Geology of Sangamon County

BY

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ILLUSTRATIONS.

GEOLOGY OF SANGAMON COUNTY.

GENERAL GEOLOGY.

Every citizen of Sangmon county, young or old, illiterate or learned, unoccupied or engaged in agriculture, in mining, in commerce or the learned professions, is at one time or another, in one way or another, interested in or affected by the geological history of Sangamon county. The boys and girls and the men and women of the county would do well to study its geology, to consider its fields, and to examine its mines as does even the Governor of the State, as may be seen from this snap shot, which the writer took two years ago at Divernon (Fig. 1).

FIG. 1—Governor Deneen inspecting Divernon coal mine, April 20, 1910.

The following account is in the main a reprint of an article which I wrote for the Historical Encyclopedia of Illinois, Vol. II, pages 814-822.

As among the races of men the iniquities of the fathers—and their good deeds, too—are often visited upon their children, so in the rock world, present conditions are closely related to past events. In inorganic as well as organic, in inanimate as well as animate nature, today depends upon yesterday and the morrow upon today. Sangamon county is now the home of a large number of prosperous people because of a series of events which have been transpiring during past millenniums. If those occurrences had been different the black soil and blacker coal of the county would have been wanting and in their place there might have been volcanic mountains or a deep ocean. Leonardo da Vinci, poet, artist and man of science, had difficulty in convincing his people that the ocean

at one time covered Italy. When fossil fish were found in rocks far up on the Apennines, the finders decided that the Creator had been trying his hand at making fish and had discarded such as were imperfect. A fossil was considered a reject, a *lusus naturae*. Here, in Illinois, on a summer day, the average citizen can with difficulty be brought to realize that the cool sea breezes, now a thousand miles away, once played over all of Sangamon county and the whole state. But that such is the fact is evident, since all of the rocks of this region were made under water and most of them under salt water. The top layers, the last to be made, were worked over, carved, denuded, transported, and redeposited by wind and by rivers of water and of ice. All of these rocks—those deeply buried and those on the surface—are silent witnesses of past conditions, of mighty forces, of changing climates. To understand them the investigator must look in many directions. He must literally delve deeply and must leave no stone unturned. Fortunately, both nature and man have done much to help him in his investigation. Where streams have carved out valleys, various layers of soil and rock have been exposed. In places, shafts have been sunk several hundred feet in search of coal, and here and there drill holes have been put down to even a greater depth. From these various cuttings knowledge has been obtained of the underlying rocks. Similar procedure in other parts of the State has added still further information, so that a good idea of the underlying strata can now be obtained. Although the anatomy of the earth is not disclosed here, as it is in mountain regions where strata are tilted and laid bare, yet much is known of the rocks which underlie the region.

Character of the Underlying Rock.

Beginning at the top and proceeding downward, the following layers are encountered:

First—There is a layer of soil which is worked over by man and penetrated by plant roots, and which is about one foot thick. Below it are two or three feet of buff clay, which is penetrated in digging cellars for houses and which, when spread out over back yards, causes would-be gardeners much annoyance, since it is sticky when wet and very hard when dry. It is followed by several feet of a mixture of clay, lime and fine sand, in places rich in organic materials. This earth is called loess. It had been borne by wind and water from some distant place and spread out over the country, and later was buried by the overlying deposits. The particles which compose it are quite uniform in size, as would be expected of wind borne material, or earth that had been deposited in quiet lakes. Even in recent years the people of this and neighboring states have seen dust carried by high winds, darkening the sun and drifting like black snow on lawns and porches. Loess was formed in some such manner and consequently exhibits slight stratification, but parts vertically, so that ravines cut through it retain for a long time vertical walls, as can well be seen in the "Zoo Park," four miles north of Springfield.

The loess is underlain by a sandy layer, at times as much as ten feet in thickness. This indicates that lakes or rivers sorted the material, as they are now doing around Lake Michigan and along Fox river. Below the sandy layer is a twenty-foot bed of blue gravelly clay, rather tough to dig through, and hence called hardpan. Its geological name is Illinoian till. (Fig. 2.) During the ice age glaciers bore from Canada and the intervening country gravel and clay, and, upon melting, deposited these materials sometimes in ridges and mounds, at other times as mud flats in shallow lakes. The "Illinoian till" consists of such mate-

FIG. 2—Picking pebbles in Illinoian till by an old mill on Sugar creek.

rial. Below it comes a layer of sand or muck, that in places attains a thickness of five feet and constitutes the so-called Yarmouth zone. Immediately underneath it, another bed of glacial material much older than the Illinoian till, and, from the fact that it is widely spread over Kansas, called the Kansan till, is encountered. It is from twenty to thirty feet thick.

