Gas, - - - -	40.10					
100.00	100.00					

The coke is dense, of a dull color, and but slightly changed.

This is the same coal worked at the Pioneer shaft, and the two analyses correspond very closely. The ash is white, but the quantity is rather greater than in the former, and

the quantity of coke is also somewhat greater. Altogether, this is a most valuable seam of caking coal, and is well adapted for household and steam purposes.

Another sample of coal taken from the upper seam, M, in the Standard shaft was subjected to analysis, and the following result obtained:

HANNA'S COAL.

Specific gravity 1.281 ; one cubic foot weighs 80.06 lbs.			
Coke, - - -	56.50	{	Ash, gray, - - - 2.50
			Fixed carbon, - - - 54.00
Volatile matter,	43.50	{	Water, - - - 5.00
			Gas, - - - 38.50
	100.00		100.00

The coke is slightly swollen with the form of the coal unchanged, and has a metallic lustre. In quality it compares favorably with other samples taken from this seam.

Coal L, appears to be the lowest seam that is worked in Sullivan county, though coal K, has been reported in bores at several localities. At the Pioneer shaft, it was struck at the depth of forty-seven feet below the bottom of L, and is here reported to be over five feet thick. This seam may be found at the other shafts, and, if proved to be of good quality and workable thickness, will materially add to the value of the property.

From the Standard shaft, to the Shelburn shaft, there is a rise of about thirty feet, in the surface of the country, in a distance of two and a quarter miles. The rise of the strata in that direction is still greater. At the Standard shaft we find that it is 218 feet from the railroad track to the bottom of coal L; while at the Pioneer shaft, one mile and a half to the south, it is reached in 181.6 feet; at Shelburn, about two miles and a quarter, at 175 feet, and in the Powers bore, three miles and a half distant, in the same direction, at 104 feet. This indicates a rise in the strata between the two extreme points here given, of at least thirty

feet to the mile, along the Evansville and Crawfordsville Railroad, and brings us within four miles of Sullivan, where a bore was made to the depth of 544 feet for coal oil, in 1864-66. Though the above rise appears to be very regular to the south for three miles and a half, it does not follow, by any means, that it continues at that rate to Sullivan; in fact, it rather approaches the general line of strike, for the usual rise is to the eastward; yet, it must be confessed that the dip is very irregular throughout the county. A persistent rise, of thirty feet to the mile, between Shelburn and Sullivan, would run coal L out before reaching the latter point. On the other hand, it is equally perplexing to suppose, where the topographical features of the country appear to be directly opposed to such an inference, that an anti-clinal axis exists between the above points, sending coal L to a depth of 269 feet at Sullivan, a rate of dip equal to forty-one feet to the mile, even though we compute it directly from Powers' bore, where the coal is actually proved to be rising in the direction of the former place. From a general observation, I made Sullivan one hundred feet lower, topographically, than the town of Merom, which is nine miles west and situated on a high bluff overlooking the Wabash river, and could detect no material change in the geological horizon. One hundred and seventy-nine feet below the top of this bluff there is a coal three and a half feet thick, including its two clay partings. If we allow for a slight rise, which exists in the strata towards the Wabash river, from Sullivan, it will make this coal correspond very well to the place of the second coal in the bore at Sullivan, counting from the top downwards. The former seam is referred to M, and the latter to N, by Prof. Collett, whereas, by this study, they are referable to L. It must be borne in mind, that as a general rule, borings made during the oil excitement, are quite unreliable as a guide to the identification of coal seams, especially when they present anomalous features in the general order of the strata, and are given from memory. This correlation of the coals from Curryville to Sullivan and Merom, here

given, is perfectly natural, and requires no violation of the observed prevailing features in the stratigraphy of the country.

A coal that is 104 feet beneath the surface at Powers' bore is not likely to be 269 feet at Sullivan. Below the seam marked L, in the bore at the latter place, it is my opinion that no-workable seam can be found. The seven feet of coal reported at 544 feet, will prove to be a bituminous shale.

These suggestions regarding the equivalency of the coal seams along the Evansville and Crawfordsville Railroad in no way militate against the practical value of Prof. Collett's able report, but are thrown out for the purpose of stimulating research in a field where there is still much to be learned. Though no faults and grand disturbances have yet been found in the western coal basin, we have in Indiana quite as many geological difficulties to encounter from an unequal distribution of the seams over a portion, at least, of the basin, as are to be found in the eastern measures.

Sullivan county is rich in valuable coal beds, and the recent opening of the Evansville, Terre Haute & Chicago Railroad will furnish a good market. Josephus Collett, Jr., the energetic President of this road, is determined that it shall be one of the greatest coal roads in the country. Together with the connecting roads, it has a supply of nine hundred coal cars to start with. The three shafts in Sullivan are doing a fine business. Two mines have been opened in Vermillion county, which, together with the above and the block coal mines of Clay county, already furnish about one thousand tons per diem on this road alone. This rate of freightage will rapidly increase as the coals become known.

DAVISS COUNTY.

Daviess county is bounded on the north by Greene, on the east by Martin, on the south by Pike and Dubois, and on the west by Knox county. In shape it is somewhat pentagonal and contains about 424 square miles, and is well supplied with water courses. The East Fork of White river flows along

its southern border and the West Fork along the western border. Sugar, Mud and Aikman creeks empty into the East Fork, and these, together with Veal's creek, a tributary of the West Fork, drain most of the county south of the Ohio & Mississippi Railroad. Prairie, Smithers, Pond and Purse creeks, tributaries of the West Fork, water the central and northern part of the county. The southern part of the county is, for the most part, high table land, rather broken by short hills from one hundred to two hundred and fifty feet in height as you approach the rivers. After passing the hills around Washington, the country north of the Ohio and Mississippi Railroad is low, rolling land, with numerous small prairies, except a small area in the eastern and northeastern part, where it is quite hilly.

Washington is the county seat and the principal town in the county, and has a population of about four thousand. It is the seat of many important manufactures, and does an extensive coal business. Indeed, Washington furnishes more business for the railroad than any other city between Cincinnati and St. Louis. No less than sixteen coal mines are in active operation in and around the city, and the shipment of coal is about seventy car loads per day, or twenty-one thousand bushels. Two seams are worked, but by far the greater portion is taken from the seam marked L in the column of coals given at page 34. The other seam is referable to X. This coal was not found, or at least not recognized, in Clay and Greene counties heretofore reported upon, and does not, therefore, appear in the column of coals given in the First Report. Indeed, at the time of arranging the general section of the coal strata, it did not appear to me, from the study of the coals in the counties then surveyed, that the small space seen everywhere between L and K would widen out to the southward in such a manner as to give room for another important seam of coal.

The evidence which served to establish the place of this coal in the column will be given in another place.

GEOLOGY.

Daviess county lies entirely within the coal measures, and, probably, includes within its area all the carboniferous strata from the highest to the lowest.

The annexed topographical map and section represents the position of the coal shafts and slopes around the town of Washington, and the extent of country worked over. The profile and vertical section taken in the direction of the line from A. to B. is made from a careful study of the measures seen at outcrops and in shafts; and from information derived from the records of numerous bores that have been put down, in search of coal, in the vicinity of Washington.

The elevations, and location of mines, outcrops and bores on this map, were determined by an instrumental survey, which was made under the direction of D. H. Kennedy, at my request, and paid for by the citizens of Washington. For the carrying out of this important work, I am indebted to Hon. W. S. Turner, Dr. Barton, Mr. W. Saltmarsh, Messrs. Spink & Cable, M. L. Brett, H. D. Kennedy, C. E., Charles Boyden, C. E., S. D. Wright, C. E., John Hyatt, and other citizens of Washington, whose names I have omitted to get. Its importance will be fully appreciated by all those who desire to acquire a knowledge of this highly favored mining district.

The section shows the order of the coals from B. to N. The zero line marks the horizon of low water in the West Fork of White River, at the crossing of the Ohio and Mississippi Railroad. The railroad elevation is indicated by the initial letters of the road (O. & M. R. R.) The position of the "Washington" or main coal seam L, with reference to the railroad level, does not hold good in this section for points along the road, but is correct for Spink, Cabel & Co.'s shaft, just west of the Petersburg road, and half a mile south of the city. At this mine the coal dips one degree to the southwest; at Mooney's slope, the dip is to the west; Wilson's slope, one degree nearly south;

1. Flour Mill and Woolen Factory.
2. Flour Mill and Woolen Factory.
3. Foundry and Machine Shop.
4. Planing Mill.
5. Foundry and Pump Factory.
6. Hotel.
7. Hotel.

