

CHAPTER XII.

CARBONIFEROUS DEPOSITS OF EASTERN IOWA.

Beyond the margin of the Iowa coal field to the eastward there are Carboniferous areas of greater or less extent. Some of these contain coal, others do not, but their age is known with certainty from the fossils they contain. These areas are more or less separate from one another and are surrounded on all sides by rocks much older. There are two classes of these Carboniferous outliers; first, those which were deposited in isolated basins, and second, those which have been separated from the main coal field through erosion. At the present time it is perhaps difficult to determine in any particular case to which one of the two classes a given outlier may belong. These outliers are known to occur as far as 75 or 100 miles beyond the margin of the continuous coal field. Geologically there are many interesting problems centered around these outlying beds. In the first place, they throw much light upon the history of the Coal Period, particularly in showing that the Coal Measures were deposited on a gradually sinking continental shore. Thus they approximately determine the limits of the ancient Carboniferous seas. In the second place, they may be regarded as forming a connecting link between the Western Interior coal field of Iowa and Missouri and

the Eastern or Central Interior basin of Illinois. It is not probable that at any time during the Carboniferous the region between the two basins was ever as deeply covered by oceanic waters as the districts on either side, yet it seems quite likely that at some time or other before the close of the Coal Measure period the two were connected, but to what extent is not definitely known.

Most of the outliers occur in counties which are largely or entirely made up of rocks much older than the Coal Age: the Lower Carboniferous, the Devonian and the Silurian. Although it is not to be expected that mineral fuel in commercial quantities is to be found wherever these outliers exist, workable coal beds do exist in some of the districts, as is well shown in the Carboniferous deposits of Scott and Muscatine counties.

The counties in which outliers have been recognized are Grundy, Delaware, Linn, Jones, Jackson, Clinton, Johnson, Iowa, Scott, Muscatine, Washington, Henry, Des Moines, and Lee.

GRUNDY COUNTY.

Although this county cannot yet be classed among the coal counties of the state, there is every reason to believe that workable coal will yet be found within its limits, the western portion being so near the Eldora district where mining has been carried on for many years, and in which no less than four coal veins are known to be present. Here the coal bearing rocks are at least 150 feet in thickness, and at a distance of less than four miles from the Grundy line. Hence, it is reasonable to expect that the coal bearing deposits extend into the adjoining county. Besides, isolated outliers, or pockets, in all likelihood occur in the district, but as the entire county

is so situated as to present few natural exposures of the underlying rocks the discovery of the exact locations of the basins must be largely due to accidental borings rather than systematic prospecting.

DELAWARE COUNTY.

West of Rockville, near the eastern county line, there is a deposit of ferruginous conglomerate found capping the bluffs and lying unconformably upon the old Paleozoic rocks of the region. In lithological characters it is essentially the same as is observed in the other Carboniferous outliers of northeastern Iowa, except that it is more distinctly conglomeratic. This deposit has been referred to the Cretaceous, but its lithological features, stratigraphical position and geographical location seem to suggest that it is more probably Carboniferous. This is rendered still more likely by the recent discovery of a number of outliers with plant remains in the neighboring counties. One of these is as far southeastward as north-central Jackson.

LINN COUNTY.

At the present time only a single locality is known in which the rocks may be referred to the Coal Measures. This is a few miles northeast of Cedar Rapids. Lithologically the beds are a ferruginous sandstone not unlike the other Carboniferous outliers of northeastern Iowa. Although the existence of the sandstone has been known for some time, no fossils were known to occur in it until quite recently, when Prof. W. H. Norton discovered quite an extensive flora of characteristic coal plants.

JONES COUNTY.

This county lies far outside of the coal field of Iowa. In the district, however, is an outlier resting on Silurian rocks, which is now believed to be of Carboniferous age. It is in the southeastern part of the county, two miles northeast of Oxford Junction (Tp. 83 N., R. 1 W., Secs. 13 and 14). The formation is a dark brown, ferruginous sandrock, similar to that which is found in Jackson county and elsewhere, and contains plant remains. There are perhaps other outliers of the same geological age in different parts of the county, but the one mentioned is the only one whose character and location is definitely known. Although thin seams of coal may occur in these outliers, it is not to be expected that coal in commercial quantities will ever be found in connection with any of them.