After penetrating these superficial deposits of soil, loess, sand, and till of two groups, the top rock of the county is reached. In many places, as, for example, along Spring and Sugar Creeks and in the valley of the Sangamon, these bed-rocks have been exposed by the cutting away of the overlying material, and, as is universally the case in prairie states, the best idea of the rock constituents of the region are to be obtained along the beds of the streams. Since the strata dip gently (about six feet per mile) towards the east and south, the lowest beds in the county are exposed on Richland creek and the Sangamon river in Salisbury township. All of the strata are composed of three kinds of rocks only, namely: shale, sandstone and limestone—though they vary

in purity as they graduate into each other, the shales changing to sandstone when the amount of sand increases, or into limestone when the amount of calcium carbonate becomes greater in quantity. The presence of iron or carbon changes the appearance of the rocks.

Beginning near the source of Sugar creek in the southern part of the county and proceeding down stream, a succession of sixty feet of strata may be noticed. They are: First, layers of sandy shale and sandstone twenty feet thick; next, brecciated limestone twelve feet thick; black shale, three feet thick; soft clay shale, six feet thick; calcareous sandstone, five feet thick; bituminous shale, six feet; and Carlinville limestone, eight feet thick. Below the Carlinville limestone is a thick bed of sandy shale, which is underlain by a three-foot bed of clayey limestone rich in fossils; and a thin bed of bituminous shale. Immediately under it is a two-foot thick bed of coal called Coal No. 8, which outcrops at Riverton. In early days, before the thick deposits which are now used, were discovered, it was dug out along the banks of the river at that place, then called Howletts, and on Spring creek northwest of Springfield. Today it is not used.

Below Coal No. 8 is a layer of fine clay (three feet thick) an impure limestone (six feet thick) and forty feet of soft shaly sandstone. Thus a typical section of the top two hundred or more feet of the rocks of Sangamon county would be as follows:

	Strata.	Feet.
1.	Soil	1
2.	Loess, often clayey	5 to 15
3.	Sand	3
4.	Illinoian till (clay, "hardpan")	11 to 20
5.	Yarmouth zone (Sand, muck)	5
6.	Kansan till	20 to 30
7.	Shales and sandstone	20
8.	Limestone (brecciated)	12
9.	Shales, black, slaty	3
10.	Shales, clayey	6
11.	Sandstone, calcareous and ferruginous	5
12.	Shales, bituminous	6
13.	Limestone, "Carlinville"	8
14.	Shale, sandy	40
15.	Limestone, clayey, rich in fossils	3
16.	Shale, bituminous	1
17.	Coal No. 8	2
18.	Clay, fine	3
19.	Limestone, impure	6
20.	Sandstones, soft, shaly	40

Layers No. 1 to No. 13, are exposed on Sugar creek. Nos. 14 and 15, which outcrop in a ravine west of the place where the old Springfield to Peoria road crosses the Sangamon, are full of fossils, more than sixty species having been found and described.

An excellent idea of six hundred feet of strata underlying Divernon, Sangamon county, can be obtained from drill cores which have recently been received at the State Museum. In early times, when miners were desirous of knowing what was beneath the surface, it was necessary for them to laboriously dig a shaft. Such work required many months of hard labor. Today, one wishing to have an idea of underlying strata needs but to drill a hole by means of one of the many excellent drills which are available. A diamond drill can rapidly penetrate to great depth at a cost of but two or three dollars per foot. The drill consists of an iron pipe, in the end of which rough diamonds are fastened both on the outer and inner edge. The pipe is rapidly rotated and the core which comes up on the inside of the pipe can be drawn out and is an excellent record of the strata penetrated. Water is used to keep the hole free from dirt. Naturally very soft formations, such as those of a clayey or sandy nature, are washed away and their record is lost. The core of this Divernon coal mine is two inches in diameter. A careful record of the boring was kept by Mr. Theodore Wilde. Since much of the material penetrated was soft shale or clay easily soluble, it was washed away and the present core is but three hundred and seventy feet long. The rocks penetrated are alternating limestone, shale, coal and sandstone. It is a surprising fact that the total amount of limestone was but twenty-two feet of pure limestone and but thirty-six feet more of impure limestone, a total of fifty-eight feet. The total sandstones amounted to one hundred and three feet. The shales make up the mass of the underlying rock, there being three hundred and seventy-four feet of pure shale, or four hundred ten feet of more or less shaly material of various kinds—blue, black, green, mottled; fairly hard or soft; calcareous, arenaceous, micaceous, bituminous. The shales are all soft in comparison to other rocks and rather easily soluble as they represent the mud of the ocean. When stuck in the mud on one of our country roads, the traveler may solace himself with the thought that there is more potential mud below him—two-thirds of all the rock for six hundred feet beneath being ready to furnish more mud as required! Our farms need never be exhausted, if we can but wash off the surface! Twenty-five feet of the six hundred consists of coal, a larger total than that of good limestone! The coal varies from beds two inches in thickness to one seven feet eleven inches in thickness.

Geological Formations.