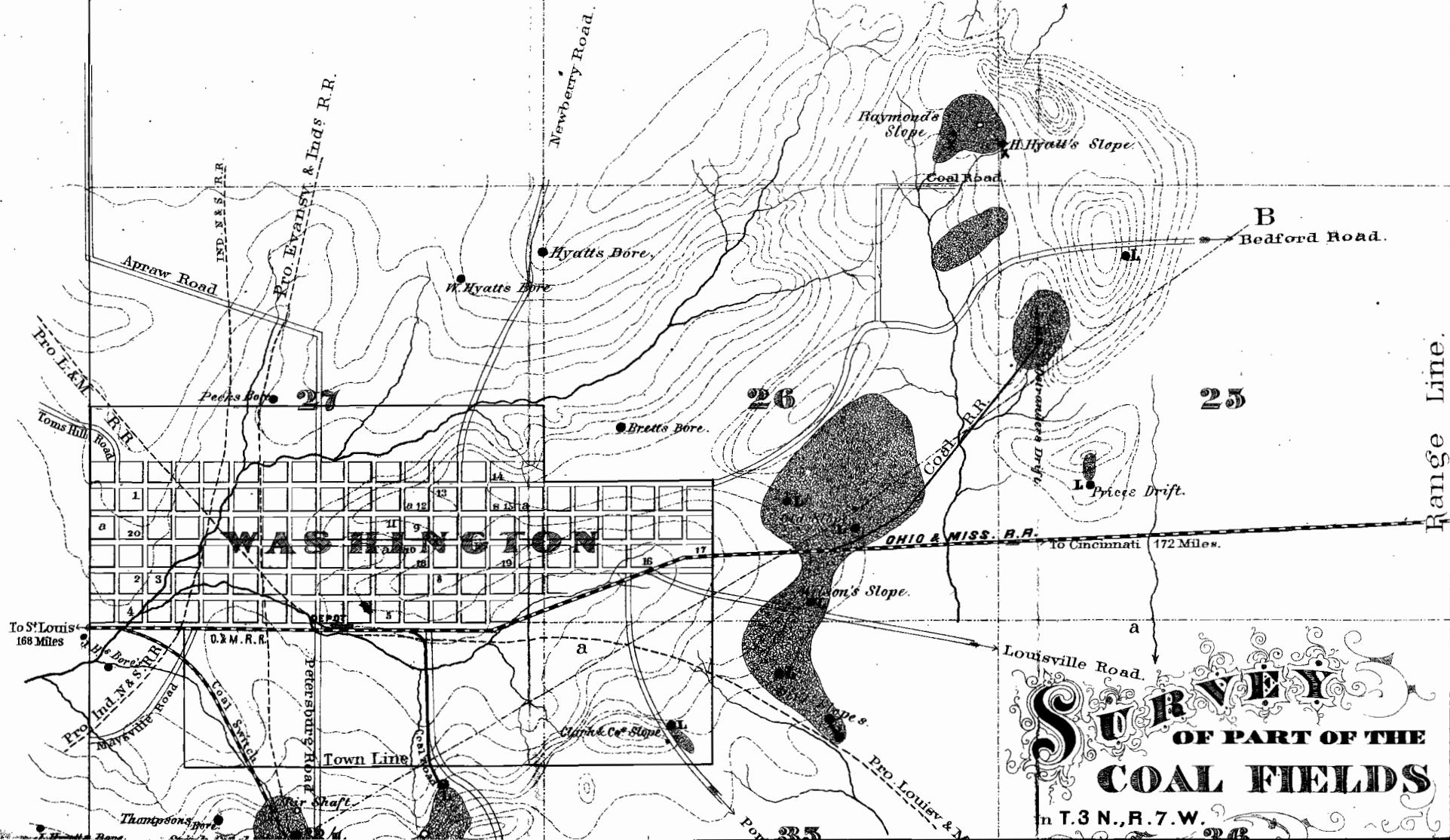
8. Hotel.
9. Court House.
10. Presbyterian Church.
11. Cumb. Presbyterian Church.
12. Catholic Church.
13. Methodist Church.
14. Christian Church.

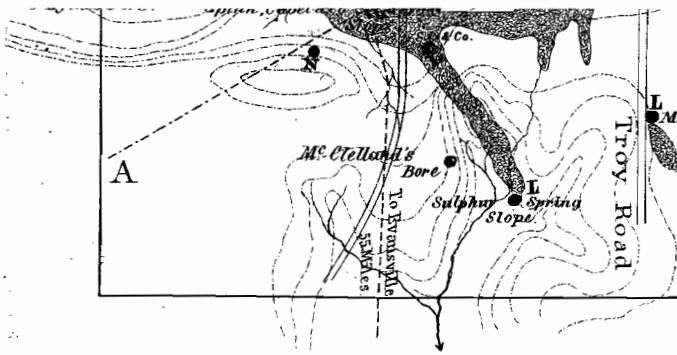
15. Baptist Church.
16. Flour Mill.
17. Saw Mill.
18. Masonic Hall.
19. Odd Fellow Hall.
20. Brewery.
- a. School Houses.

SECTION 22

23

24



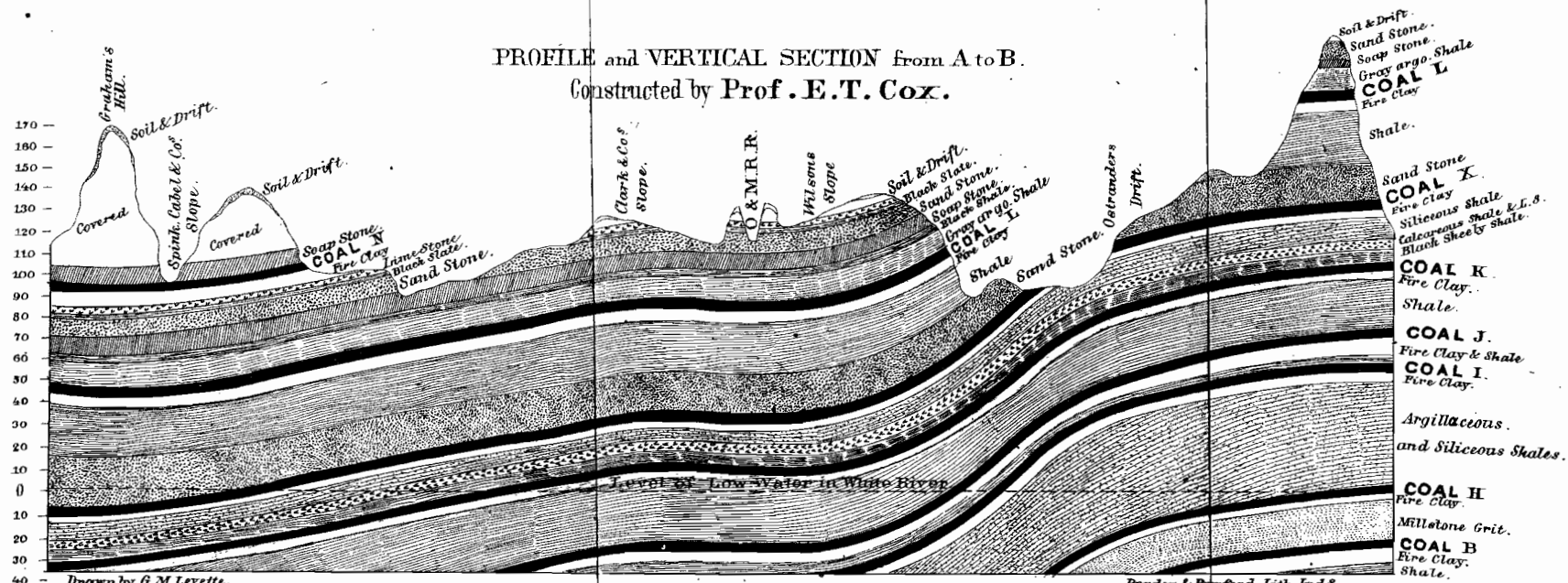


Daviess County

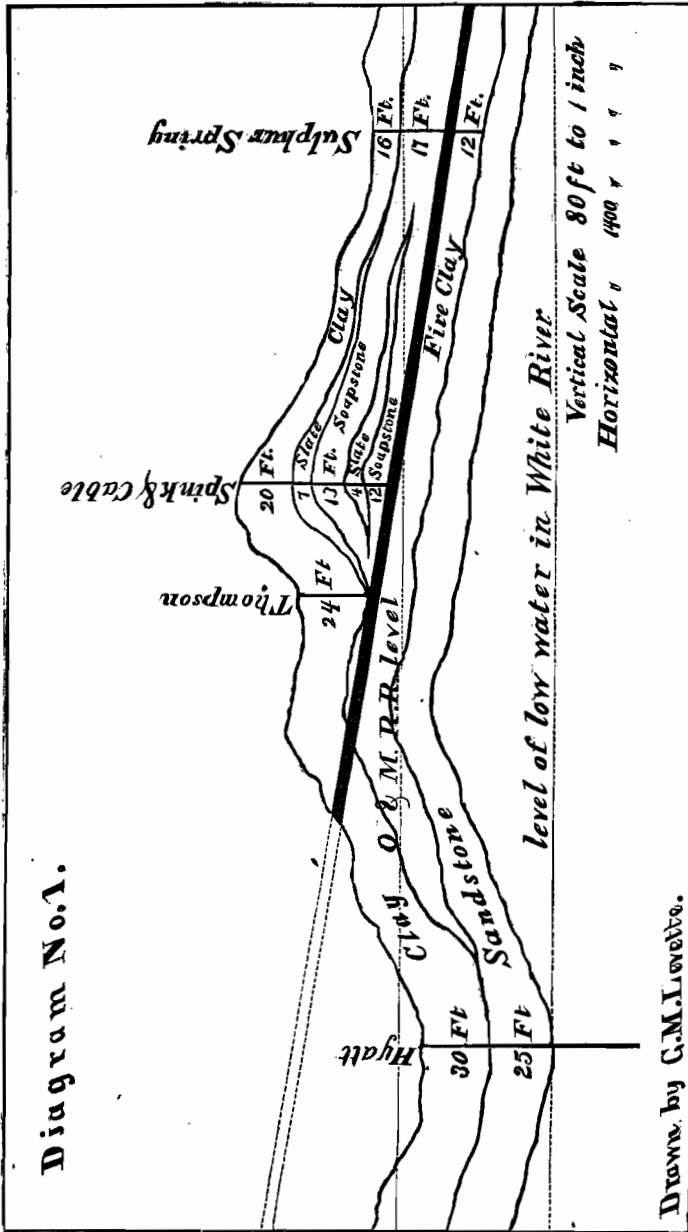
INDIANA.

