

GEOLOGY.

But little attention has been paid to the Geology of Indiana county. The present report will necessarily be meagre, and perhaps in some particulars imperfect; but we give as far as we have data.

Indiana county belongs to the ninth district of the general palaeozoic region of the State.

It comprises only the Vespertine, Umbral and Seral series. The former is very narrow lines of out-crop, bordering and dividing some of the coal basins. The coal basins are bordered generally by the seral conglomerate.

The different *formations* dip south-west.

Vespertine – This formation, as seen in the county, is a coarse gray sandstone, engirdling each basin by a continuous belt of rocks. At the gap of the Laurel Hill, on the Conemaugh, it is visible on the north side of the river for several hundred feet; thickness supposed to be about 400 feet.

On the Conemaugh, at the western slope of the Chestnut Ridge, this formation is a gray argillaceous and micaceous sandstone, with a few beds of dark shale of a thickness of about 350 feet. In the anticlinal belts of the Chestnut Ridge this formation occupies the highest flanks, and even the summits of the mountains which sustain the seral conglomerate, and the coal measures at a subordinate elevation on their slopes. The rate of diminution of this deposit is nearly due west.

Umbral Red Shales – This formation, at the Conemaugh gap, contains seral, loose, coarse and fine pebbly sandstone – red and green marl alternating red predominant, including a few sandy layers, 35 feet; gray, fine grained sandstone 5 to 6 feet; impure white ore from one to three inches; alternating green and red shale, bands of sandstone, including 6 inches coarse ore 17 feet. Argillaceous sandstone 3 feet; red shale and green argillaceous sandstone 3 feet; red and green shales and argillaceous sandy bed 8 feet; calcareous sandstone 10 to 12 feet thick; red sandy limestone 3 feet; light bluish gray sandy limestone, thick bedded and very oblique, 40 feet.

At the western slope of the Chestnut Ridge, is consists of red marly shales, containing little gray sandstones in the upper half; centrally a thick bed of sandy limestone; and is composed in its lower part of olive shales, thickness, 195 feet. This formation occupies a sort of elevated terrace on the mountains, a little below their actual tops, with a gentle depression, so that the vespertine conglomerate is brought nearer the true coal rocks, and forms with the seral conglomerate but one general rim or border to the several basins. In some parts it would seem not to be overlaid by the conglomerate, but is succeeded by coal measures.

Seral – This formation generally caps the highest summits of crests of the table lands, and has the same peculiarity as in the coal measures elsewhere in the State.

Two and a half miles from Campbell's mill, on Black Lick creek, the following section was had: Unknown to the top of the hill, 40 feet; sandstone, 40 feet; unknown, 20 feet; sandstone, 17 feet; red argillaceous strata; sandstone, 4 feet; slate and shale, 10 to 15 feet; unknown, 20 to 30 feet; red argillaceous stratum, containing small bivalves; red argillaceous stratum, blueish in spots, 8 feet; light green fossiliferous limestone, 10 inches; 20 feet to the creek not exposed. Nearly opposite this section, nodular hematic ore in very red shale may be observed. Near the mouth of Black Lick creek, the following section was obtained: Olive slate, 20 feet; blue slate; unknown, 15 feet; callareous clay, 2 ½ feet; red and green shale, 6 feet; green shale 10 feet; unknown, 25 feet; green fossiliferous sandstone, 10 inches; unknown, 10 feet; red shale, 3 feet; to the level of the creek, 54 feet.

Above the forks of Two Lick, 35 or 40 feet above the level of the stream, the following section was obtained:

Argillaceous limestone, studded with bivalves, imperfectly preserved, 6 inches; compact limestone with fewer fossils, 4 inches; green and red shales in colored bands, 10 to 12 inches; green fossiliferous limestone 10 inches; greenish sandstone, 5 inches; red shale, 2 feet; dark blue slate.