All of the strata given in the above typical section are found in the Upper Productive division of the Pennsylvanian formation—a formation which closes the period commonly called the Carboniferous period—since at that time all the great coal deposits were formed. The formation is called Pennsylvanian since it is so well developed in Pennsylvania. The Lower Productive is the division of the Pennsylvanian most coveted by mankind because it is the coal division, par excellence. In Pennsylvania the subdivisions of the Pennsylvanian, beginning with the bottom, are as follows: 1, Pottsville sandstone or Millstone grit; 2, Alleghany

series; 3, Conemaugh; 4, Monongahela. The divisions in Illinois are: 1, Mansfield sandstone; 2, Carbondale shale and limestone; 3, McLeansboro limestone, shale and sandstone. The Carlinville limestone of Illinois, No. 13 in the above section, possibly corresponds with the Conemaugh, being in the Upper Productive. The chief coal beds of Sangamon county, Nos. 5 and 6, occur in the Carbondale series, that is to say in the top division of the Lower Productive (strata which may be correlated with the Upper Freeport and Kittaning, which are parts of the Alleghany series in the Lower Productive formation). In Sangamon county the McLeansboro attains a thickness of about two hundred feet and the Carbondale a thickness of about three hundred feet. Below the latter formation is a one hundred fifty foot thick bed of Mansfield (Pottsville) sandstone, finer grained and lacking the coarse gravel which characterizes this formation in Pennsylvania. It was deposited millions of years ago on the upturned and eroded strata of the rocks which constitute the Mississippian system, so-called since so well developed along the Mississippi river. It consists in descending order of the following[1] members:

The Chester (Birdsville, Tribune, Cypress) standstones, 600 feet; St. Genevieve limestone, 200 feet; St. Louis limestone, 200 feet; Salem limestone, 100 feet; Warsaw shales, 40 feet; Keokuk limestone, 100 feet; Burlington limestone, 200 feet; Kinderhook sandstone, 200 feet. The total thickness of these strata in Sangamon county however, is less than six hundred feet.

Proceeding downward layers of shale and limestone, 200 feet thick, are encountered. Their fossils and physical character indicate that they are a part of the Devonian system. A diamond drill core sunk to a depth of 1,500 feet at Springfield, shows, according to Savage[2] that the Devonian black shale begins at a depth of 1,339 feet. Below the Devonian the Silurian is represented by possibly one hundred feet of Niagara limestone. Judging from strata in other parts of the State, which dip under the above enumerated formations, various divisions of the Ordovician and Cambrian formations would be penetrated in a further descent; and it would be noted that one hundred feet of Cincinnati sandstone and shale, three hundred feet of Trenton-Galena dolomite and one hundred feet of St. Peters sandstone, underlie the formations previously encountered in deep drilling. Though positive data are wanting, it is more than likely that the Magnesian limestone is, in this region, underlain by Potsdam sandstone, since borings in the northern part of the State have shown these formations to be 1,000 feet in thickness, and to be sloping under the above enumerated strata.

These relationships can best be seen in the generalized geologist section given on page opposite.

[1] E. F. Lines, Ills. State Geological Survey. Bull. No. 17, p. 60.
[2] Copy of log discussed by T. E. Savage, now in possession of J. A. Udden, Augustana College, Rock Island, Ill.

GENERALIZED GEOLOGICAL SECTION.

Systems.	Series.	Rocks.	Thickness.
Recent or Human		Surface soils	1 foot
Pleistocene or Glacial		Loess	8 feet
		Illinoian till	15 feet
		Kansan till	16 feet
Pennsylvanian	Upper Productive: McLeansboro	Shales, limestones, (coal unimportant)	200 feet
	Lower Productive: Carbondale	Coals numbers 2 to 6, limestone, shale, sandstone	300 feet
	Lower Productive: Mansfield (Potsville)	Massive sandstone	150 feet
Mississippian	Chester	Limestone	
	St. Genevieve	Limestone	
	St. Louis	Limestone	120 feet
	Salem	Limestone	100 feet
	Keokuk (Warsaw)	Shale and limestone	200 feet
	Burlington	Limestone	100 feet
	Kinderhook	Limestone, shale	160 feet
Devonian		Shale and limestone	200 feet
Silurian	Niagara	Limestone	100 feet
Ordovician	Trenton-Galena	Dolomite	
	St. Peter	Sandstone	
	Lower Magnesian	Limestone	
Cambrian	Potsdam	Sandstone	

Older rocks than the Potsdam are not found in the State of Illinois. Noticeable is the absence of the newer rocks which are found in many parts of the world. After the Pennsylvanian period long eras passed during which the rocks of succeeding periods were formed. Named in order beginning with the oldest they are: the Permian, Triassic, Jurassic, Comanchean, Cretaceous, Eocene, Miocene and Pliocene. The constructive agencies which recorded the passing of the millenniums involved in those periods, were as active and extended as the agencies whose work has been recorded in the rock strata underlying the prairies of Sangamon county.

