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THE COALS OF THE TWELVE POLE REGION OF WEST VIRGINIA.

THEIR RELATION TO THE COALS OF THE HANGING ROCK
REGION OF OHIO.

BY ANDREW ROY.

The Ohio extension of the Norfolk & Western Ry. crosses the Ohio river into West Va. at Kenova, at the mouth of Twelve Pole Creek, ten miles above Ironton. The road then follows Twelve Pole to its source on its way to connect at Bluefield. Twelve Pole Creek is sixty-five miles in length and extends in a general south-eastern course through the Barren and the lower measures from its mouth to the head of the creek.

The coal measures in Ohio dip to the south-east, and all the lower coals up to No. 6, or the Sheridan vein, have become buried under the Ohio river in ascending that stream from Portsmouth to Kenova. At Petersburg, opposite Ashland, the Sheridan coal is seen in the hills fronting the river, sixty to eighty feet above the river bed. At Sheridan mines, the vein is down to within forty or fifty feet of the river bed, and before reaching Kenova, it plunges under water. It has been cut through in sinking for the foundation of the abutments of the railroad bridge at Kenova.

From Kenova to Fleming, a new town site on Twelve Pole at the mouth of Billy's Branch, the distance is twenty-eight to thirty miles. The basin or trough of the great Appalachian belt passes between these points—the coals which have dipped under the Ohio river at Kenova, emerging from Twelve Pole a little above Billy's Branch, the center of the basin being near Wayne Court House. The western side of the basin is much narrower here than the eastern side, for from Wayne Court House to Portsmouth, Ohio, the north-western out-crop of the coal field, the distance does not exceed fifty miles, while from Wayne Court House to Pocohontas, the south-eastern margin, the distance is fully seventy-five miles.

As the coal seams emerge from Twelve Pole, the strata are found rising rapidly, the line of rise being south twenty to twenty-five degrees east. There are two seams above the water level at the mouth of Billy's Branch, both belonging to

the barren measures. The upper bed is a vein of rather poor quality from two and one-half to three feet thick, lying about one hundred feet below the only well-defined limestone horizon in the district which I have named the Billy's Branch limestone. The lower one is the Jackson Branch coal, met about one hundred and eighty feet lower; this vein is also from two and one-half to three feet thick at Jackson Branch and dips to the north. The next bed in descending order is the upper Furguson coal; it emerges from Twelve Pole at the mouth of Billy's Branch and is one hundred and forty-six feet lower than the Jackson Branch seam. Passing up the Twelve Pole a few hundred yards, another coal rears its head above the water, known as the Lower Furguson. It lies about thirty feet below the Upper Furguson. The Upper Furguson is a very persistent coal, but irregular in its thickness, ranging in height from a mere trace to eight and one-half feet. The Lower Furguson is very unreliable, having been subjected to dinuding agencies by currents of water in tumultuous motion during the first stages of subsidence of the coal marsh, as is evident by the irregular layers of sandstones which is so often found usurping the place of the coal. Proceeding further up the stream, another coal, called the Damron, comes up; this vein is from thirty-six to forty inches thick where it is opened at Damron's Ford, and is a hard splint overlain with a shale roof. The lower part of the vein is semi-cannel. A few hundred yards south, at a vertical depth of forty feet below the Damron, the Upper Dunlow coal emerges from Twelve Pole; this vein attains its best development at Dunlow, ten miles south of Billy's Branch, where it is met one hundred and twenty feet above the level of Twelve Pole. It is a double seam with a heavy parting of fireclay in the middle. Thirty feet below it occurs another bed, known at the Lower Dunlow. The Upper Dunlow is generally five and a half feet thick, including partings. The Lower Dunlow about three and one-half feet thick. Fifty feet lower another seam arises, eighteen inches in height.

From Billys' branch to Moses' fork, a distance of thirteen miles by the creek—by a straight line, not more than eight or nine miles, the Upper Furguson coal which is the main seam of the section, rises three hundred and twenty feet. For the first two or three miles, the rise is very rapid, being seventy or eighty feet the first mile, and forty to fifty feet per mile for the next two miles; then the strata becomes more gentle, with occasional slight reverse dips to the head of Twelve Pole.

In the Hanging Rock region of Ohio, there are several beds of limestone, some of which are very persistent and serve as unerring guides in identifying the various coal seams of that

region. Beginning at the uppermost and reading downward they are known in the State Geological Reports as "The Cambridge," "The Grey" and "The Blue" limestones. In the Twelve Pole region at Billy's Branch, there is as I have said, but one well-marked limestone horizon. The Billy's Branch limestone lies two hundred and eighty feet above the Jackson Branch coal, and four hundred and twenty-six feet above the Upper Furguson coal. If this lime rock represents an equivalent in the Hanging Rock region of Ohio, it is either the Cambridge or the Ames, which is due about one hundred feet above the Cambridge. The strata of both the barren and the lower coal measures become thicker in crossing over from Ohio into the West Va. division of the Appalachian Coal belt, otherwise the Pittsburgh coal would come in the section of Billy's Branch; but the Pittsburgh coal, which has been mined in the Kanawha, at Raymond City, and other points, lower down the river, is lost in air in coming westward into Cabell Co.