JACKSON COUNTY.

Although this county is far removed from the productive coal field it is interesting to know that within its borders outliers of Carboniferous strata are found. It is not improbable, therefore, that thin seams of coaly material of quite limited extent may eventually be encountered in this part of the state. The Coal Measure outlier of this district has recently been made known by Professor Osborn, of the Iowa Agricultural College. The situation is in the southwestern corner of Jackson county, in the neighborhood of Monmouth. It is well exposed in the Stewart lime quarry and is said to crop out near the top of the hills in the vicinity for a distance of about three miles. The beds are made up chiefly of a compact ferruginous sandstone, and contain characteristic coal plants.

Specimens of lepidodendrids and calamites obtained were two to four inches in diameter and from one to two feet in length.

CLINTON COUNTY.

Only two areas, and these very limited, which can be referred to the Carboniferous, are known to occur in this county. One forms a small outlier of brown, ferruginous sandrock, lying in the northwestern corner of the county. It is probably continuous with a similar bed in the adjoining parts of Jones. The other is on a small branch of Deep creek in the northcentral part of the county, near Charlotte. Although these outliers carry characteristic Carboniferous plant remains, it is not probable that workable seams of coal will ever be found in connection with them.

JOHNSON COUNTY.

Johnson county is almost entirely made up of Devonian rocks, the exceptions being a small area in the northeastern corner, which is Silurian, and one in the southwestern part, which is Lower Carboniferous. There are, in addition, a few isolated beds of soft, ferruginous and often shaly sandstone which are found overlying the Devonian rocks. These beds are exposed chiefly along the Iowa river. The largest exposure is in the northern part of the county bordering the northern bluff of the stream and it probably is continuous with a similar formation in Iowa county. It forms a broken area fifteen to twenty miles long and three or four miles wide. The sandstone beds apparently rest unconformably upon the Devonian limestone. The thickness is from forty to fifty feet or more in places. Intercalated are bands of shale some of which are carbonaceous and pass into thin seams of impure coaly matter. The rocks are said to

contain remains of Coal Measure plants. At Iowa City, near the milldam, an excellent exposure of thinly bedded sandstone is seen filling an old gorge cut from Devonian limestone, the line of contact, which is inclined at a high angle, being clearly visible for thirty or forty feet. The ancient bed of the water course opens out to the westward, the present channel of the river being at right angles and cutting directly across the old one.

IOWA COUNTY.

Although Iowa county cannot yet be regarded as one of the coal producing districts, it is quite probable that workable coal seams will be found in the southwestern part of the region. The greater portion of the strata below the drift is made up of Devonian and Lower Carboniferous limestones. In the southwestern corner the Coal Measure strata of Keokuk county probably extend over into this county, as one of the principal mining districts of Keokuk is situated within a few miles of the Iowa county line.

In the northeastern part of the county, along the north bluff of the Iowa river, there exists an extensive deposit of brown, ferruginous sandstone, moderately compact but very irregularly bedded. There is no direct evidence as to the geological age of this formation, but it is thought to belong to the Coal Measures. No indications of coal has been found in connection with it. Though perhaps representing one of the Coal Measure outliers, no workable coal deposits need be sought for in connection with it.

SCOTT COUNTY.

The northern half of the county is composed almost entirely of Upper Silurian dolomites. They are well

exposed at LeClaire and other points along the Mississippi, as well as along many of the smaller interior streams. They often show considerable disturbances, the strata frequently being tilted as high as thirty or forty degrees. The southern half of the county is made up almost entirely of Devonian rocks, which are largely limestones, with some sandrock and shale. These beds are best exposed along the Mississippi, from a point below LeClaire to the Muscatine county line.