ORIGIN OF THE ROCKS.

None of the rocks in Sangamon county were formed by fire as were many rocks in mountain regions. Either wind or water were the agents active in their construction. The water in which they were deposited was cold, sometimes salty, other times fresh. Sometimes it flowed in a river of water or of ice. At other times it constituted a lake or an ocean. The kind of rock and the fossil remains contained therein lead to such a conclusion. Sandstone, shale and limestone are the only kind of rocks native to the county. The sandstones were formed along shores of great lakes or oceans, as they are being formed today when waves and winds carry away soluble or light material from the debris of the coast, leaving the heavier and insoluble substances, usually particles of quartz, sorted according to size. Farther from the shore line were formed clay deposits and shales which are composed of finer materials than is sandstone, materials which, because of their fine subdivision, would be held longer in

suspension and transported farther into the region of deep water. Shales indicate that the shore line was sinking when they were deposited upon sand. Farther still from the shore, water would be reached which was nearly free from mechanically suspended sediments, but which contained abundance of dissolved salts, chief of which was calcium carbonate. Myriads of protozoa (rhizopods), coelenterata (sponges, corals), echinodermata (crinoids, asteroids, echinoids), mollusca (bryozoans, brachiopods, lamellibranchs, gasteropods and cephalopods), and vertebrata, extracting the calcium carbonate and other salts from the waters, transformed them into shell substances or bones. Upon the death of the animals these shells and bones fell like gentle rain upon the floor of the ocean, forming extensive deposits of calcareous material, which are the chief constituents of limestone. The floor of the ocean rising again, the order was reversed, shale being deposited, then sandstones and gravel. Finally the ocean receding entirely, all the region projected above the water level. Thus the succession of rocks indicates the ebb and flow of the water, the viscissitudes of the periods during which the various strata were being put down.

Some Characteristic Fossils.

In addition to the testimony of the rocks themselves is that of the remains of the animals which, at one time, lived in the ocean that covered this region, died, were buried in the mud, changed to stone and thus con-

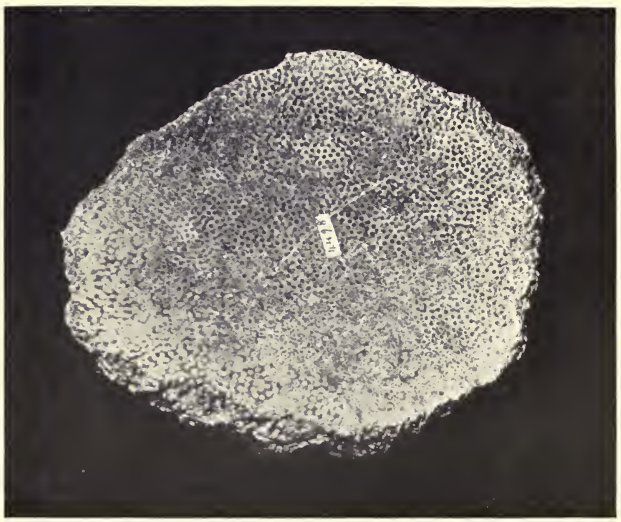

Fig. 3—A seven-inch mass of fossil corals (Syringopora) found near Springfield, now in the museum.

FIG. 4—Fossil corals found near Springfield, now in museum.

tributed to the formation of those rocks. The accompanying photographs show fossils now in the State Museum, which were found at Roll's ford on the Sangamon river, about six miles northwest of Springfield, and others found on Sugar creek a few miles south of the city. More than seventy-five different species of fossils have been found in the county, but the few illustrations here presented are sufficient to give an idea of life of those remote periods and to show how events, which occurred millions of years ago, are recorded in the rock pages of geological history, a history which deals with such unlimited periods of time as to dwarf into insignificance the few years within which man has left his records on the earth.

FIG. 5—Fossil brachiopods found near Springfield, now in museum.

The picture (Fig. 3) is that of a seven-inch mass of coral (Syringopora multattenuata), a coral which lived in communities. The individuals were cylindrical corallites connected by hollow processes or by horizontal expansions. The walls were thick and wrinkled and the inner part of the calcareous tube was divided by delicate ridges formed by faint septa. This coral was most luxuriant in carboniferous times.

Another coral is shown in Fig. 4. These corals were single individuals, cone-shaped and about as long as the joint of the little finger of a man's hand. They suggest a "horn of plenty." The skeleton of this coral (Lophophyllum proliferum) is ribbed on the outside so as to show the meeting of the hundred or more partitions or septa which project out into the body cavity. As in the case of all corals, the calcareous portions were covered

FIG. 6—Fossil lamellibranchs found near Springfield, now in museum.

by jelly-like masses. Corals are all exclusively marine and indicate that the water covering the country at that time was a part of the ocean.