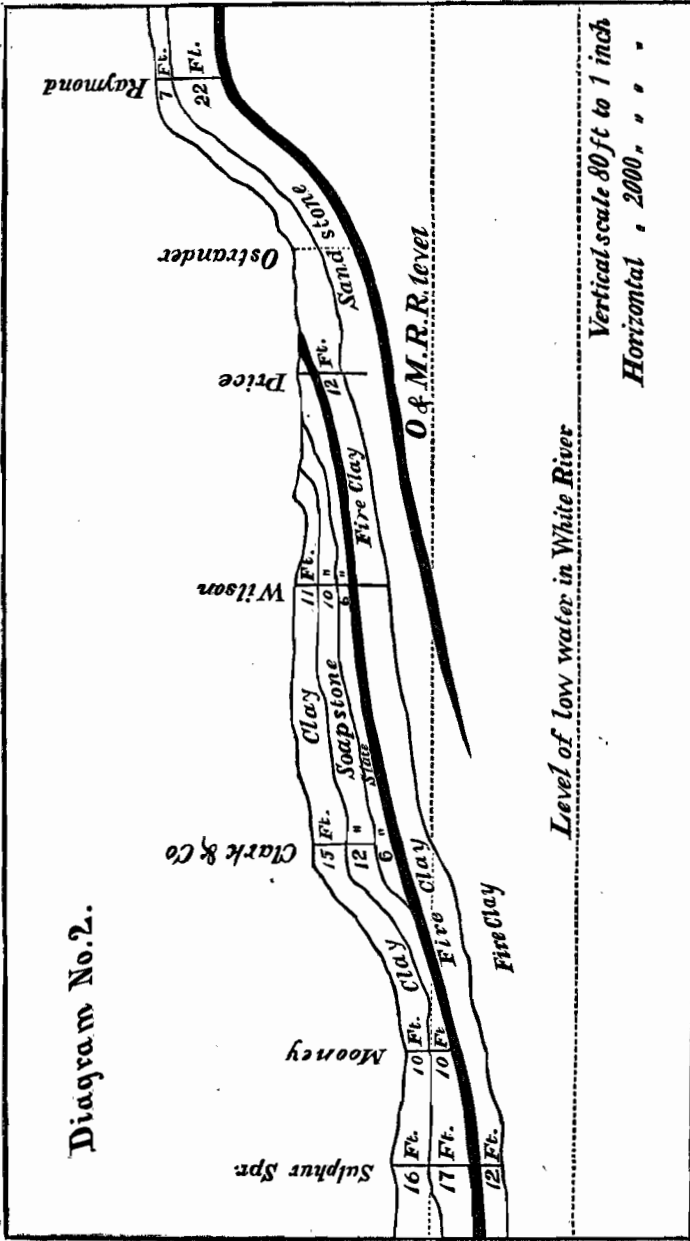
Scale, 3 inches to one Mile.
 Underground Workings.
 Drawn by S.D. Wright.

PROFILE and VERTICAL SECTION from A to B.
 Constructed by Prof. E.T. Cox.



Clark & Co.'s, one degree southeast. The mine at Sulphur Spring draws all the water from Spink & Co.'s, and from Mooney's slope. Though somewhat irregular, this clearly indicates that the general tendency of the dip is to carry this coal above the stratified rocks in the hills north of Washington, and it is only caught by the top of a very high hill in the northeast corner of section 25, near the Bedford road. The following diagrams will show the rise of the coal in two directions from the Sulphur Spring shaft:





The lower dotted line represents the horizon of low water in the West Fork of White River, at the crossing of the Ohio and Mississippi Railroad; and the upper dotted line, the level of the Ohio and Mississippi Railroad, where it passes through the town of Washington.

Coal L, in the Sulphur Spring shaft, is seventeen feet below the level of the railroad, and is taken as the starting point in these sections. The section represented by Diagram No. 1, is one and one-twelfth miles long, and crosses the county in a northwest direction through, or near, Spink, Cable & Co.'s shaft, and Thompson's bore, to J. Hyatt's bore, which commences near the level of the railroad. At Spink, Cable & Co.'s, coal L is nearly on a level with the railroad; at Thompson's bore it is seventeen feet above, and continued at the same rate of rise, it is seen that J. Hyatt commenced his bore entirely below coal L. After passing through thirty feet of surface clay and drift material, this bore is reported to have penetrated twenty-five feet of sandstone, and twenty-four feet of soapstone and slate; beneath this, a coal was struck, but I was unable to learn its thickness. It is, however, a subordinate coal of moderate thickness. Higher up the same branch, which runs near the above bore, in a northeast direction, three other bores were made for coal. The first, in order, is Peck's. This bore commenced twelve feet above the railroad level, and furnished the following section:

SECTION OF PECK'S BORE.				
SPACE.		FT.	IN.	
		10.		Clay.
		20.		Quick Sand.
68.		38.		Slate.
2.6		2	6	Coal K. ?
		D.		Fire Clay.
85		81		Slate.
		4		Black Slate.
3		3		Coal I. ?
				Fire Clay, ?
158.6	Total.			

W. Hyatt's bore commenced forty-seven feet above the railroad and passed through:

SECTION OF W. HYATT'S BORE.				
SPACE.		Fect.	In.	
88.		20		Clay and soft rock.
		10		Reddish soft rock.
		2		Iron ore ?
		8		Hard pan.
		6		White sandstone.
		10		Blue sandstone.
		20		Light soapstone.
		1		Black slate.
		2		Hard rock.
		5		Hard black slate.
		4		Hard rock. <i>Probable place of coal.</i>
90		84		Slate.
		6		Brown slate.
1		1		COAL.
179.	Total.			

Hyatt's bore, about one and three-quarter miles northeast of the latter, commenced seventy-four feet above the railroad and seventeen feet below the horizon of Raymond's coal. It passed through :

Clay and soft rock,	-	-	-	-	20 ft.
Hard sandstone,	-	-	-	-	40 ft.
Soapstone,	-	-	-	-	40 ft.
Total,	-	-	-	-	100 ft.

There is no report of coal being reached in this bore, and it is my opinion, that all the bores, above referred to, commenced below coal X.

Diagram No. 2, presents a section running northeast, from Sulphur Spring shaft, to Raymond's coal X. This section, also, shows that coal L, rises from the Sulphur Spring shaft, where it is seventeen feet below the level of the railroad, to the northeast, at the rate of about twenty-six feet to the mile. At Mooney's mine it is ten feet below the railroad level, at Clark's twenty-two feet above, at Wilson's thirty-four feet, and at Price's fifty-four feet above the railroad. This rise carries it out before reaching the hill at Raymond's mine, but it is caught by a much higher hill that lies between Raymond's and Ostrander's.

The conclusion to be drawn from the above diagrams and the study of the coal around Washington, is, that the strata rise with the hills to the north, and coal L was removed ages ago from the northern part of the county by denudation. The bores which have been cited above, as well as Brett's bore, are shown to have commenced on a horizon, even lower than coal X. At Mr. Brett's dwelling house, some thirty or forty feet above the commencement of his bore, a heavy sandstone was penetrated in digging his well, which I refer to the sandstone over Raymond's coal. Now, if these stones are synchronous, then coal X may be found just below it, but, as the bore which was made in search of this coal by Mr. Brett, was commenced at a lower horizon,

and on the side of a gently sloping hill, which proved to be largely composed of accumulated clay and other earthy material derived from disintegrating forces, it failed to find the coal, as may be seen by the following account of the material passed through, commencing thirty-eight feet above the railroad level:

SECTION OF BRETT'S BORE.				
SPACE.		FEET.	IN.	
100.		57		Surface Earth and Clay.
		33		Gray Slate.
		4		Dark gray Slate.
		1		Slate
		5.		Black Slate.

The five feet of black slate found in this bore, is probably the same seam passed through by W. Hyatt, three-quarters of a mile to the northwest. Specimens of the hard rock, reported as superimposed on the black slate in the latter bore, were sent to me for examination, and proved to be limestone. This leads me to believe that the five feet of black slate occupies the position of coal K.

This would, also, appear to be the place of the two and three quarter feet of coal in Peck's bore, as the spaces to the seam of coal eighty-four feet below, in the former, and eighty-one feet, in the latter, tend to confirm this correlation.

Fifty-five feet above coal L, and extending from the Portersville road to the Petersburg road, south of Washington,

is a seam of coal, two feet thick, which I refer to N. It shows itself by crops under all the high points, it is a very good quality of caking coal and about fifty thousand bushels have been mined from it.

The following column represents the number and position of the coals in Daviess county as nearly as they can be determined at this time :

S. G. R.—3

CONNECTED SECTION OF COAL MEASURES IN DA-
VISS COUNTY.

SPACE.		FEET.	IN.	
26.		20		Surface Earth and Drift.
		6		Argo. Silicious Shale.
2.		2		COAL N.
		4		Fire Clay.
		8		Argo. Shales.
		1		Pyritiferous Shaley Limestone.
55.		14		Arenaceous Shale.
		31		Bluish Argo. Shale.
5.		5		COAL L. (Main Washington.)
		11		Dark and light colored Fire Clay.
41.		30		Arenaceous Shale and massive Sandstone.
3.10		3	10	COAL X.
		2		Fire Clay.
23.		10		Silicious Shale.
		6		Calc. Shale and Limestone.
		5		Black, sheety, bituminous Shale.
5.		3-5.		COAL K.
		3		Fire Clay.
28.		25		Shale.
1.		1		COAL J.
		1		Fire Clay.
11.		10		Shale.
3.6		3	6	COAL I. Good Block.

CONNECTED SECTION OF COAL MEASURES—Continued.				
SPACE.		FEEET.	IN.	
60.		60		Argillaceous and Silicious Shale.
				Place of Coals F, G, and H.
25.		25		Silicious Shales.
1.		1.		Place of Coal B.
80.		65		Massive Sandstone. "MILLSTONE GRIT."
		15		Buff Shale.
2.6		2	6	COAL A.
		1		Fire Clay.
13.		12		Buff Shale.
.6			6	COAL.
368.4	Total.			Low water East Fork of White River.

From the limestone between coals N and L, I obtained a number of very fine fossil shells; *Brachiopods*, *Spirifer camēratus*, *Productus semireticulatus*, *P. wabashensis*, *P. elegans*, (*longispinus*), *Athyris subtiliti*, *Chonetes mesoloba*, *Cephalopods*: Fragment of large *Nautilus*, species undetermined, *Bellerophon carbonarius*, *B. percarinatus*, *B. Montfortianus*, and *Orthoceras Rushensis*. This stone had been thrown out in digging the air shaft to ventilate the Wilson mine, and having been decomposed by atmospheric influences, had left its less affected fossil contents in a very good state of preservation. On some of the *Productus elegans* I saw spines that were more than two inches in length, but too frail to be preserved.

The gray argillaceous shale, forming the roof of coal L, contains a variety of beautiful fossil plants, and remains of crustacea. Of the former, I could determine, *Sigillaria reniformis*, *Pecopteris arborescens*, *Sphenophyllum Schlotheimii*, *Neuropteris hirsuta*, *N. Loschii*, *Asterophyllites sublaevis*? and *Alethopteris lonchitidis*?

Crustaceans. A small *Euproops Danae*? (*Limulus*), resembling the horse-shoe crab, not more than three quarters of an inch long. Great quantities of small crustaceans resembling *Cypris*.