There are a number of Carboniferous outliers within the limits of Scott county. The beds are for the most part sandstone with occasionally some shale. One of the most notable basins of Coal Measure strata is just below the town of LeClaire, where the apparently level strata are seen resting on the upturned edges of the Silurian limerock, the angles between the two planes of stratification being from fifteen to twenty degrees. Another outlier of the same kind is known to exist a few miles below the one just mentioned. On the Iowa side of the river no coal is known to occur in these beds, but on the opposite side a thin seam of coal and its accompanying bituminous shale is said to exist. In east Davenport another similar outlier of Carboniferous strata has been reported. Coal has been prospected for here, and it is said that workable seams have been found.

From a few miles below Davenport to the west county line the upper portion of the bluffs is occupied by the eastern extension of the Muscatine outlier. Although only about one-third of the entire outlier rests in Scott, the majority of the mines now worked in it are situated in this county. Like in Muscatine county there are two sandstones found closely associated with one another, the lower one being of Devonian and the upper of

Carboniferous age. Probably all the mines now in operation are not working in the same vein, as is generally supposed, for it is quite possible that several seams exist. The coal worked varies from one to six feet in thickness, and is of the ordinary bituminous variety. Below the chief seam a short distance and lying just above the Devonian limestone a cannel coal is said to exist in some places. As reported by Hall the cannel portion is from one foot to one and one-half feet in thickness and is situated between black shales, the upper one of which is from two to two and a half feet and the lower about one and a half feet thick.

Coal has been mined in Scott county for upwards of forty years. At the present time the mines operated are all near Buffalo. There are two well defined groups of mines, the first located on Stillwater creek, about a mile west of the railroad station, and the other about three miles north, in the vicinity of Jamestown.

In the district west of town there are at present only two mines working. The Friedley (Tp. 77 N. R. II E., Sec. 17, SE. qr., SE. $\frac{1}{4}$) is a shaft about fifty feet deep, located a short distance from the creek. The section of the coal as found at this place is as follows :

	FEET.	INCHES.
4. Shale, gray, argillaceous.....	32	
3. Shale, black, fissile.....		8
2. Coal.....	3	
1. Shale, clay, hard, black.....	9	

In mining, the black shale (number 3) is taken down and the gray shale allowed to form the roof, which is exceptionally good. The coal is bright, clear and clean, running from two and one-half to four and one-half feet in thickness, and dips to the east about three feet in a hundred. Small slips occur and low "horsebacks" are

occasionally encountered. The coal is worked by the room and pillar plan. The entry has been driven 130 feet east and 200 feet south. The output is quite large for a country bank, and an important local trade is supplied. A half mile south is the Kantz mine which has been operated in a small ravine leading into the Stillwater. The coal here worked is reached at a depth of 106 feet, and is apparently the same as that worked at the Friedley bank, the difference in the depths of the shafts being due largely to surface irregularities, though a slight dip northward has been noted. The coal averages about three and a half feet in thickness. The gray shale is left for the roof. The shale underlying the seam is quite sandy and in many places passes into a characteristic compact sandstone. A short distance directly west of the Kantz mine is the Webster shaft which is not now in operation. In former years several other mines were also worked in the immediate neighborhood.

Around Jamestown coal has been mined for a long time, and at present four mines are in active operation. The coal here appears to run in a trough trending south-east and northwest, and has been traced for over two miles. Near the Mackin and James mine it apparently bends westward. It is not exposed beyond this point. The workable coal varies from 200 to 400 feet in width, being thinner at the edges than in the middle. The seam along the median portion of the trough is called by the miners "swamp coal" and is said to be more than six feet in thickness in places. On both sides the bed rises so that the "swamp" is fully ten feet below the margins. Along the edge of the basin, in some portions of the field, a roll or "pinch-out" has been traced for a considerable distance. As a rule, however, the vein is quite free from

"troubles," the small slips and low "horsebacks" occurring not interfering seriously with mining.