Brachiopods thrived in abundance in those waters. From many species the one shown in Fig. 5 (Spirifer multigranosa) illustrates the shape of the shells. Brachiopods were so named since their arms are used as feet. An interesting part of their anatomy are the spirally coiled ribbons which support fleshy cartilaginous arms fringed with movable cirri or tentacles which set up currents in order to bring food to the mouth.

In Fig. 6 are shown mollusks in the group of Lamellibranchiata, animals with laminated gills. The shells of this mollusk (Leda), formerly called Yolida)

Fig. 7—Fossil gastropods (left, Pleurotomeria; right, Bellerophon) found near Springfield, now in museum.

Fig. 8—Fossil gastropds found near Springfield, now in museum.

had compact, thin walls closed with teeth in two series meeting below the umbones, and resemble in a marked manner, the modern clam in many respects.

Gastropods, animals which walked on their stomachs just as do snails, are represented in Fig. 7. In the left hand column is Pleurotomaria sphaerulata, a gastropod having a spiral of medium height, conic section and subspherical outline. Several hundred species of these gastropods are known. Another genus, Bellerophon percarinatus, is shown in the next column of the same figure. It is an interesting animal with its shell bilaterally symmetrical and coiled in one plane. The broad aperture, oval in shape, and with flaring outer lip, produces a striking shape.

It was named Bellerophan after a Greek mythological hero. More than three hundred species have been found in the palaeozoic era and the maximum of development was reached in the carboniferous period.

The Pyramidellidae, another family of gastropods, all of which were marine animals, are represented by several representatives of the genus Subulites (Polyphemopsis). The species peracuta (so-called because in form they are very sharp) and inornatus (not ornamented) are represented in Fig. 8. They are turreted shells with oval aperture and sharp outer lip.

In the State Museum there are more than thirty different species of fossils similar to those shown in these two photographs, and they give clear ideas of the relation of the rocks of Sangamon county to those of similar age in other parts of the world.

ECONOMIC DEPOSITS OF THE COUNTY.

Building Materials.

Sand deposits do not exist in any quantity. Such as there are along the Sangamon river have been derived chiefly from the materials washed out from between the Kansan and Illinoian till. They are useful for abrasives and as constituents of mortar and cements. The best sandstone in the county for building material, No. 20, in the typical section given above, outcrops at Koke's Mill, where layers from six inches to two feet in thickness and of fair crushing strength can be obtained. This is the material which was used in the construction of St. Paul's Episcopal Church in Springfield in 1848. The stone is not very firm and weathers to a brown color by the oxidation of the iron which it contains.

A better building stone is furnished by limestone (Fig. 9) the stone obtained from the majority of the eight quarries indicated on the accom-

Fig. 9—Outcrop of the limestone (No. 8 in typical section) which furnished the stone for the Old State House, Springfield. Quarry a quarter of a mile west of Crow's Mill.

panying map. As will be noted it is exposed in various creek beds and is widely spread over the county. This is the material which was employed in the construction of the old State House erected at Springfield between 1837 and 1853, at a cost of $260,000.00. This building is now used as the county building. The chief quarry for the stone, No. 8, in the typical rock section given above, was at Crow's Mill eight miles south of the public square in Springfield. The place which at that time was a rocky quarry, has been smoothed out by the hand of time so that now a visitor at that place sees scarcely a trace of the former excavations, a green carpet of grass and clover having been spread as a mantle over the old quarry. (Fig. 10.) The present State House is constructed of Niagara limestone obtained from the quarries of Joliet

Fig. 10—Old Crow's Mill quarry, now overgrown with grass.

and Lemont. Since the Crow's Mill limestone soon turns to an unattractive brown shade, it is not very much prized in building. However, it is abundant enough in quantity to furnish a valuable stone of medium grade which can be used to advantage in the construction of foundations, in bridge building and in the manufacture of quicklime.

Clay Deposits.

Much more valuable as a building material than the products of any of the quarries is the output of the clay pits. In quantity clay is practically unlimited. The manufacture of brick, tile and earthen ware,

though in its infancy yields annually considerable sums. For example, in this county in 1906 drain-pipe to the value of $10,194.00 and brick to the value of $208,732.00 were produced. There are thirteen companies engaged in this industry. The material which they employ is obtained from either the yellow loess-like clay, six to eight feet in thickness; the weathered clay, six feet thick, underlying; or the blue compact clay, forty-five feet thick which is below that. All of these materials produce brick of average strength and about 2.66 in specific gravity. A typical analysis of the composition of the clays used in the manufacture of brick at a Springfield clay pit is as follows:

SiO_2	= 60.31	Al_2O_3	= 17.74	C	= 6.71
Fe_2O_3	= 5.04	K_2O	= 2.88	MgO	= 1.96
FeO	= 1.96	Na_2O	= 1.07	TiO_2	= .84
H_2O	= .81	CaO	= .41	S	= .14

Coal Deposits.