The limestone over coal K is also highly fossiliferous, containing large *Productus punctatus*, *P. cora*, *P. semireticulatus*, *P. elegans*, (*longispinus*), *P. Rogersii*, *Spirifer camēratus*, *S. lineatus*, *Athyris subtilita*, *Chonetes mesoloba*, *C. Smithii*? *Aviculopecten providences*, *Bellerophon*, *Sp.*? (a very large specimen subsequently lost or mislaid,) *B. carbonarius*, and *Orthis Rushensis*.

In the black, sheety, bituminous shales, usually forming the roof of coal K, in this county, there are spines, small bones and scales of fish. Below this horizon, no fossils were observed, probably from the fact that very little has been done, as yet, to develop the lower seams of coal.

At present, our knowledge, regarding the organic remains of the carboniferous epoch, is so imperfect, notwithstanding the labor that has been bestowed upon the subject, that no

reliance can be placed on palæontological evidence as a means of determining equivalent strata. Both the fauna and flora have a great vertical range, in the carboniferous rocks, and the majority of the species now known can be traced from the highest to the lowest members. The time usually spent at a locality, in collecting fossils, is, by no means sufficient to enable one to pronounce upon the non-occurrence of species that have been seen in abundance in another place, even though it should occupy a different horizon. Indeed, it is not an uncommon occurrence to find, at different localities, quite a change in the predominating fossils in strata of undoubted correlation. This may be accounted for from the fact, that in time past, as well as in the present, local causes, or conditions, existing at one place, favored the accumulation of certain kinds of organisms, while other kinds were repelled. The experienced collector, of recent shells, can readily tell, in what depth of water, character of the bottom, whether mud, sand or rock, where he must look for certain species; and, were the fauna and flora, of to-day, covered up by sediment and subsequently converted into stone, the future palæontologist would find in strata, that are synchronous, a marked difference in the fossil remains, and guided by this evidence, alone, would most likely fall into grave errors with regard to their relative age. There can be no well defined boundary of geological epochs based upon the progress of animal or vegetable life alone. Then, surely, we can not undertake, by such evidence, to establish the chronological order of the strata which it embraces.

Coal *L*, in Daviess county, is an excellent caking coal, being quite free from deleterious impurities. The seam ranges from three feet, ten inches, to five and a half feet, and will average five feet in the neighborhood of Washington. The color is dull-black, fracture irregular and cubical, contains but little calcite in the partings, and may be handled and stocked without much loss. It is used for making gas, both at Vincennes and St. Louis, and the quality

of the gas compares favorably with that made from the Youghiogheny coal.

Specimens taken from various mines south of Washington, were subjected to analyses and the following results obtained:

AIKMAN'S Coal, L, section 34, township 3, range 7, worked by Spink, Cable & Co.

Specific gravity, 1.270; one cubic foot weighs 79.37 lbs.	
Coke, - - 59.50	{ Ash, nearly white, - - 3.00
	{ Fixed carbon, - - 56.50
Volatile matter, 40.50	{ Water, - - 5.00
	{ Gas, - - 35.50
100.00	100.00

The coke is much puffed, brittle and glossy.

DUTCH BANK, Coal L. Section 34, township 3, range 7, worked by Spink, Cable & Co.

Specific gravity, 1.264; one cubic foot weighs 79 lbs.	
Coke, - - 63.50	{ Ash, white, - - 2.00
	{ Fixed carbon, - - 61.50
Volatile matter, 36.50	{ Water, - - 2.00
	{ Gas, - - 34.50
100.00	100.00

SPINK, CABLE & Co.'s main slope, coal L, section 34, township 3, range 7.

Specific gravity, 1.294; one cubic foot weighs 80.87 lbs.	
Coke, - - 64.50	{ Ash, fawn color, - - 4.50
	{ Fixed carbon, - - 60.00
Volatile matter, 35.50	{ Water, - - 5.50
	{ Gas, - - 30.00
100.00	100.00

The coke is swollen, bright, porous and slightly laminated.

SULPHUR SPRING BANK, Coal L, section 34, township 3, range 7, worked by Spink, Cable & Co.

Specific gravity 1.280; one cubic foot weighs 80. lbs.

Coke, - - -	64.30	{	Ash, brown, - - -	6.00
			Fixed carbon, - - -	58.30
Volatile matter, - - -	35.70	{	Water, - - -	4.50
			Gas, - - -	31.20
	<hr/>			<hr/>
	100.00			100.00

Coke much puffed, brittle and glossy.

THOMAS WILSON'S, Coal L, section 26, township 3, range 7.

Specific gravity 1.268; one cubic foot weighs 79.25 lbs.

Coke, - - -	61.70	{	Ash, white, - - -	2.50
			Fixed carbon, - - -	59.20
Volatile, - - -	38.30	{	Water, - - -	3.40
			Gas, - - -	34.90
	<hr/>			<hr/>
	100.00			100.00

Coke slightly swollen, laminated and glossy.

Coal X, taken in the descending order, is the next workable seam in this county. The thickness varies from two to five feet. It outcrops in a great many places and has been opened and mined by Raymond, and H. Hyatt, on section 23, one mile northeast of Washington, and by Ostrander, on section 25, about half a mile south of the former openings.

It is a very pure coal, contains less ash and water, and, also, less fixed carbon, but more gas than coal L. The color is jet black, fracture cubical, shows more or less carbonaceous matter in the horizontal partings, and some scales of calcite in the vertical seams. A sample taken from Raymond's mine was analyzed and contained:

RAYMOND'S COAL, X, section 23, township 3, range 7.

Specific gravity 1.200, one cubic foot weighs 75 lbs.

Coke, - - 52.50	{	Ash, cream color, - - -	1.75
		Fixed carbon, - - -	50.75
Volatile matter, 47.50	{	Water, - - -	1.00
		Gas, - - -	46.50
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100.00			100.00

The coke is porous, puffed and lustreless.

Over this coal is usually found a heavy bedded or schistose, coarse grained, grayish brown sandstone, with, sometimes, a few inches of bituminous or argillaceous shale intervening between the two. At Raymond's and Hyatt's tunnels, or entries, the massive sandstone rests immediately upon the coal. At the former mine the seam is a little over three feet, and at the latter about two and a half feet thick. The altitude of these mines above the railroad is ninety-two feet. The coal is wagoned to the city, where it has a good reputation as a fuel.

At Ostrander's entry the seam is four feet thick and has an elevation of fifty-four feet above the railroad. This mine is extensively worked and the coal is hauled, over a tram road, to the Ohio and Mississippi Railroad.

Along the West Fork of White river, coal X can be traced, by outcrops, from Edwardsport, in Knox county, to a point some distance below the mouth of Veal's creek. An instructive section is here given of the strata at Edwardsport, from coals L to K, and presents the key to the chronological order of the coals around Washington:

SECTION AT EDWARDSPORT, KNOX COUNTY.				
SPACE.		FEET.	IN.	
26.		20		Surface, Soil and Clay.
		6		Gray Shale.
5.		5		COAL L. (Curry's Coal.)
		3		Fire Clay.
41.		38		Space containing silicious Shales and Sandstone.
1.10		1	10	COAL X.
		4		Fire Clay.
28.6		20		Shale, where exposed.
		2	6	Buff Fossiliferous Limestone.
		2		Black, Sheety Shale.
5.		5		COAL K.
		2		Fire Clay.
27.		25		Shales.
134.4	TOTAL.			Low water in White river.

The buff fossiliferous limestone, in the above section, contains *Productus punctatus*, *P. semireticulatus*, *P. elegans*, *P. cora*, *Chonetes mesoloba*, *C. Smithii*, *Orthis Rushensis*, *Bellerophon carbonarius*, and an abundance of *Encrinite* stems, and in the black, sheety shale, below the limestone, are found teeth, scales and spines of fish.

At the town of Edwardsport, coal K is three and a half feet thick, lies twenty-five feet above the river bed, and is cut through by the grade of the Indianapolis and Vincennes Railroad. A quarter of a mile in a southerly direction,

where it is again cut through by the railroad, the thickness is scarcely two feet, but thickens up to five feet, where it shows in the river about one mile below the town on property belonging to Dr. Keith. Coal X is seen, at intervals, about twenty-five feet above. Previous to the time of my visit to this locality, it was the received opinion, of the citizens, that the coal on Dr. Keith's land was a lower seam than the one cut by the railroad, and in order to fully test the matter, Dr. K. put down a bore one and a quarter miles south of the town, near the railroad, which commenced just beneath coal X, passed through coal K and continued to a sufficient depth, through barren strata, to satisfy himself of the accuracy of my determinations. At this point a shaft was subsequently sunk to coal K, and it is now mined by Mr. Ostrander.

The levels obtained here show that the strata dip slightly to the south, and at Appraw's ford, carries coal X down to the level of the water. Formerly, in times of extreme low water, the citizens of Washington obtained most of their coal at this place, by mining it out of the bed of the stream. When I visited this locality, the river was up, and, I had no means of measuring the thickness of the seam, but, was informed by parties who had worked it, that it was about four feet thick; the superimposed rocks are schistose sandstone. About two miles below Appraw's ford, on the Knox county side of the river, is the Weaver mine—coal X. The seam at this place, is three feet ten inches thick, at high water mark, and has a sandstone roof. The quality of the coal at the Weaver mine is remarkably good, and mining operations have been abandoned, only, for the want of regular railroad transportation for the coal. The next opening to coal X, in going down the river, is one mile below Maysville, on section 6, township 2, range 7. Here, a slope was made to the coal, starting close to the bank of the old Wabash and Erie Canal; it has a sandstone roof and is, as nearly as I could determine owing to the interference of water, four feet thick.

When the canal was open for navigation, extensive mining operations were carried on at these mines, transportation was cheap and the coal found a ready market in the towns along the canal. The seam lies just below the bed of the canal, and the low ridge, above it, furnished the following section:

SPACE.		FEET.	IN.	
				Covered slope.
		7		Soft, shaly Sandstone.
		6		Soft, gray Sandstone.
4		4		COAL X.
		0		Fire Clay.

The siliceous shale, in the upper part of this section, is seen for several hundred yards along the river bluff, going south.