The Upper Furguson Coal is, I think, the equivalent of the Waterloo seam of Lawrence Co., Ohio, No. 7 of the State Geological Reports and the Freeport coal of the Pennsylvania nomenclature. Reading upward from the Upper Furguson, the Billy's Branch limestone is too high up to match with the Cambridge, or even with the Ames limestone, except on the theory of the thickening of the measures on the southern wing of the great coal field. From the Cambridge limestone to the Jackson shaft coal in southern Ohio, the interval is only about seven hundred and fifty feet. On Moses Fork, thirteen miles up Twelve Pole from Billy's Branch, the Upper Furguson coal is three hundred and twenty feet above the level of the creek, and the Billy's Branch limerock, which has overshot the hills at this point, is due four hundred and twenty-six feet higher; while below the level of Twelve Pole there must be several hundred feet of the lower measures buried, for it is still fifty miles to the outcrop of the coal measures in the line of the rise of the strata, which at a pitch of only ten feet to the mile would make five hundred feet of the lower measure due at the mouth of the creek; or twelve hundred and forty-six feet from the base of the lower measure to the Billy's Branch limestone.

Calling the Upper Furguson coal of the Twelve Pole region of West Virginia the Waterloo, or No. 7 coal of the Hanging Rock region of southern Ohio, equivalent seams, the Jackson Branch coal would match with the Cambridge limestone coal; and the upper Dunlow coal would match with the Sheridan, or No. 8. The following would represent the sections on both sides of the basin of the great coal field. Reading from the Jackson Branch downward:

HANGING ROCK OF OHIO.		TWELVE POLE OF W. VA.	
Cambridge.....	Feet. 130	Jackson Br.	Feet. 146
Waterloo, No. 7	50	Upper Ferguson.....	30
No. 6, B.....	20	Lower Ferguson	50
No. 6, A	30	Damron	30
No. 6	24	Upper Dunlow.....	30
No. 5	40	Lower Dunlow	40
Gray Limestone.....		18 inch Vein	
No. 4			

At Moses Fork, ten or twelve miles south of Billy's Branch, a bed of sandstone with tiers or boulders of limerock, occurs on the horizon of the eighteen inch vein of the Twelve Pole section; but at this point, owing to the thickening of the strata composed of heavy layers of sandstone which divide the Ferguson and Dunlow coal, the elevation of the Upper Ferguson above this limerock horizon is nearly two hundred feet.

As those before me this evening are practical miners, rather than geologists, they will be fully as much interested by a brief description of the Twelve Pole coal, for commercial purposes, as with their relations in the geological scale. The coals of this new region are all dry-burning splints, though one or two of the beds are at times disposed to run into cannels; this is notably the case on the Damron horizon, which on Moses Fork, becomes a fine cannel thirty-five inches in thickness, and overlain with a strata of splint seventeen inches thick. This cannel horizon is of a wide extent, stretching westward across to the

Levisa Fork of the Big Sandy, in Kentucky, where the cannel has been mined for several years at White House, and extending east to the Left Fork of Twelve Pole, where the vein shows thicker and purer than on the Big Sandy; thence still eastward to the Kanawha at Cannelton, not, however, in an unbroken belt, but in detached basins, some of which are of a very limited area.

On both forks of Twelve Pole, thence stretching to the Guyandot river, the cannel is met in many outcrops, and always of an excellent quality, unexcelled, perhaps, in any other coal region of the United States.

All the other coals of the Twelve Pole district under discussion are hard splints, dry-burning in character, very free from sulphur and high in fixed carbon; the seams are, no doubt, equivalents of the coals of the lower measures of the Kanawha river region of which there are six different veins in course of development, respectively known as the Cannelton vein, the Coalburgh vein, the Winefrede vein, Campbell's Creek vein, the Cedar Grove vein and the Eagle vein. These coals have made a reputation for themselves, wherever they have been introduced, as the best in the market, the Winefrede standing at the head of the list.