In boring a well in Indiana, 1,325 feet above tide, 340 feet above Blairsville, 50 feet above the beds of the rivulets on each side; one south about 100 perches, the other west 80 perches; about 50 feet below the red slate, in the immediate neighborhood; Well 162 feet deep – bore 2 ½ inches – digging in gravel and hard slate rock 17 ½ feet; hard slate rock of a dark blue color, 8 feet; soft slate rock of a dark blue color, 40 ½ feet; soft slate rock, in which was a vein of water, 19 feet; at 75 feet, the water sunk to 33 feet from the top of the well; red shale mixed with yellowish green sandstone and slate, very soft, with a vein of water 7 feet; in this shale the water sank to 43 ½ feet from the top of the well; black slate, pretty hard, 4 feet; white flint very hard. 4 inches; at this stage of boring the water sank to 53 feet 10 inches from the top of the well; dark colored hard slate, with a mixture of white. 2 feet; blue clay with a little sand 4 feet 6 inches; water 54

feet from the top of the well; hard gray sandstone rock 2 feet 6 inches; light blue slate and white clay, very soft, 4 feet; dark gray, fine-grained slate with very little sand, 5 feet; dark blue slate, with a few thin shales of whitish colored slate, 18 feet; black slate not very hard, 16 feet; soft black slate 1 foot 3 inches, hard slate 2 feet; gray sandstone 5 feet 6 inches, black slate, very hard 3 feet 3 inches.

Coal – The second and third, and a small portion of the fourth basins of the bituminous coal region, underlies Indiana county. The coal formation dips southwest with symmetrical flexures.

At Centreville, near the middle of the second basin, only the upper coal and limestones are out of the water. Coal six feet thick, emerges half a mile below the village; the same vein is seen one and a half miles above the village. Two coal seams, supposed to be of the barren series, appear north of Boliver on the hills. The third measure is four feet thick. Following the basin to the northeast, the same measures have been worked at various points. In the neighborhood of Strongstown, the first coal vein measures four feet; then strata, 100 feet; second vein, three feet thick; 50 feet higher; third vein, 18 inches thick; then 30 feet strata, fourth vein, 18 inches thick. There are only two coal seams exposed on the Conemaugh in the third basin, each underlaid by a bed of limestone; they crop out at the axis of the Chestnut Ridge.

The upper Freeport coal has been worked in the northern part of the county, and in the north-eastern part of the county, several beds on Two Lick creek and Yellow creek, on Dixon's run, Buck run, Rayne's run, Pine run, near the village of Marion, on Crooked creek, near Chambersville; on McKee's run, four and one-half miles north of Indiana; this bed is coal 22 inches; grayish black crumbly shale from 8 to 10 inches; coal 4 feet 6 inches – the roof of gray micaceous sandstone; dip north 30 degrees west; it contains sulphate of iron – the same is seen in many other places to the north-east.

The other veins average from 3 1/2 to 5 feet, all underlaid with limestone, and some of them roofed with shale and iron ore.

On Little Mahoning creek, at Robertsville, the upper Freeport coal is seen; the same is seen four miles west. At Dilt's Mill there is a thin vein of coal supposed to be the same. At Ewing's Mill shale and thin coal seams are opened. At Kinter's Mill, on Little Mahoning, where the third axis crosses the Mahoning valley, the upper Freeport coal is opened above the level of the stream, and 6 inch vein of a barren measure is seen above the calcareous shales. From Mahoning south to the Conemaugh, the beds are the common ones of the basin, occurring at the level of the small streams, while the hills are composed of the unproductive high measures. We also find coal measures, superficial and thin, until they cease to be continuous, prolonged by a few scattered patches, leaping from summit to summit on the narrow, synical table-lands.

At Smicksburg, in the fourth basin, the upper and lower Freeport seams are opened. The upper vein is four and a half feet thick, the strata, between the upper and lower average about fifty feet. The lower bed has been opened at various points, measuring two and a half feet. Between the terminus of the Chestnut Ridge and the water-shed between the eastern and western waters, the coal seams are split, and very irregular in many places. The same is observable in spots on the borders of the third and fourth basins. In one hundred part of Blairsville coal, there is as follows: Volatile matter, 31; carbon, 69; earthy matter, 4. Laminated columnar, hard, compact, shining, jet black.