In the Hanlon and Blackwell mine (Tp. 77 N., R. II E., Sec. 11, NW. qr., NW. $\frac{1}{4}$) the coal is reached by a shaft seventy feet deep. The section measured may be taken as representative of the coal of the basin :

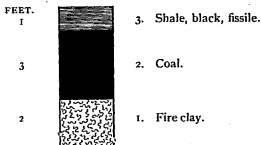


Figure 212. Seam in Hanlon and Blackwell Opening. Jamestown.

On the same land is the old Williams mine, and just across the road the deserted Mackin opening. About a quarter of a mile directly west is the Friedley and Hoyt shaft which is about seventy feet deep. In this mine the "swamp coal" was also measured. The section is :

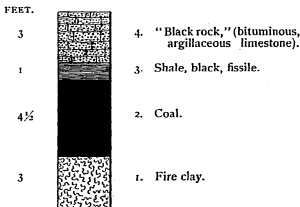


Figure 213. Coal Bed at Friedley Mine. Jamestown.

The black shale roof is covered in places by a hard, compact, black, calcareous limerock, carrying some iron.

Irregular nodules of this dark clay ironstone called "niggerheads" attain a measurement sometimes of five feet.

Near the Jamestown schoolhouse a section of a shaft sunk several years ago was given as :

	FEET.
8. Soil	1
7. Clay, yellow, drift.....	48
6. Sandstone, soft, yellow.....	10
5. Shale, carbonaceous.....	20
4. Shale, black, fissile.....	9
3. Clay ironstone	4
2. Coal	4
1. Fire clay.....	2

About half a mile west of the Friedley and Hoyt mine is the Mackin and James shaft, which is probably the most important one in the district, supplying a large local trade. The coal is five feet thick in places, with an average thickness of perhaps three feet.

A mile directly south is the Rowan mine, working apparently the same vein. There are two veins of coal said to be present in this place about thirty-five feet apart. The thickness of the seam averages about three feet. The dip is to the southeast, four feet in a hundred.

Besides the mines mentioned there are a number of others which have been worked from time to time. With facilities for loading the output directly on a railroad track an important commercial trade might soon be developed.

MUSCATINE COUNTY.

The coal bearing strata of Muscatine county forms an irregular belt from one to five miles in width extending along the course of the Mississippi river from a short distance below the city of Muscatine

nearly to Davenport. With the exception of this zone the entire district beneath the drift is made up of rocks much older, Devonian chiefly. At the time of the early explorations under the auspices of the Federal Government during the latter part of the forties the outcrops were best exposed in the vicinity of the former place, and consequently the Carboniferous area was widely known as the Muscatine outlier. In reality it forms part of the Illinois field from which it is now separated only by the comparatively narrow, recent channel of the Mississippi. The coal bearing strata form the upper part of the bluffs and occupy an eroded depression in the Devonian rocks.

Over most of the region there are two sandstones quite similar in general appearances and closely associated. The one is Devonian in age and carries a very distinct and characteristic fauna; the other is a Carboniferous accumulation and its organic remains are chiefly those of plants. Although the latter rocks are largely sandstones there is some shale near the base. The formation is quite extensively developed for a distance of eighteen or twenty miles above the city of Muscatine. On Pine creek, a mile above its mouth in a narrow gorge, locally known as the Wild-cat den, more than a hundred feet of the brown and yellow sandstone rises above the creek level in perpendicular cliffs. The same rocks are also well shown at Wyoming hill, four miles above Muscatine, where abundant remains of plants are found. Just below Muscatine it is well exposed in a high mural bluff. At the present time the details of the section are somewhat obscured but appears to be essentially the same as that given by Hall more than thirty-five years ago, which is as follows:

	FEET.
8. Thin bedded sandstone, with shaly layers.....	19
7. Massive sandstone, with large concretions.....	10
6. Seam of coal, or shaly coal, with under clay.....	4
5. Shaly sandstone, with shaly partings, more shaly in the lower part	8½
4. Thin bedded sandstone, with shaly parting	5
3. Heavily bedded sandstone.....	6
2. Green shale	3
1. Distance to level of river (covered).....	20