The clay, sand, limestone and sandstone are far surpassed in value by the coal mined in the county. Forty-one mines, thirty-seven of them producing, are located on the accompanying map. (Fig. 11.) Their output in 1906 gave Sangamon county the leading place as coal producer in the State of Illinois, and since that time its premiership has been contested by Williamson county alone. In the 25 years before 1907 Sangamon had lead all counties in the State in coal production, having yielded more than fifty-two million tons. In 1908, 6,553 men working in these mines produced about five million tons of coal, which cost the consumer something more than ten million dollars. No other single source of wealth contributed so much to the prosperity of the people in this county. In his work on the geology of the State, in the sixties, Worthen numbered the different coal beds of the State from 1 to 17, No. 1 being considered the lowest and oldest geologically and the others supposed to follow in order. The chief beds of the county lie about one hundred and sixty feet below coal No. 8, which as pointed out in the typical section above is about one hundred feet below the surface deposits; in other words the chief coal deposits are from two hundred to three hundred fifty feet below the surface, while south of Sangamon, for example, at Mt. Olive, in Macoupin county they are four hundred twenty-five feet, and in the county eat, Macon, at Decatur, they are six hundred feet deep, due to the prevailing dip of the strata to the south and east.

The two beds, Nos. 5 and 6, are readily distinguished by their physical characteristics. No. 5 is known as *Horseback* coal, because of clay fissures or horsebacks due to vertical partings, filled with clay when the fissures are wide or with shaly calcareous deposits when narrow. The bed is six feet thick, has a good roof and furnishes a large output. Bed No. 6 is called *Blueband* coal since about two feet from the bottom of the bed there is a horizontal band of slaty material from one inch to an inch and a half in thickness. The separation in this coal is along horizontal rather than vertical lines. The bed is from six to eight feet

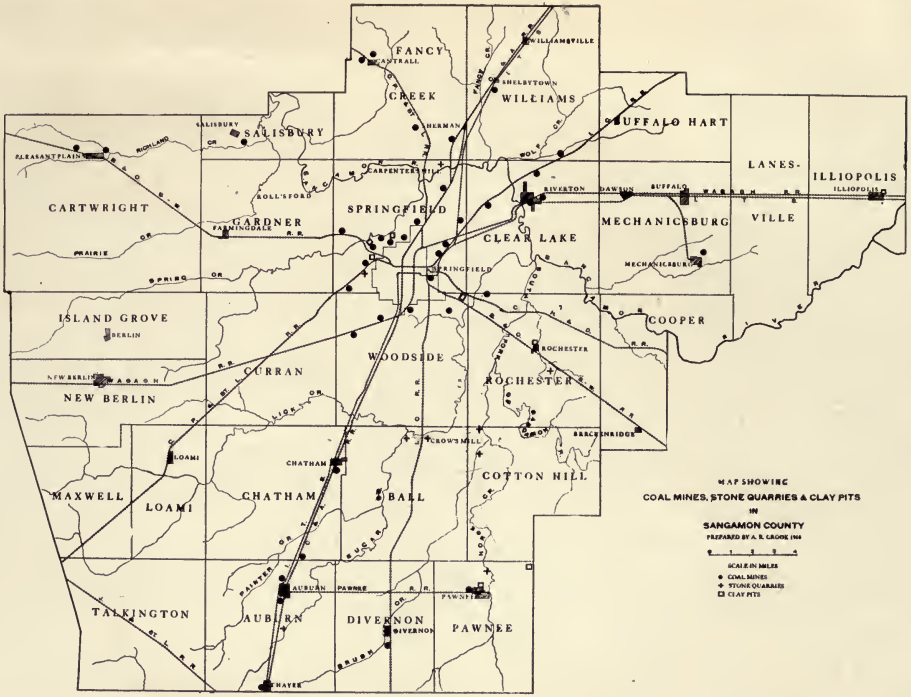
FANCY CREEK
WILLIAMSVILLE
SHELBYTOWN
WILLIAMS
BUFFALO HART
SALISBURY
SALISBURY
PLEASANT PLAIN
RICHLAND
SHERMAN
CARPENTERSVILLE
LANES-VILLE
ILLIOPOLIS
CARTWRIGHT
ROLL'S FORD
GARDNER
FARMINGDALE
SPRINGFIELD
RIVERTON
DAWSON
BUFFALO
MECHANICSBURG
CLEAR LAKE
PRAIRIE
SPRING
ISLAND GROVE
BERLIN
COOPER
WOODSIDE
ROCHESTER
CURRAN
NEW BERLIN
NEW BERLIN
ILLIOPOLIS
CROWS MILL
BERGENBRIDGE
LOAMI
CHATHAM
COTTON HILL
MAXWELL
LOAMI
CHATHAM
BALL
SUGAR
PAWNEE
AUBURN
DIVERNON
TALKINGTON
AUBURN
DIVERNON
PAWNEE
CHAYER
MAP SHOWING
COAL MINES, STONE QUARRIES & CLAY PITS
IN
SANGAMON COUNTY
PREPARED BY A. R. CROOK 1908
SCALE IN MILES
COAL MINES
STONE QUARRIES
CLAY PITS

FIG. 11.

thick. Composition and ash content of Nos. 5 and 6 are quite similar, though No. 6 contains a slightly larger amount of moisture, and it is said that No. 6 affords the largest amount of heat for a given sum of money.