The Guyandot Coal Land Association owns 260,000 acres of mineral on the Guyandot river and on both forks of the Twelve Pole, and the quality of the coals of these tracts is fully equal to the best grades of the Kanawha splints and cannels. On the east fork of the Twelve Pole there is an extensive deposit of the cannel on the lands of this company, which in extent and value I have never seen excelled. Toward the southern end of the basin the splint coals are rather badly split up by the layers of slate and bone, but toward the head of the Twelve Pole, and across the divide on Island Creek, and on the Guyandot river, these intercolated strata thin down and sometimes disappear altogether.

The railway to this new district will, it is expected, be finished by the middle of June of the present year, and the whole extension from Ironton to Bluefield by the beginning of January, 1892, when extensive mining operations will soon result along the whole line. However, it may be later before the road reaches these points, as the difficulties of road-building are more than usually great on Twelve Pole and Tug River.

THE CHAIR—Gentlemen, you have just listened to a very able paper by Mr. Roy. Do you wish to discuss it?

PROFESSOR ORTON—I would like to say a word upon the paper. I was greatly interested in it. This whole subject of geological strata, whether sandstone, shale or limestone, seams of coal, iron ore, or whatever it is, is a fascinating one to any one who follows it, as any of you can testify. I am not acquainted with that part of the field. There are some implications in that paper that I would be inclined to question. I should be inclined to believe, from the geography of the field, and from what little I know of the geology of that side of the river, that the axis of the basin lies further to the east than Mr. Roy has intimated; and I would look for an explanation of the eastward dip, or eastward pitch or rise to the eastward, as possibly due to one of the broad and low folds which we know traverse the center of the field. The Kanawha coals I know a little more of; but I don't feel that I have a very good knowledge of that field. There is one fact brought out in this paper that interests me, and it is as to the proper names of the coal seams. Our seams were named, as all must recognize, early in the geological work done in our State, by numbers. Unfortunately, the numbers, as Dr. Newberry often assured me, were not what he would have assigned to them. He would have had but one or two, and he would have subsequently added others. Now, then, geology shuts us up to one system. We are obliged, when we find any new territory and a formation which has been named and identified elsewhere, when we can prove the connection of that, it is not possible to give it a new name. We can, of course, use the local name and say, "Nelson coal," or whatever it may be; but we have no right to burden the memories of the students of science with these names. Now, the names of our great formations come from the State of New York, because the work was first done there, and I have to recognize Clinton limestone. I cannot say "Findlay" limestone, or name it from some point where it comes to the surface. I am bound to take the name that has been given it. And when we come to the Hudson River shales, while I would like to call them "Cincinnati" shales, and tried to do so for a while; yet, I cannot do that. I am not a good geologist, certainly, if I give a new name for an old thing. Now,

the names of our coal seams come to us from Pennsylvania, and as far as we can follow the extension of the coal seams of Pennsylvania, we must hold on to these earlier names. I want to point out to this institute of mining engineers the great advantage that comes from that. Our local names for local designation, but in your general statements follow those which give one comprehensive view and show the extent of the formation. Some of my friends among the older geologists and mining engineers of the State have objected and have criticized this principle; but if the connection can be proved—and, of course, it requires labor to prove it—it becomes clearly of advantage to recognize this unity of the series. And as far as these facts of Mr. Roy's go, they are exceedingly interesting and valuable, and I trust he will be able to extend these connections and compare the coal seams of the field in which he is working now with the coal seams of the Kanawha field, if it is possible.

MR. MORRIS: Mr. President; I move a vote of thanks be extended to Mr. Roy for his paper.

The motion, being seconded, was unanimously adopted.

MR. PRICE: Mr. President, I move we adjourn for dinner.

SECRETARY HASELTINE: Mr. President, before you put that motion, I wish to say here that the Jeffrey Manufacturing Company have made arrangements for two or more hacks or busses to be waiting at the foot of the stairs at half past one o'clock this afternoon to take us to the Jeffrey works and from there over to the Minott Electrical Works, or any place you may desire. They desired to know how many would be present to be transported, and for that purpose I suggest, Mr. President, that you would ask for an expression of this assembly, either by rising or holding up their hands, so that we may form an idea of about how many desire to go.

THE CHAIR: Will each one that wishes to go on this excursion stand up and be counted by the secretary.

SECRETARY HASELTINE: Remember, this is free to all. I count thirty-five or thirty-six.

On motion, the convention took a recess.

FRIDAY EVENING SESSION, 8 O'CLOCK P. M.

The Institute was called to order by the President, who said:

Gentlemen, we left part of the afternoon's program unfinished, and the first thing in order will be a paper by Mr. William Hibbs on the management of men in mines, and it will be read by the Secretary, as Mr. Hibbs is not present.

SECRETARY HASELTINE: Mr. President, and gentlemen of the Institute, this paper came in a day or so ago, but in the rush of business I have been unable to read it, and if I do not read it very readily you will attribute it to that fact.