Ten miles southwest, and about the same distance west from Indiana, the great Pittsburgh coal seam caps the highest knolls between the streams; sinking deeper and deeper under overlying rocks, until three and a half miles west of Saltsburg, 175 feet of upper barren measures overlies it, containing two unimportant coal seams. The Pittsburgh coal vein is seen on the north side of Two Lick; half a mile north of Black Lick it is seven feet thick. Southeast of Two Lick, and one and a half miles north of Black Lick, a seven foot bed, parted by bands of slate, has been opened. In the neighborhood of West Lebanon, the same vein is opened in the higher hills. Near McMean's, on Blacklegs creek, the vein is eleven feet thick.

West of Indiana, there is a third axis brought up in all the creeks, which affords an abundance of both fuel and lime. This coal has been opened at Jacksonville and various other points in that neighborhood. The vein averages about 3 1/2 feet. There is a barren measure overlying the Pittsburgh coal seam of 500 feet. The barren measure between the upper Freeport and Pittsburgh, is from 450 to 500 feet. Limestone accompanies all the coal measures in the county; in some places, the limestone is but a few feet under the coal; in other places from 20 to 30 feet. In the barren measure between the upper Freeport and the Pittsburgh coals, there is a fossiliferous limestone. In some parts of the county, it has been used for various purposes; the veins average from two to five feet thick.

Iron Ore – Bands of iron are found in various parts of the county. Several furnaces have been in operation on Black Lick creek, Laurel Run, and Mahoning creek, near Smicksburg, for several years. At Blairsville, the ore in 100 parts, contains carbonate of iron 67.20; peroxide 7.48; carbonate of lime 3.24;

carbonate of magnesia 1.50; silica 12.34; water 8 and metallic iron in 100 parts 37.24; dove color, smooth, nodular.

At a bank south-east of Blairsville the following was obtained in 100 parts: Carbonate of iron, 37.80; carbonate of zinc, 5.50; carbonate of magnesia, 7.50; silica and insoluble matter, 37.80; alumina, 7.60; water, 3.50; metallic iron in 100 parts, 18.27. The ore is mottled red and green nodular, somewhat spathose. On the west side of the Chestnut Ridge the following is found: Peroxide of iron, 51.25; oxide manganese, a trace; carbonate of lime, 2; silica and insoluble matter, 36.50; alumina, 5.96; water, 4; metallic iron in 100 parts, 35.87; cinnamon brown, nodular.

At Ewing's Mill, on Little Mahoning creek, there is a vein of very pure carbonate of iron, 18 inches thick, in layers of 4 or 5 inches thick, with concretions of silica, while masses and veins apparently pure carbonate of lime subdivide the ore.

At Robertsville there is bog ore. The above are nearly the only bed analyzed, but on the surface of the county ore is abundant. It is believed that the ore generally in the county would average about 30 per cent. metallic iron.

Organic Remains – Many have been found in the county, but few persons have paid any attention to either name or classification. The Fern has been found in abundance. In the northern part of the county, the Neuropteris minor, and the Allethopteris Pennsylvania 1st and 2d have been found. One place in a coal seam, the "Modiola." In many quarries, there have been reptilian foot prints discovered.

Soil – The soil in the eastern part of the county is loam and sand as far as the pine timber extends; in the balance of the county the soil is loam and slate, with a clay admixture in spots. The subsoil is clay and slate. The subjacent rock is a peculiar hard, blue micaceous sandstone in the low lands. In the higher table-lands it is variegated blue and red.

Water – The water used for domestic purposes throughout the county is generally obtained from springs, which are very numerous, and from most of them a strong current of pure water flows throughout the year, very seldom affected by the driest season. In towns and in villages, the water is generally obtained by digging or boring wells to the depth of from fifteen to thirty feet; some of them are affected by dry season. There are a few wells in Indiana, bored to the depth of 200 feet. But very few pipes of any kind are used as conduits.

Salts – In the Conemaugh valley there are numerous salt wells, from which are annually manufactured large quantities of salt of a very superior quality. The wells are bored to the depth of from 700 to 1,000 feet; the water is pumped up with steam engines, and boiled in large kettles and pans. The yield is variable. At first it yields in fifty or sixty gallons of water a bushel of salt. After pumping for a length of time, the yield is less, requiring one hundred gallons or upwards to produce a bushel of salt. Several springs in the county are thought to possess medicinal properties, but from the limited knowledge of their ingredients, we will pass them for the present.