Two higher coals, too thin for use at present, lie fifty and one hundred sixty feet, respectively, above No. 5. Several beds have been found below No. 5. At Riverton a diamond drill showed two seams each about two and a half feet thick lying respectively one hundred twenty-five feet and two hundred fifty feet below No. 5, and a four foot bed at three hundred twenty feet below No. 5.

In the drill at Divernon the first coal encountered was a nine-inch seam at a depth of one hundred fifty-one feet below the surface. This is probably coal No. 8 which outcrops at Riverton. At a depth of two hundred sixty-one feet, a two inch seam was met, and at three hundred twenty feet the best coal bed of the county, No. 6, was discovered. It is seven feet eleven inches in thickness. Not satisfied with this bonanza the drillers proceeded farther with the following result: At three hundred sixty-nine feet they found a bed about three feet thick; at three hundred eighty feet one one foot thick; at four hundred thirty feet one two feet thick; at four hundred sixty, one one foot one inch thick; at four hundred ninety, one a foot and two inches thick; at five hundred fourteen, one a foot and eight inches; at five hundred fifty-nine feet, one four feet five inches thick. This was the last bed found and at six hundred four feet the boring was discontinued since a conglomerate was reached which was thought to be a part of the Mansfield formation. Though a line of demarcation between the McLeansboro and the Carbondale is difficult to locate in this boring, or at any place in the county, it may possibly be found at about two hundred seventy-five feet below the surface.

Coal is the most valuable product of the county and but few counties in any state in the United States even in those regions reputed for their mineral wealth, derive more valuable or useful mineral substances than this which is obtained right here in Sangamon. Without these coal seams in this or other regions, there could be no manufacturing on a large scale, no railroads, no cities.

The following represents a typical analysis of Sangamon county coal: Moisture, 10.5 per cent; Ash, 7.7 per cent; Volatile material, 38.9 per cent; Fixed carbon, 42.9 per cent. The pure coal amounts to 74.25 per cent and the sulphur, 3.5 per cent.*

Physically the coal is sometimes shaly but usually compact and breaks with conchoidal fracture; its hardness is 2.5; its specific gravity 1.4. In color it is black. The color of its powder is brown. In luster it is earthy to vitreous. It dissolves in potassium hydrate without coloring the solution brown as does lignite or other less completely mineralized hydrocarbon compounds. When bleached in nitric acid and potassium chlorate and washed in alcohol, its vegetable texture can be plainly seen and this is one means of knowing that coal has been made from vegetation. Another means of establishing this fact is that coal can be actually made

* Illinois State Geological Survey, Bulletin No. 3, 1906, p. 73.

in the laboratory by heating wood in a test tube. First a white cloud of steam is driven off. Then oxygen and hydrogen are separated leaving lignite. Next when the tube is closed to keep the oxygen of the air from uniting with the carbon, carburreted hydrogen is formed after continued heating. This gas explodes the weakest part of the tube and is burnt off. As the heating is continued tar is formed, then bituminous coal and finally anthracite. A third reason for the belief is that coal is now being slowly formed where wood, buried and protected from oxidation, is losing its less stable constitutents, as for example in peat swamps and in abandoned mines. The timbers in an abandoned mine in the Hartz mountains which had stood under water for five hundred years, upon the draining of the mine recently, were found to have been changed to lignite. Again in many mines tree stumps are still in position. And finally more than seven hundred species of plants have been found and determined in coal. It is thus evident that the materials which furnish the coal are vegetable, but the manner of their accumulation is not so clear. When exposed to the air wood rapidly oxidizes, but when protected under water conditions are favorable for gradual loss of volatile material with retention of fixed carbon. Peat swamps furnish favorable surroundings for coal formation. Materials carried to them by floods are protected from oxidation. Vegetation grows on the bottom, on the top and throughout the mass of algae, mosses and other low vegetable forms. The swamp being buried under clay and sand and depressed by change of level of supporting strata, is compressed by the great

FIG. 12—Sangamon county is a prairie, save where streams have fashioned valleys or glaciers deposited their burdens.

accumulation of material. Alternate rising and sinking of the land may occasion a repetition of these processes, until several layers of coaly material are formed. Subsequent deep burial, great pressure and final elevations produce a coal field with various layers. The cross sections of the coal fields in Sangamon county show that such must have been the history of the formation of our coal.