Three quarters of a mile below the mouth of Veal's creek, coal K makes its appearance in the bed of the river, and coal X, reduced in thickness, is seen a few yards above. The following section exhibits the relative position of the two seams:

SECTION NEAR MOUTH OF VEAL'S CREEK.				
SPACE.		Ft.	In.	
		4		Covered space.
24.		20		Shaly sandstone.
2		2.3		COAL X. Fire Clay.
		5		Siliceous shale
			6	Hard blue limestone.
15.6		2		Calc. shale, fossiliferous.
		5		Pyritiferous calcareous shale with fossils.
		1		Hard blue limestone.
2.		2		Black bituminous sheety shale.
		2		COAL K, exposed above low water.
51.6.	Total.			

The entire thickness of coal K could not be determined, as the coal extended beneath the water. The bituminous shale, forming the roof, contains a great number of round, ferruginous, calcareous concretions, a foot or more in diameter. Many of these balls have weathered out and are strewn over the bed of the river. This shale, also, contains numerous fins and scales of fish. The superimposed limestone and calcareous shale are highly fossiliferous, containing large *Productus punctatus*, *P. cora*, *P. elegans*, (longispinus,) *P. Semireticulatus*, *Aviculopecten providensis*, *Bellerophon carbonarius*, *Chonetes mesoloba*, *Orthis Rushensis*, and *Cyathaxonia prolifera*. The entire calcareous bed is remarkably rich in a great variety of shells; in some spots the surface was literally covered with large *Productus semireticulatus*, with their long spines entire and well preserved. I regret that a severe rain storm prevented me from making as complete a collection of its abundant fossil fauna as was desirable.

The sandstone overlying coal X, appears in the hills,

near Pond Creek Mills, on land owned by Hon. James D. Williams, in Knox county. At my request, he had Mr. Elbrig, of Brazil, who is an experienced hand at the business, put down a bore which reached coal X, four feet thick, within a few feet of the depth at which I stated that it would be found.

HON. JAMES D. WILLIAMS' BORE.				
SPACE.		FEEET.	IN.	
32.4		4		Surface.
		2		Sandstone.
		5		Shale.
		21		Solid blue sandstone.
			4	Black slate.
4.		4		COAL X.
50		4		Fire clay.
		5		Sandstone.
		4		Gray shale.
		5		Blue soapstone.
		7		Gray slate.
		25		Black slate.
86.4				

This bore was stopped just before reaching coal K.

Believing that one seam of coal was sufficient for all the mining he might do, the boring was stopped without testing the depth to coal K and its thickness.

Between Washington and Montgomery the sandstone over X, makes its appearance in several places, and the coal, which is struck by a number of wells north and south of the road, between these points, may be referred to that seam. It is, also, possible that this coal seam may exist at Cross' on section 17, township 2, range 6, where I was not fully satisfied that all the coal, exposed at several openings, did not belong to the subordinate seam K, which is readily recognized by the superimposed black, sheety shale, and limestone.

As we approach the eastern border of the county, coal K passes from a caking to a semi-block, and, probably, block coal, but it also diminishes in thickness and is rarely found thick enough to justify working. In the neighborhood of Montgomery and Black Oak, on the Ohio & Mississippi Railroad, it ranges from one and a half to three feet in thickness. At Cross' the old openings were filled up and I was unable to make a measurement of the seam, but Mr. Cross assured me that it was four feet thick. From the examination of small fragments, found lying around the mouth of the abandoned mine, I am rather inclined to believe that this seam is, here, a good quality of block coal. For this reason, I was very anxious that an opening should be again made to the body of the coal, that I might be able to decide the question. Though this work was promised by the proprietor, other business occupied his time, and I was not able, on a second visit, which was made for the purpose, to obtain any further clue to its character, than that already derived from the small weathered fragments, above alluded to.

The limestone at Cross' is from five to ten feet thick, and may be followed, for several miles, down Akerman's creek, and contains a great many fossil shells, similar to those found below the mouth of Veals creek. The underlying bituminous shale, also, contains the same character of fish remains, seen at that locality. At Montgomery, the limestone and coal K crop out on the side of the road, the former is, here, about one foot, and the latter, about two feet thick. Coal K has, also, been found, near this town, by bores and sinking wells. On section 12, township 2, range 6, and on section 7, township 2, range 5, on Ricketts' land, coal K is reported to be three feet thick. In the south part of the county, it ranges from two and a half to three feet in depth of strata, and has been rudely opened at a great many places; particularly in the neighborhood of Alfordsville and Glendale. On section 20, township 2, range 5, at Mr. Shea's, a coal, reported to be four feet thick, was passed through in digging his well, which I refer to K. Southeast

of Shea's, on the hill, after crossing Sugar creek; and on the road to Alfordsville, I obtained the following section:

SECTION NEAR SHEA'S.				
SPACE.		FEET.	IN.	
		10		Soil and Clay.
32.		20		Silicious Shale, with alternating bands of Iron Ore.
		2		Gray, Silicious Limestone.
4.		4		Shale. Place of COAL K. ?
		3		Fire Clay.
			1	Flaggy Sandstone.
24.		20		Sandstone and Shale.
		?		COAL I ?
		2		Fire Clay.
		14		Good Iron Ore mixed with Shale.
36.		20		Silicious Shale.
		0		Bed of Sugar Creek.
96.	TOTAL.			

At Alfordsville, Mr. J. A. McCord is mining coal K by a drift running into the face of a low ridge. The section, visible, contains:

SECTION AT McCORD'S.				
SPACE.		FEET.	IN.	
		20		Covered space.
38.		15		Argo. Silicious Shale.
		3		Black, bituminous shety Shale.
2.6		2	6	COAL K, (Block Coal.)
.6			6	Caking Coal.
		0		Fire Clay.
41.	TOTAL.			

Though the limestone is seen in the road, near by, I did not find it in this section. The coal is quite sulphury, and is not suited for manufacturing purposes. The same seam is, also, found at the following localities, near the town of Alfordsville:

Ross, northwest quarter, section 34, township 2, range 5.

Camp, southwest quarter, section 34, township 2, range 5.

J. A. McCord, northeast quarter, sec. 34, town. 2, range 5.

O'Bryan, northwest quarter, section 26, town. 2, range 5.

J. A. McCord, northeast quarter, sec. 33, town. 2, range 5.

Allen, northeast quarter, section 4, township 1, range 5.

T. Scales, southwest quarter, sec. 9, township 1, range 5.

Near Ross' the limestone, which overlies the coal, is from four to five feet thick where it crops out in Sugar creek.

At Thomas Scales' mill, on Sugar creek, in southwest quarter, sec. 9, town. 1, range 5, I found the following section:

SECTION AT THOS. SCALES.				
SPACE.		FEET.	IN.	
		20		Covered space.
103.		70		Argo. shale, with bed of white clay and sandstone.
		3		Hard blue fossiliferous limestone.
		8		Arenaceous shale.
		2		Black bituminous shale.
2.		2		Semi-block COAL K.
		0		Bed of Sugar Creek.
105.	TOTAL.			

Just below the mill, in the bed of the creek, is a layer of very hard bastard limestone, six inches thick. It is of a handsome blue color, and will take a fine polish.

The limestone, above the coal, contains: *Productus punctatus*, *P. cora*, *P. semireticulatus*, *Spirifer cameratus*, *S. lineatus*, *Pinna sp.* (?), and *Chonetes mesoloba*. Had time permitted, I have no doubt but the list of fossils might have been very greatly extended.

Near Glendale, coal K outcrops at a number of places, and is struck in digging wells. The following is a list of places where coal, probably referable to K, is found:

Burton, on Mud creek, east part section 10, township 1, range 6.

Arms, northeast quarter section 28, township 2, range 6.

Conner, southwest quarter section 27, township 2, range 6.

Fagan, southwest quarter section 34, township 2, range 6.

Gregory, southeast quarter section 29, township 2, range 6.

Gregory, Chris., southeast quarter section 5, township 2, range 6.

Lamb, northwest quarter section 27, township 2, range 6.

McGhee, northwest quarter section 34, township 2, range 6.

Ragsdale, southeast quarter section 28, township 2, range 6.

Rennselaer, southeast quar. section 27, township 2, range 6.

Smock, C., southwest quar. section 33, township 2, range 6.

At Glendale, Dr. Mitchell dug a well, which passed through:

Soil and drift, - - - - - 8 feet.

Soft sandstone, - - - - - 15 feet.

Hard blue limestone, containing flint, - 0 feet.

Where the coal was exposed to view, at the above localities, it was not over two and a half feet thick, and is, generally, less. It is reported to be four and a quarter feet thick in Michael Fagan's well. Chris. Gregory's coal is fifteen inches thick, and is overlaid by black, bituminous, slaty shale, containing fish remains; superimposed on the black shale, is forty feet of argillaceous and silicious shale, which reaches to the top of the hill.

Analysis of CHRIS. GREGORY'S coal (K?), on section 29, township 2, range 6:

Specific gravity, 1.276; one cubic foot weighs 79.75 lbs.

Coke, - -	62.50	{	Ash, drab, - - -	2.00
			Fixed Carbon, - - -	60.50
Volatile matter,	37.50	{	Water, - - - -	7.00
			Gas, - - - -	30.50
	<u>100.00</u>			<u>100.00</u>

The coke is very porous and brilliant.

This is a very good coal; it contains a large amount of fixed carbon, and a small quantity of ash.

JOHN GREGORY'S coal (K?), on section 5, township 2, range 6, though I believe it to be the same seam as the above, is not so good, as may be seen by the following analysis:

Specific gravity, 1.275; one cubic foot weighs 79.68 lbs.

Coke, - -	51.50	{	Ash, lilac, - - -	2.00
			Fixed carbon, - - -	49.50
Volatile matter,	48.50	{	Water, - - - -	6.50
			Gas, - - - -	42.00
	<u>100.00</u>			<u>100.00</u>

The coke is puffed, porous, and brilliant.

McCord's coal, at Alfordsville, is of variable quality; the upper part of the seam is block coal, and the lower part caking coal. As stated above, it contains combined sulphur and irregular bands of iron pyrites. The following analysis was made from a sample of the block-coal part of the seam:

M'CORD'S COAL K.

Specific gravity, 1.245; one cubic foot weighs 77.81 lbs.