The coal seam (number 6) of the section is, as originally described by Whitney, not very regular, but is divided into several smaller and somewhat irregular areas toward the river. To the west a short distance it becomes more regular, and attains a thickness of two and a half to three feet. A little farther westward it appears to thin out entirely, allowing the sandstones above and beneath to come together. There are perhaps several coal seams in this outlier. The thickness of the one worked varies from an inch to over three feet. It was formerly mined in the vicinity of Muscatine and at several other places along the bluff's from below the city to the mouth of Pine creek. For several years, however, little coal has been taken out, yet the openings of several of the deserted pits are still recognizable. The only place within the limits of the county where coal has been mined recently is at the Hoor bank, about three miles east of Muscatine (Tp. 77 N, R. 1 W., Sec. 29, NW. qr.). At the present time the mine is not in operation, owing to the death of the former owner. It is a drift which has been worked for some years. Two entries have been driven back into the hill a distance of about 1,000 feet. The coal averages three feet in thickness and is quite regular. The floor is a soft gray fire clay. The roof is a sandstone, quite firm and rather compact. Its excellent character and the freedom of the coal from irregularities or clay seams makes it

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quite probable that other mines could be operated here to considerable advantage. The section at the opening of the Hoor mine is given below :

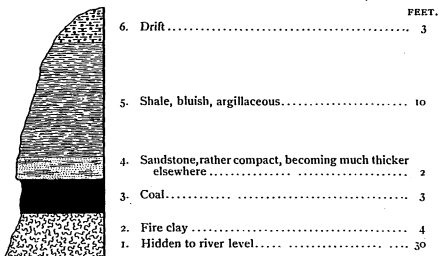


Figure 214. Coal at Hoor Drift. East of Muscatine.

WASHINGTON COUNTY.

Washington county lies beyond the boundaries of the main body of the Iowa coal field, and while there are workable coal seams in the limits of the district they apparently all belong to outlying areas. The greater portion of the county is occupied by Lower Carboniferous and Devonian rocks. The former are well exposed along the larger streams over more than two-thirds of the entire area of the county. The latter occur in the northeastern corner. There are a number of Coal Measure outliers in the county, but the only one in which coal has been mined is in the southcentral portion, near Verdi. The Saint Louis limestone outcrops in the beds of the several creeks in the neighborhood, but a small area of Coal Measure strata appears to have escaped complete erosion. Like

the other deposits of this kind it is composed chiefly of coarse grained, ferruginous sandstone, with a few feet of shales intercalated at different places. At the present time the coal is exposed only in a few places a mile and a half west of the town named, in the shallow channels of the various water courses. The seam is not now worked, yet there are remains of numerous diggings. Thirty years ago there were several mines in active operation, and considerable coal taken out (Tp. 7 $\frac{1}{2}$ N., R. VII W., Sec. 4, NW. qr.). The section given by Worthen is:

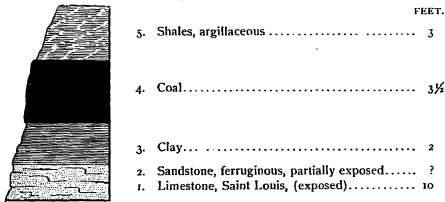


Figure 215. Coal Seam near Old Liebig Mine. Verdi.

Sandstone like the one outcropping near Verdi is exposed at a number of places in different parts of the county. At Wassonville, just north of Wellman, in the northern part of the county, a similar outlier of Coal Measure sandstone has been reported and considerable expense has been involved at various times in search for coal. The rocks, however, exposed at the surface here are almost entirely Lower Carboniferous. Beneath the main mass of earthy limestone containing bands of fossiliferous chert is ten feet of argillaceous shale, bluish and black in color. It is well exposed at the old Maple mill, two miles below, as well as at Wassonville. These shales

appear to have been taken for Coal Measure formation and many prospectors have considered it a good indication of the existence of coal. At one place a shaft eighty feet deep, beginning in the Burlington limestone, was sunk down to it. Small pieces of the shale taken from a shaft were found to be more or less bituminous, and with a hot fire were made to burn.