Soils.

Fully as important as the various rock strata, clay pits and coal deposits for the prosperity of Sangamon county, is the nature of the surface soil. (Fig. 12.) Though but a foot or two in thickness, the soil is the source of millions of dollars worth of food and raiment. In 1909 the agricultural products of the county exceeded nine millions of dollars in value. Such an enormous yield would be impossible under less favorable conditions. There are four chief kinds of soil; the Marshall silt loam, the Miami silt loam, the Miami black clay loam and the Kaskaskia loam, named in order of their abundance. These may be recognized by one riding through the county in the early spring largely by their color as well as by their texture and their position in relation to slopes and levels.

Miami silt loam occupies about seventeen per cent of the area of the county. It is a granular soil crumbling readily; in color it is brown, but nearly black when wet. The color is due to the large amount of vegetable matter which it contains. It extends to a depth of about eighteen inches. It occupies broad rather level areas, usually avoiding bluffs, but found on remnants of the old moraines in Buffalo Hart and Mechanicsburg townships. It is a loess, weathered and containing a large per cent of humus. Corn, oats and hay thrive on this soil.

Miami silt loam occupies about seventeen per cent o fthe area of the county ;it is looser, more floury and porous, lighter in color and contains less organic material. It is rarely more than twelve inches in depth, and is found along the slopes of the Sangamon river and its tributaries, being characteristic of hilly country with broken topography and good drainage. Fruit, grass and wheat thrive on it.

Miami black clay loam constitutes sixteen per cent of the area of the county. It is darker than the Marshall soil, heavy, sticky so as to merit the name of "Gumbo," granulated and subject to extensive cracking when baked in the hot summer sun. Driving along country roads after a rain storm, one readily recognizes this soil since it dries less readily is sticky and subject to ruts. Its depth is about eighteen inches. It occupies level areas, is subject to swamps because of its poor drainage, contains a large amount of organic matter, washed in from surrounding lands or derived from the imperfect oxidation of local vegetation. This organic matter devaying forms acids which attack the silt particles and renders the soil more sticky. The Miami black clay loam is the typical black prairie soil which has made Illinois famous for its corn production. No soil makes better corn land.

If there were no swamps there would be no Miami black clay loam. If there were no active erosion there would be no Miami silt loam and

the only soil in the county would be that known as the Marshall silt loam or the following:

The Kaskaskia loam is a somewhat sandy, silty, granular, brown to drab soil, reaching to a depth of about fourteen inches and found most extensively on the bottom lands, approximately about ten feet above the river, along the Sangamon and its tributaries. It is an alluvial soil, generally valuable if not flooded, for corn, oats, hay and especially for pasture and timber.

Water.

In water resources, Sangamon county is fortunate. On account of the low topographic relief (Fig. 12) which in the maximum does not exceed two hundred feet, and on account of the earth cover of the comparatively level strata, the water line is at a comparatively uniform level. The Sangamon and its tributaries flow in a generally northwest direction. These streams furnish water for the towns and cities, but throughout the county, wells furnish the main supply of water. More than fifty per cent of the wells are sunk as deep as the top of the Illinoian till and find an abundant supply of water at an average depth of twenty-one feet. Fourteen per cent of the wells are sunk as far as the top of the Kansas till. That is they have penetrated the sand, loess and Illinoian till and have an average depth of thirty-five feet. Seventeen per cent have been so sunk as to avoid a portion of the loose surface deposits and have penetrated as far as bed rock with an average depth of twenty-seven feet. On the whole since the water in these wells has been strained through soil and sand, it is wholesome where not contaminated by man. But a small amount of mineral matter is contained in this water. The salts found are of the most part calcium and magnesian carbonate and a small amount of iron oxydes and some sulphates. None of these are present in quantities sufficiently great to render it less valuable for drinking purposes or for use in steam boilers.

Conclusion.

Sangamon county is a synonym for a country of plains, the highest point in the county, in the southwest, being seven hundred twenty feet above sea level, the highest rock strata being seven hundred seventeen feet. The lowest point in the county, being also the lowest rock surface, is four hundred and ninety feet, in the southwest corner where the Sangamon leaves the county. Such a level surface shows slight disturbance of original rock strata either by the pressure of the forces contracting the earth, or by the erosion of rapidly flowing rivers. The surface is even more level than it otherwise would have been had it not been smoothened out by the materials brought down from northern regions by the glaciers and scattered here and there both by wind and by water. Glaciers have done their best to spread the blanket of oblivion over the geological past of the county. But ours if the advantage which comes from that past.

The slow process of millions of years have contributed to our prosperity. As we consider the enormous supplies of coal, the boundless

deposits of stone and clay, the marvelously fertile soil and the wholesome and abundant water, we realize that all the periods of the geological history with its bundle of processes have given to the inhabitants of Sangamon county a region well qualified to be one of the garden spots of America.

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