Coke - -	56.00	{	Ash, flesh, - - -	2.00
			Fixed carbon, - - -	54.00
Volatile matter,	44.00	{	Water, - - - -	4.00
			Gas, - - - -	40.00
	<u>100.00</u>			<u>100.00</u>

The coke is very compact, and unchanged in form.

A specimen of coal, thrown out in digging through a seam, said to be four feet thick, in Cornelius O'Brien's well, on section 25, township 2, range 5, gave, on analysis, the following result:

CORNELIUS O'BRIEN'S COAL K.

Specific gravity, 1.270; one cubic foot weighs 79.37 lbs.

Coke, - - -	58.00	{	Ash, salmon, - - -	1.50
			Fixed carbon, - - -	56.50
Volatile matter,	42.00	{	Water, - - - - -	6.50
			Gas, - - - - -	35.50
	<hr/>			<hr/>
	100.00			100.00

The coke is slightly swollen, brilliant, and lamellar. This appears to be a very fair quality of semi-block coal.

The coal at Lamb's is said to be four feet thick, and was extensively worked by stripping, previous to the discovery of coal at Washington; the mine has, long since, been abandoned, and the old opening is so completely filled with clay, washed from the creek banks, that I was unable to determine its quality or measure its thickness. Following up the creek, a short distance, I found the fossiliferous limestone and chert, which is seen on Akerman creek at Cross'; this led me to refer the coal to K.

In the southern part of the county it is doubtful if any workable seam of coal exists between K and A, and, with the exception of the localities, already cited, I was unable to recognize any seam higher than A. The coal seam I is almost always a good quality of block coal. It is seen at outcrops and is struck in wells, and its presence, proved by trial bores, in a great many places in the neighborhood of Montgomery and Black Oak stations, in the east part of the county, on and near the Ohio & Mississippi railroad. The thickness of the seam varies from two and a half to four feet. At Montgomery there is an abandoned slope which reaches to this coal at a depth of forty feet. For some reason no mining has been carried on, here, for some years,

and the slope was full of water; the seam is said to be four feet thick, and the coal had a good reputation in the market. No good samples could be obtained from the old slack pile, and I was unable to infuse enthusiasm enough into the citizens to have the mine pumped out, that such an examination could be made, as would enable me to report on the value. The following section shows the position of the coals at this place:

SECTION AT MONTGOMERY.				
SPACE.		FEET.	IN.	
		8		Soil and Clay.
16.9		6		Brown Shale, with Ironstone.
		1	6	Dark, fossiliferous limestone.
		1	3	Black, bituminous, sheety Shale.
1.6		1	6	COAL K, (Caking.)
47.6		46.		Arenaceous Shale.
		1	6	Blue, argillaceous Shale.
4.		4		COAL I, (Block.)
6.		4	0	Fire Clay.
75.9	TOTAL.			






At Black Oak station, a shaft was being sunk to coal I, on the north side of the railroad, but it had not reached the seam at the time of my visit. On the south side of the railroad, along a small branch of Prairie creek, Mr. Alva Clark is mining coal I by a drift which had already been carried several hundred feet under the ridge. The seam ranges from three to four feet in thickness and is a good quality of block coal. The following analysis gives its composition in 100 parts:

ALVA CLARK'S BLOCK COAL I.

Specific gravity, 1.277 ; one cubic foot weighs 79.81 lbs.

Coke, - - -	60.80	{	Ash, white, - - -	3.50
			Fixed carbon, - - -	57.30
Volatile matter, 39.20		{	Water, - - - -	4.50
			Gas, - - - -	34.70
	<hr/>			<hr/>
	100.00			100.00

The coke is brittle, swollen, brilliant and amorphous ; the ash is white which indicates that it is free from iron pyrites, and the quantity of fixed carbon is very large. It will prove to be an excellent fuel for smelting iron. The roof is a bluish shale, passing upward into gray shale, of which there was six feet exposed to view ; superimposed on the shale, is, ten feet of soil. Near by the above mine, Mr. Clark had dug down the low bluff, forming the west bank of the branch, and exposed the following section :

SECTION AT CLARK'S.				
SPACE.		FEET.	IN.	
10.		8		Gray and buff argo shales.
		2		Compact dark argo shale.
.10			10	Caking COAL J.
.4			4	Fire clay.
3.		2-3.		COAL I. (Block.)
1.		1		Fire clay.
.10			10	Caking COAL H.
6.		6		Hard fire clay, and not to the bottom.
22.	TOTAL.			

In the above section, three seams have nearly united into one. The upper is probably a thin coal J, which is sometimes found between K and I ; the middle seam is I, and the lower seam, probably H, which like J, is not a very reliable seam. At this place the coal is worked by stripping. South of Black Oak station, in the middle of the southwest

quarter, section 30, township 3, range 5, Col. James S. Morgan has driven an entry into the block coal seam I, and has three and a half feet of good solid coal. Openings have, also, been made on adjoining farms, and the coal has uniformly proved to be of good quality. Indeed, coal I has been proved, by the aid of bores, to extend over a very broad area in this part of the county, and as the Indiana Mineral Railway, running from Bloomfield, in Greene county, on the north, to the Ohio river, at the mouth of Crooked creek, in Spencer county on the south, will pass through this district, it will be of incalculable value to the land owners, and induce the building of blast furnaces, and other establishments for the manufacture of iron.

The following record of the bores, made for coal in township 3, ranges 5 and 6, were kindly furnished by Mr. Clapp, who directed the work; they will serve, in a great measure, to point out the number and thickness of the coal seams, including K, and some of the subordinate coals that lie above the millstone grit. The terms used in designating the material passed through, are those furnished by the superintendent of the drilling, and the distinction between the sandstone and limestone is not always reliable:

All sections, given in this report, are made on a scale, vertically, of forty feet to one inch.

Section of a bore on George T. Hays' farm, five miles east of Washington, Daviess county, Indiana.

BORE No. 1.				
SPACE.		FEET.	IN.	
75.3		10		Clay.
		2		Sandstone.
		2		Shell rock and gravel.
		6		Blue Clay.
		4		Soft Sandstone.
		10		Hard Sandstone.
		6		Hard Limestone.
		10		Sandstone.
		10		Hard Sandstone.
		15		Soapstone.
3.			3	Black Slate.
		3		COAL K ?
29.		11		Fire Clay.
		1		Lime Rock.
		2		Fire Clay.
		1		Hard Rock.
		6		Fire Clay.
		2		Hard Rock.
		6		Soap Stone.
4.		4		COAL I ?
		3	6	Fire Clay.
42.6		2		Hard Rock.
		4		Fire Clay.
		1		Hard Rock.
		4		Fire Clay.
		1		Hard Rock.
		1		Hard Black Slate.
		5		Soapstone.
		5		Fire Clay.
		1		Hard Rock.
		1		Chalk Slate.
153.9		13		Black Slate.
	Total.	1		Hard Rock.

In going along the wagon road from Washington to Montgomery, we find the limestone which lies above X quite persistent, and easily traced from Thomas Wilson's, where it was dug into, for some depth in sinking a shaft (and which, at the time, was thought to commence above L,) to the point in the road, where the limestone is seen which overlies coal K. In descending on the strata, along this road, no other limestone was observed. This leads me to doubt the existence of a limestone, six feet thick, in the upper part of this bore, and also the abundance of limestone reported in the lower part. The intervening spaces, and the thickness of the coal beds, are given, no doubt, with considerable accuracy. The upper coal in this bore is probably K, and the lower one I.

Section of a bore on Mr. Hitt's farm, four and a half miles northwest of Washington :

BORE NO. 2.				
SPACE.		Fr.	In.	
60.		40		Surface.
		4		Slate rock.
		3		Pebble rock.
		5		Black Slate.
		8		Fire Clay and ashy Slate.
1.		1		Slate and COAL.
101.		13		Pale gray Slate.
		8		Dark gray Slate.
		24		Ashy gray Slate.
		56		Black Slate.
1.5		1	5	COAL.
13.		13		Gray Slate.
1.6		1	6	COAL.
34.1		12		Gray Slate.
		21	1	Black Slate.
		1		Fire Clay.
212.	Total.			

I am at a loss to point out the correlation of the thin coals found in this bore, but they evidently lie below the sandstone, superimposing coal X, in the hills north of Washington. Along the northern edge of these hills the sandstone makes its appearance at about the same level, above the streams, as the bore at Hitt's; and between these two places the county is devoid of prominent hills, and presents the appearance of having been subjected to the action of powerful denuding forces. Indeed, this level character of the country continues to the northern part of the county, and the coals which are found near Epsom, and elsewhere to the northward, are for the most part, subconglomerate.

Section of a bore on Alva Clark's land, at Clark's station on the Ohio & Mississippi railroad.

BORE NO. 3.				
SPACE.		FEEET.	IN.	
		16		Surface.
38.		10		Fire Clay.
		12		Dark gray Slate.
1.2		1	2	COAL K?
42.		42		Slate Rock.
3.		3		COAL I.
7.1		7	1	Slate rock.
91.3				

In this section the coals are referable to K and I.

Section of a bore on Harris & Moot's land, west half, northwest quarter, section 29, township 3, range 5.

BORE NO. 4.				
SPACE.		FEET.	INCHES.	
118.3		72		Surface.
		4		Gray slate.
		4		Fire clay.
		22		Dark gray slate.
		3	3	Sand rock.
		13		Black slate.
	4.3		4	3
5.		5		Fire clay.
127.6	TOTAL.			

Coal I is found at 128 feet below the surface, in this bore, and is of good workable thickness.

Section of a bore on Harris & Moot's land, south of the Ohio & Mississippi Railroad.

BORE NO. 5.				
SPACE.		FEET.	IN.	
47.2		33	2	Surface.
		6		Sandstone.
		8		Dark gray Slate.
2.		2		COAL K ?
25.		6		Fire Clay.
		4		White Sandstone.
		15		Dark gray Slate.
1.6		1	6	COAL J ?
13.		3	6	Sandstone.
		9	6	Black Slate.
4.6		4	6	COAL I.
93.2	TOTAL.			

In this section, coal I is reached at eighty-eight and one-third feet from the surface, and two other seams are passed, which are probably referable to J and K.