HENRY COUNTY.

The indurated rocks of Henry county are largely Lower Carboniferous limestones. At least three members of this series are represented. The lowermost is the Burlington limestone which crops out in the eastern part of the county at several points. Above it comes the Keokuk limestone and shales which are well exposed along the Skunk river from the southeastern corner of the county to the mouth of the Big Cedar. There is also a small outcrop of the same rocks farther up the river in the northwestern corner of the county. The Keokuk beds also occur along Big creek, southwest of Mount Pleasant. The uppermost member of the Lower Carboniferous in the region is the Saint Louis limestone, which is the surface rock found immediately beneath the drift over most of the county. It outcrops along the Skunk and all of the smaller streams throughout the county. It presents the usual lithological characters. In places sandy layers are intercalated, the most noticeable occurrences being in the northwestern corner of the county, below Coppack. The Coal Measures are found chiefly west of the Skunk river. They rest in marked unconformity upon the underlying rocks. For the most part the beds are sands and shales, though well developed coal seams have been opened along the west county line.

West of Rome, near the Skunk river, the Coal Measure sandstones are exposed to the water's edge. In this vicinity a number of mines have been opened though at present most of them are deserted. There is said to be also a four-foot vein of cannel coal in the bed of the river some twenty feet below the seam worked. In the neighboring ravines the workable coal vein crops out at several points. The following is the section measured :

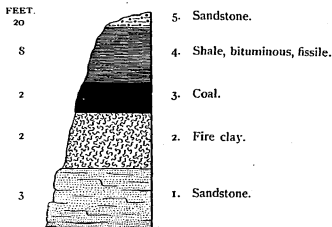


Figure 216. Bluff on Skunk River. Rome.

On the east side of the river, below the railroad bridge, yellow sandstones are seen at short intervals, deep gorges being formed by the minor tributaries as they enter the stream. On the west side, between the river and Cedar creek, is a long, narrow ridge almost entirely occupied by coal bearing strata. Coal from fifteen to twenty-five inches in thickness is known to exist. It has been mined at several places and also on the west side of the larger stream.

Above Oakland Mills and four miles west of Mount Pleasant, on the Skunk river, coal was mined for some years. North of Salem about two miles a thin coal seam has been opened in the valley of a small ravine. West

of the same place, four or five miles, in the vicinity of Hillsboro, mining has been carried on quite extensively, although most of the openings are in Van Buren county, just across the line. The principal mine is the Cox pit (Tp. 70 N., R. VIII W., Sec. 25, NE. qr., NE. $\frac{1}{4}$). The section of the coal bed is:

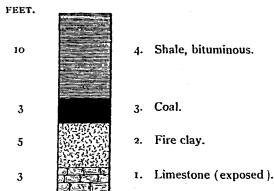


Figure 217. Coal Bed at Cox Mine.
Hillsboro.

Although not running at present this is the largest mine in the vicinity. The opening is a drift and has been operated for more than twelve years. The thickness of the shale forming the roof is from four to twenty-five feet, the variability being due largely to preglacial erosion. Coal has been mined in the neighborhood for upwards of thirty years, half a dozen openings being still in operation. Directly east of Salem about five miles, at Boyleston, coal is exposed in the wagon road (Tp. 70 N., R. VI W., Sec. 26). It has been mined to some extent here, the vein being four feet in thickness at some points. The Coal Measure area of this region probably forms a portion of the larger tract which is known to occupy also the northern portion of Lee county, where considerable mining has been done, and to extend westward into Van Buren and Jefferson counties.