Section of a bore on J. C. Montgomery's land, one half mile north of Montgomery Station, on the Ohio and Mississippi Railroad :

BORE NO. 6.				
SPACE.		FT.	IN.	
60.		30		Surface.
		25		Dark gray Slate.
		1		Sandstone.
		4		Black Slate.
1.		1		COAL K?
		4		Fire Clay.
20.		15		Dark gray Slate.
		1	4	Black Slate.
1.4		1		COAL J?
		5		Fire Clay.
23.		7		Ashy Slate.
		7		Dark gray Slate.
		4		Black Slate.
2.6		2	6	COAL I.
107.10	Total.			

Three seams are also passed in this bore that are, probably, referable to I, J and K.

Section of a bore on Harris & Moot's land, section 29, township 3, range 5.

BORE No. 7.				
SPACE.		FEET.	IN.	
		32		Surface.
64.		8		Hard Gray Rock.
		24		Dark Gray Slate.
.8			8	COAL K?
		1		Fire Clay.
9.		3		Sandstone.
		5		Gray Slate.
1.4		1	4	COAL J?
		2		Fire Clay.
16.		4		Sand Rock.
		10		Black Slate.
5.		5		COAL I.
96.	Total.			



This bore, also made on Harris & Moot's land, passed through three seams of coal. The lower one, I, at ninety-six feet from the surface. It is here reported to be five feet thick; the upper seams are thin.

Section of a bore on the land of C. H. Dant, southwest quarter section 19, township 3, range 5:

BORE NO. 8.				
SPACE.		FEET.	IN.	
71.		30		Surface.
		12		Fire clay.
		18		Black slate.
		10		Sand rock.
2.9		1		Black slate.
		2	9	COAL I.
46.		10		Slate rock.
		10		Dark gray slate.
		6		Black slate.
		5		Slate rock.
		4		Fire clay.
		6		Black slate.
		3		Fire clay.
.3		2		Black slate.
			3	COAL.
120.	TOTAL.			

I am unable to correlate the coals in this bore, but the two and three-quarter feet seam evidently belongs to I.

Section of a bore on James Kennedy's land, section 19,
township 3, range 5 :

BORE NO. 9.				
SPACE.		FEET.	IN.	
50.		32		Surface.
		14		Dark gray Slate.
		4		Black Slate.
.2			2	COAL.
15.		5		Hard, gray Rock.
		10		Black Slate.
4.6		4	6	COAL I.
69.8	TOTAL.			

In this bore, made a short distance north of the former, coal I has thickened up to four and a half feet; K is not present, and the two inch coal, probably represents the place of J.

Section of a bore on A. J. Hart's place, section 29, township 3, range 6, north of Ohio and Mississippi Railroad :

BORE NO. 10.				
SPACE.		Ft.	In.	
		12		Surface.
49.		27		Slate rock.
		10		Black Slate.
1.8		1	8	Slate and COAL.
		5		Fire Clay.
		18		Pale gray Slate.
		35		Slate rock.
130.		19		Dark gray Slate.
		2		Black sand rock.
		1		Black Slate.
		1		Black sand rock.
		5		Fire clay.
		12		Pale gray Slate.
		1		Sand rock,
		15		Black Slate.
		4		Fire clay.
		4		Dark gray Slate.
		8		Ashy Slate.
180.8	Total.			




This bore evidently passed through the places usually occupied by the coals between K and the conglomerate coals, as indicated by the three beds of fire clay.

Section of a bore on the land of Ignatius Walker, east half, section 36, township 3, range 6.

BORE NO. 11.				
SPACE.		FEET.	IN.	
22.		22		Surface.
.10			30	Soft Coal.
18.7		8	7	Pale gray Slate.
		7		Dark gray Slate.
		3		Black Slate.
1.		1		COAL K?
20.		2		Fire Clay.
		4		Ashy Slate.
		4		Dark gray Slate.
		10		Blue Sandstone.
2.4		2	4	COAL I?
22.		3		Fire Clay.
		4		Ashy Slate.
		15		Dark gray Slate.
1.9		1	9	COAL G?
88.6	TOTAL.			

The coal at sixty-two feet, in this bore, is probably the equivalent of I.

Section of a bore on the land of James Kennedy, on section 19, township, 3, range 5.

BORE NO. 12.				
SPACE.		Feet.	In.	
54.		46		Surface.
		4		Gray Slate.
		4		Black Slate.
.4			4	COAL.
		4		Hard gray Rock.
8.		4		Black Slate.
.8			8	COAL.
		1		Fire Clay.
6.6		5	6	Black Slate.
4.2		4	2	COAL I.
73.8	TOTAL.			

The coal, four feet two inches thick, at the bottom of this bore, is referable to I. The thin coal above is, probably, J, while K appears to be absent.

Section of a bore on Jessie Billings' place, sections 32 and 29, township 3, range 6, south of Ohio and Mississippi Railroad :

BORE NO. 13.				
SPACE.		FT.	IN.	
		24.		Surface.
		51.		Slate Rock.
		6		Pale gray Slate.
		14		Dark gray Slate.
		2		Black Sand Rock.
		2		Slate.
		2		Fire Clay.
		16		Ashy slate.
		2		Blue Sand Rock.
		12		Black Slate.
		5		Fire Clay.
		10		Blue Slate.
		10		Black Slate.
		1		Gray Slate.
157.	Total.			

This bore is made about three-fourths of a mile southeast of Bore No. 10, and on the same section.

The sections, furnished by the above bores, are highly instructive, and go to show a marked want of persistency in the various coal seams, both as regards their thickness and continuance over the basin; a fact to which I called attention in my First Report, 1869, and at the same time pointed out the obstacles which are thus thrown in the way of determining the correlation of coal seams.

Coal A is a subconglomerate coal. It is the next workable seam, in the descending order, and makes its appearance by outcrops in the northeastern and southeastern part of the county. Near Epsom, on Mr. Critchlow's farm, is a caking coal, one and a half feet thick, and is, without hesitation, referred to A. Above it there is a calcareous, fossiliferous shale, containing *Productus semireticulatus*, *Orthis Rushensis*, *Chonetes mesoloba*, and fragments of undetermined species.

On Hon. W. S. Turner's land, in Clark's Prairie, southeast quarter, section 35, township 5, range 6, a coal was struck in digging a well, at the following depth:

Surface soil and clay,	-	-	-	10 (?) feet.
Ferruginous shale,	-	-	-	6 feet.
Coal A, (good caking coal,)	-	-	-	1½ feet.
Fire clay, (good for fire brick,)	-	-	-	2 feet.

This coal is struck, in the wells, all around Clark's Prairie, which is three miles long and two and a half wide; and is also found in the same manner, at several places along the road, from thence to Clarksburg.

Around Clarksburg, coal A has been opened on the outcrop, at a number of places, and furnishes the coal required for neighborhood use, and is here, generally, a good quality of block coal.

Descending the hill to Howard's Mill, on a branch of First creek, the road passed over:

SECTION AT HOWARD'S MILL.				
SPACE.		FEET.	IN.	
58.		8 ?		Soil and Clay.
		20 ?		Drift, Clay and Gravel.
		25 ?		Heavy bedded Sandstone.
		5		Buff colored Sandstone in thin beds.
2.6		2	6	COAL A, lower 6 in. caking coal.
			8	Coal Rash.
		?		Fire Clay.
60.		60		Covered Slope to branch.
120.6	TOTAL.			

The heavy sandstone in this section belongs to the Millstone Grit, and the lower carboniferous limestone makes its appearance two and a half miles to the east of Howard's Mill, in the western edge of Martin county.

I am of the opinion that there are two seams of subconglomerate coal in this part of the county. The upper seam averages eighteen inches in thickness, is a good block coal, and has a hard, silicious fire clay at the bottom. The lower seam averages about two and a half feet and is also good block coal, with the exception of the lower six inches, which is caking coal. The latter is the most persistent seam, and has been found at the following places:

Critchlows, - - - N. E. $\frac{1}{4}$, Sec. 14, T. 4, R. 6.
 Hasting's, - - - N. E. $\frac{1}{4}$, " 23, " 5, " 6.

Howard's B.,	-	-	S. E. $\frac{1}{4}$,	Sec. 15,	T. 5,	R. 5.
Ketchum's,	-	-	S. W. $\frac{1}{4}$,	" 13,	" 5,	" 6.
Kinneman's, E.,	-	-	N. E. $\frac{1}{4}$,	" 30,	" 5,	" 5.
Laughlin's,	-	-	S. E. $\frac{1}{4}$,	" 25,	" 5,	" 5.
McCallahan's,	-	-	N. W. $\frac{1}{4}$,	" 32,	" 5,	" 5.
Odell's,	-	-	N. W. $\frac{1}{4}$,	" 15,	" 5,	" 5.
Riggin's,	-	-	S. E. $\frac{1}{4}$,	" 8,	" 4,	" 5.
Shaffer's,	-	-	N. W. $\frac{1}{4}$,	" 20,	" 5,	" 5.
Sims',	-	-	S. W. $\frac{1}{4}$,	" 2,	" 4,	" 5.
Sims',	-	-	S. W. $\frac{1}{4}$,	" 35,	" 5,	" 6.
Smiley's	-	-	N. W. $\frac{1}{4}$,	" 15,	" 4,	" 5.
Spalding's,	-	-	S. $\frac{1}{2}$,	" 34,	" 4,	" 5.
Suit's, J. N.,	-	-	S. E. $\frac{1}{4}$,	" 21,	" 4,	" 5.
Turner's, Hon. W. S.,	-	-	N. W. $\frac{1}{4}$,	" 13,	" 5,	" 5.
Turner's, Hon. W. S.,	-	-	S. W. $\frac{1}{4}$,	" 36,	" 5,	" 6.
Turner's, Hon. W. S.,	-	-	S. W. $\frac{1}{4}$,	" 10,	" 4,	" 5.
Ward's,	-	-	N. E. $\frac{1}{4}$,	" 8,	" 5,	" 5.
Ward's,	-	-	N. W. $\frac{1}{4}$,	" 17,	" 5,	" 5.

Mr. Clapp also furnished me with the record of a bore which he had made on the property of Mr. A. H. Doherty, northwest quarter, section 36, and which passed through strata as follows:

BOBE NO. 14.				
SPACE.		Ft.	In.	
		50		Surface.
99.6		9		Fire Clay.
		3		Hard Rock.
		8		Ashy Slate.
		12		Hard Sand Rock.
		17	6	Soft Sandstone.
99.6	Total.			