The outliers of Coal Measure strata in Henry county are quite numerous. The more important ones are along the east side of the Skunk river and Big creek. Southwest of Mount Pleasant, near the water-works, bituminous shales are well exposed, and in places contain some coaly material. There is also a small outlier directly west of Mount Pleasant, where the dark colored shales are seen a short distance above the Saint Louis limestone. The section here is as follows :

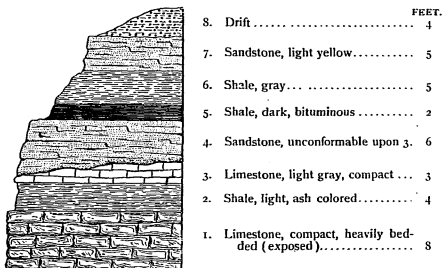


Figure 218. Contact of Coal Measures and Saint Louis Limestone, on Branch of Big Creek. Mount Pleasant.

Southeast of Mount Pleasant a distance of three miles is a small basin of coal where mining has been attempted for some years. In the southeastern corner of the county another outlier of Coal Measure strata is known forming part of the small area which extends into Des Moines county. A coal vein one foot in thickness is known to occur in this pocket.

DES MOINES COUNTY.

The rocks of this county are almost entirely Lower Carboniferous limestones. There are, however, several

small outliers of Coal Measure strata within the limits of the district. These are chiefly confined to the southwestern portion of the county. Two miles directly northeast of Augusta are several exposures of brown, massive sandstone which rise in high bluffs. No coal or the accompanying shales are noticed in connection with these outcrops. Seven miles to the northwest and about three miles southwest of Danville, on Cedar creek, there are a number of exposures indicating clearly that a Coal Measure basin of several miles in extent exists in this part of Des Moines county and the adjoining portion of Henry. The clays are now used chiefly in the manufacture of pottery and tiling. A thin coal seam is found in connection with the shales. At one place (Tp. 70 N., R. IV W., Sec. 30, SE. qr.) the vein was formerly worked to a small extent for local use. At the present time the coal is not well exposed. The section given by Worthen is as follows :

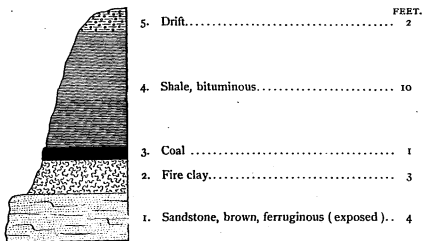


Figure 219 Bluff on Cedar Creek.
Southeast of Danville.

LEE COUNTY.

Lee forms the extreme southeastern corner of the state. For the most part the rocks underlying it are

older than the Coal Measures, all of them belonging to Lower Carboniferous limestones which form the great floor of the coal bearing series in Iowa. In the extreme northeast, along Skunk river, below Augusta, the Burlington limestone is well exposed near the base of the bluffs. The Keokuk limestone, which outcrops along the Skunk river above Augusta, along the Mississippi from Fort Madison to Keokuk, and northwestward from the latter place along the Des Moines river to the Van Buren county line, forms the surface rock of much of the county. Capping the bluffs in the southeastern part of the district and making up probably a considerable portion of the interior surface rock, is the Saint Louis limestone, the white, compact brecciated beds of which are so well exposed in many places.

The coal bearing strata are composed almost entirely of isolated outliers of the Iowa coal field on the one side and of the Illinois field on the other. Most of the Upper Carboniferous basins consist of brown sandstones which form the basal member of the Coal Measure series. This sandstone is found in many localities in the northern part of the county, in the southeast between Montrose and Keokuk and elsewhere. It is a compact, brown sand-rock, rather heavily bedded and withstands weathering well.

Coal has been mined in a very desultory manner for a number of years, and the seams now continue to be worked a little from time to time. As the coal layers are chiefly in limited pockets or outliers it cannot be expected that the county will ever rank among the coal producing districts of the state. The principal places where coal is known to exist are in the northern part of the county, near the middle of Pleasant Ridge township,

and in the northeastern part of Franklin township; also short distances north and west of the city of Keokuk.

In the vicinity of Keokuk the principal places where coal has been taken out is below the city, just above Nassau slough.