After passing a few miles north of the latitude of Washington, the whole county, as far as the southern boundary of Greene county, appears to have been subjected to powerful denuding forces, which swept away the upper part of the coal measures. Minor denuding forces were also, simultaneously, in operation along the valley of Veals creek, to the south of the Ohio & Mississippi Railroad, while the district around Washington was, in a great measure, exempt from these influences, and stood, like an island, in the midst of the destructive elements.

Coal A, probably covers the entire area of the county. In the northeastern part, at High Rock, on the property of Capt. Slicer and Mr. Sloan, it crops out in several places. It is two and a half feet thick, and composed of block and caking coals. The following section shows the strata at that point:

SECTION AT HIGH-ROCK.				
SPACE.		FEET.	IN.	
		15		Covered Slope. :
105.		65		Massive, coarse-grained sandstone—"MILLSTONE GRIT."
		25		Buff Silicious Shale.
2.6		2	6	COAL A, part "block."
12.		12		Bluish Argo, Silicious Shale.
.6			6	COAL.
		0		Low water in White river.
120.	TOTAL.			

About one hundred feet above the coal, under High Rock, is a fossiliferous chert rock, which has every appearance of being the representative of the cherty limestone usually found lying above coal K. The fossils seen in this chert were: *Productus punctatus*, *P. semireticulatus*, *P. cora*, *Spirifer cameratus*, *Chonetes mesoloba*, and *encrinite* stems. Large blocks of this chert are seen in the lane, near Capt. Slicer's house, at Scales', and on Mud creek. It is in connection with limestone superimposing coal K. Now, if the correlation here pointed out proves to be correct, it tends to show that there is a great diminution in the depth of the strata between coal K and the Millstone Grit.

QUATERNARY.

Drift: Except in a few places, where it has been removed by denudation, the drift is found resting upon the coal measure strata. It varies in depth from a few inches to twenty feet or more, and is composed of beds of yellowish clay and gravel, sand, and bluish clay and gravel—"hardpan." Boulders are rare, and seldom larger than a man's head. Associated with the granitoid pebbles, are rounded fragments of silurian limestone, containing fossil shells. On a low hill, mostly composed of drift material, in Col. Morgan's farm-yard, on section 31, township 3, range 5, fossils of the silurian age are found in considerable abundance, completely weathered out and in good preservation; they have been the subject of much wonderment to the uninitiated in the science of geology. In our search, we were only able to find *Orthis lynx*, *O. occidentalis*, and *Strophomaria alternata*.

Loess: Some of the sand ridges, along the West Fork of White River, may be of this age. The buff colored marl beds, belonging to this epoch, usually containing land and lacustrine fossils, were not found.

ECONOMICAL GEOLOGY.

Coal is the most important mineral found in Daviess county. It underlies its entire area, which comprises about 271,000 acres.

In parts of the county, as shown by the foregoing report, there are as many as six seams of coal that are of workable thickness; combined, they will give an average of *nineteen* feet of coal. As these seams are not all continuous, or of workable thickness throughout the county, it will be a reasonable estimate to take EIGHT feet as the available quantity, and estimated for 271,000 acres, will yield 3,497,661,500 tons, as the quantity of coal which is available for mining purposes in Daviess county.

Coal L, which is mined at Washington, is the best caking coal yet furnished to the market from the Western coal field. It makes excellent gas for illuminating purposes, and a fair quality of coke for foundries. It is used, both at Vincennes and St. Louis, in the gas manufactories. Between fifteen hundred and two thousand tons are mined daily from this seam alone.

The *Black Coal* in the eastern part of the county, is of excellent quality, and, like the same character of coal in Clay county, is eminently adapted for the manufacture of iron and steel.

The Indiana Mineral Railway, running in a northerly and southerly direction, will pass through the centre of this basin of block coal, and will provide additional opportunities for locating blast furnaces and other branches of iron manufactures.

Iron Ore: Bog iron ore is found at many places in the northern part of the county. South of Clarksburg, on Malica Cumming's place, there is a considerable bed, in a meadow, in which was growing a luxuriant crop of grass; it is reported to be four feet thick, and to cover six or seven acres. A spade was procured, and we dug a foot or more into the ore, which was dry and almost impenetrable. This locality is in Clark's Prairie, and the ore is said to be found in patches over a considerable area to the southwest.

At Z. N. Gaston's, it is said to cover four acres. There is no other way to determine the quantity of ore, in the deposit, than by measuring the area, and probing the beds in a number of places. When roasted, the ore will yield about fifty per cent. of metal.

Iron made from bog ores is apt to contain a little phosphorus, which makes the metal hard and suited for rail-heads, though worthless for steel and many other uses. Bog ore is not so highly esteemed by furnace men, when the water has been long drained from it.

There is, more or less, clay iron-stone interstratified with the shales throughout the county, but at no place was it

seen of sufficient thickness to be of value. The greatest quantity observed is near the town of Alfordsville.

Ochre: Close to the town of Alfordsville, there are several beds of highly ferruginous, red clay, that will make a good, durable paint when properly ground and prepared.

Building Stone: The massive sandstone, overlying coal X, in the hills north of Washington, may be quarried in blocks of any required dimensions, and will make a durable building stone. Some portions of the bed are reddish brown, mottled with spots of a deeper red, while others are of a uniform chocolate shade. This stone is used in the foundations of houses at Washington, and if properly selected, would answer well for superstructures.

The limestone, at Cross' and elsewhere on Aikman's creek, may be had, of any desired length, in blocks four feet thick. The color is black, mottled with spots of gray, and occasionally contains small seams of white calc spar. It is very close grained, very hard, and will take a fine polish. For outside work it is not durable, but makes a handsome marble for mantels, table tops, etc.

This stone has been burnt into lime; the color is dark, but it makes a good, strong mortar for laying bricks or stone.

Clay: Good clay, for making brick, is found in all parts of the county.

Water, for drinking purposes, is usually found by digging wells to the depth of eighteen to thirty feet. Where coal is not encountered in these wells, the water is free from deleterious mineral and organic matter, and is quite wholesome to drink, though generally too hard to be used for laundry purposes, without resorting to what is commonly called "breaking." The best way to "break" hard water, is to mix a quantity of caustic lime with it. The free carbonic acid of the water unites with the lime, and precipitates the calcic and magnesian salts, which give hardness to the water.

AGRICULTURE.

There is, in this county, a great variety of soil, and marked attention is being paid to its improvement.

In the bottom land, along the rivers and creeks, the soil is a sandy loam; on the prairies and flat lands, in the northern part of the county, it is a light, ashen-colored soil, with, here and there, ridges of clayey brown soil, some portions of which are inclined to be wet, and are commonly termed "craw fish land." The wet lands are being rapidly improved by ditching. Thorough draining would make them among the best soils in the county. The hill land is a clay loam, with the exception of a strip of sandy soil two or three miles broad, extending along the West Fork of White River. The river "bottoms" yield large crops of corn, for which it is thought to be the best adapted, though all the cereals and grasses are grown upon it with profit. The hill land yields the largest crops of wheat, but is likewise good for corn, oats, and other small grain, as well as grasses, and is remarkably well adapted for clover. The prairie and flat lands in the north, are best adapted to the growth of grasses. The sandy soil of the ridges, in the west part, is rather thin for the cereals and grasses, but is well suited for the growth of peaches, apples, and other fruits, and is especially adapted for melons, of which large quantities are grown, and the crop is highly remunerative.

Timber: The following is a list of the forest trees, upland, low land, and undergrowth, observed in this county:

- Ash, Black, *Fraxinus sambucifolia*—low land.
- Ash, White, *Fraxinus americana*—low land.
- Alder, Black, *Alnus glauca*—swampy ground.
- Beech, Red, *Fagus ferruginea*—upland.
- Beech, White, *Fagus sylvestris*—upland.
- Birch, Black, *Betula lenta*—low land.
- Buckeye, *Pavia lutea*—low land.
- Cherry, Wild, *Cerasus virginiana*—low land.
- Coffee Nut, *Gymnocladus canadensis*—low land.

- Cottonwood, *Populus canadensis*—river banks.
 Dogwood, *Cornus florida*—swamps.
 Elder, Box, *Acer negundo*—low land.
 Elm, White, *Ulmus americana*—low lands.
 Elm, Red, *Ulmus rubra*—low land.
 Gum, Black, *Nyssa sylvatica*—low land and upland.
 Gum, Sweet, *Liquidamber styraciflua*—low land.
 Hazel Nut, *Corylus americana*—swamps.
 Hackberry, *Celtis crassifolia*—low land.
 Hickory, Common, *Juglans tomentosa*—upland.
 Hickory, Pignut—*Juglans porcina*—upland.
 Hickory, Shellbark, *Juglans squamosa*—upland.
 Ironwood, *Carpinus ostrya*—low land.
 Locust, Black, *Robinia pseudo-acacia*—low land.
 Locust, Honey, *Gleditsia triacanthos*—low land.
 Linn (Basswood,) *Tilia americana*—low land.
 Maple, Soft, *Acer rubrum*—low land.
 Maple, Sugar, *Acer saccharinum*—low land.
 Mulberry, *Morus rubra*—low land.
 Oak, Black Jack, *Quercus ferruginea*—low land.
 Oak, White, *Quercus alba*—low land.
 Oak, Red, *Quercus rubra*—low land.
 Oak, Black, *Quercus tinctoria*—low land.
 Oak, Chestnut, *Quercus prinus-palustris*—upland.
 Oak, Water, *Quercus aquatica*—swamps.
 Pawpaw, *Annona triloba*—low land underbrush.
 Persimmon, *Diospiros virginiana*—hills and low lands.
 Poplar, *Lyriodendrum tulipifera*—hills.
 Red Bud, *Cercis canadensis*—low land undergrowth.
 Sassafras, *Laurus sassafras*—hills and low lands.
 Spicewood, *Laurus benzoin*—upland underbrush.
 Sycamore, *Acer pseudo-platanus*—river banks.
 Willow, White, *Salix alba*—river banks.
 Walnut, White, *Juglans cathartica*—low land.
 Walnut, Black, *Juglans nigra*—low land.

In the northern part of the county, the growth is principally oak.

CONCLUSION.

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