The section near one of the openings is as follows:

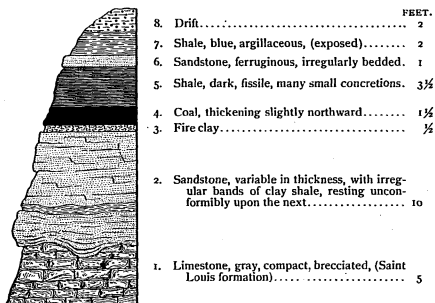


Figure 220. Top of Bluff on Mississippi River at Nassau Slough. Below Keokuk.

Below number 1 of the above section the full thickness of the Saint Louis limestone, the "Warsaw," the "Geode bed," and part of the Keokuk limestone is exposed. The coal mined here is of very good quality. It has been worked at different times during the last thirty or forty years. No coal, however, has been taken out since 1890.

North of the city, in the bluffs near Rand park, coal was formerly mined by means of drifts. The openings, however, are now abandoned. Very little coal was taken out at this point, and the entry is at present blocked or filled by débris from the fallen roof.

Still farther up the river, and a mile beyond Sandusky station, a Coal Measure outlier is exposed in the top of the bluff, but no coal is known to exist at this point.

In the northern part of the county, three miles northwest of Denmark and a couple of miles from the Skunk river, coal is worked at the Stevenson bank. The output is entirely local. A mile to the north (Tp. 69 N., R. V W., Sec. 14, NE. qr., NW. $\frac{1}{4}$) coal is obtained by stripping. Of late years, however, only small quantities have been taken out. An outcrop near the road shows the following section :

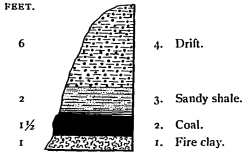


Figure 221. Outcrop southeast of Denmark.

On the opposite side along the creek, sandstone, shales and the Saint Louis brecciated limestone appear at a slightly lower level. The coal here dips westward. A mile and one-half directly west, on Sutton creek, coal is also known to exist on both sides of the stream. It is obtained both by drifting and by stripping. At one time the beds were worked to a considerable extent, the output being used principally at West Point, a few miles to the south. The seam is said to be from twenty to thirty-five inches in thickness. At the present time but little coal is being mined at this point, and the few tons which are taken out each year are obtained by stripping along the creek bottom.

Two miles west of West Point coal has been obtained in small quantities for many years. Along the road side (Tp. 68 N., R. VI W., Sec. 1, NE. qr., NW. $\frac{1}{4}$) coal has been exposed in recent washouts. A mile and a half directly south of this point are several abandoned workings which formerly supplied all local demands. Three miles northwest, also a mile northeast of Denmark (Tp. 68 N., R. V W., Sec. 10, NW. qr., NW. $\frac{1}{4}$) on a tributary of Sugar creek, several openings have been made at various times. In a ravine leading into the creek from the south is an old drift where the following section is shown :

	FEET.
5. Drift	5
4. Coal	1½
3. Fire clay.....	2
2. Sandstone	5
1. Limestone, Saint Louis (exposed).....	14

A mile directly north of the last named locality, on the opposite side of the creek, in section 4, is the old Har-

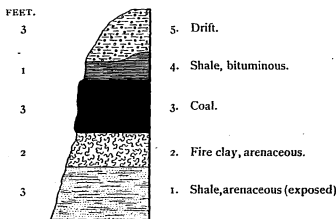


Figure 222. Coal Bed at Old Harwick Mine.
Near West Point.

wick mine. It was worked by a shaft, which is now abandoned, and by a drift in a ravine. Coal was formerly

taken out of this mine in sufficient quantities to afford abundant local supplies. It was also worked by stripping in several places near by. The coal was reported by the present owner to have a thickness of three to three and one-half feet. The section at the opening of the drift is shown in figure 222.

A short distance northwest is another small shaft in which coal has been mined for local use.

The coal of this portion of the county, though manifestly occupying an isolated position, belongs to an outlier having an extent of twenty-five or thirty square miles altogether. With the proper railroad facilities and systematic prospecting it is not improbable that coal in commercial quantities could be obtained for a number of years at least.

