

*By Mrs Mary Heiber
Cary*

THE GEOLOGY OF LA SALLE COUNTY.

Geological Periods.

It has taken mankind centuries of diligent research and earnest meditation to understand and become accustomed to the idea that the ground which we tread is constantly changing, and that the present surface of the land is the latest phase of a long succession of geographical revolutions, that mountains and plains, hills and valleys belong to many different epochs of the earth's history. The living world of to-day includes a background of past geographical conditions, out of which by continuous sequence the present state has arisen.

The poet Rückert tells us, in one of his poems, the story of the immortal Chidder, who, traveling about, aeons after aeons revisits the same place again and again. He passes over a meadow where he had found a city one thousand years ago and a sea five hundred years ago. Half a millennium elapses, and he travels under the ancestral trees of a forest; finally he finds another city, and asking the people whom he meets, what place this is, he receives the same answer, be it from citizen, fisherman, hermit or shepherd, that the meadow, the sea, the forest, the city was always in this place, and will remain forever.

There is a deep thought in this myth! For what seems to us immovable and eternal is whirling past in the swift current of time. The ground upon which we live appears solid to us, it is the very symbol of stability, and if this is true of any part of the earth's crust, it is most certainly true of Illinois. Our prairies do not seem to change, and should Chidder come among us now to ask whence

the prairie came, and what will become of it, we feel inclined to repeat the old answer, "the prairie has always been and always will be."

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 And yet Chidder would smile for he knows better. Not long ago when he visited this region, it was an enormous glacier, and this ice field appeared, then, just as eternal as the prairie now. Yet aeons before the glacier spread over the country, an ocean raged, and at various times during the carboniferous age, Illinois was a great receptacle for the deposits of coal which at this late period ^{is} dug out, to be used for the industrial pursuits of the energetic race which inhabits the state to-day.

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 Yet while these great changes are taking place, we should know that if they are considered from the ephemeral standpoint of a human life, they proceed slowly, very slowly. For there is hardly a region to be found on earth where the geological changes extend equally over a larger area than the prairies of Illinois.

the following are the five most important divisions
 The history of the changes that have taken place as written in the mute language of the terrestrial records, show five strata: The prairies rest first, upon the glacial drift, second, the coal measures, third, the Trenton limestone, fourth, the St. Peter's sandstone, and fifth, the lower magnesian limestone.

THE PRESENT SURFACE AND THE GLACIAL DRIFT.

The larger part of

Illinois is covered with nearly parallel strata of rock of the carboniferous age. In general the surface slopes greatly to the west; the elevation of the Mississippi Valley is about four hundred feet less than that of Lake Michigan. The glacial deposits are spread in an even sheet over the area which was reached by ice, and wide sheets of gravel, clay and sand have been left over the low ground of the former surface. Crowds of boulders have been dropped over the plains and valleys, and probably lines of moraine have been traced. We find boulders of various granites, trap, greenstone, hornblende, quartz, agates, jasper, and occasionally pieces of copper and galenite. The drift is of various thickness, from five feet in the valleys to probably one hundred and fifty feet in the prairies.

The surface of La Salle County is richly agricultural in its prairies and bottom lands, while in its many narrow and rocky valleys we find a region devoted ^{of} to pasture and forests.

The Illinois River in its westward course, runs through the centre of the county, its principal tributaries being from the north, the Fox River, Clark's Run, Pequamsoggin and the Little Vermillion; from the south, the Big Vermillion, Covel and Cedar Creeks, while Indian and Mission Creeks are the tributaries of the Fox River, and the Tomahawk of the Little Vermillion. There is a descent of about four hundred feet from the north county line towards the Illinois River at La Salle; southward the rise is less. The valleys of the streams are deep and narrow where they have been cut into the

underlying rocks, only the Illinois River has extensive bottom lands. The Illinois Valley is a mile or more in width, and varies in character in different portions of the county. East of Ottawa it is productive; while Ottawa is built on the St. Peter's sandstone, most of the valley from Ottawa to Utica is rendered of little agricultural value by the surface exposures of the St. Peter's sandstone and calciferous limestones. From the east line of the county there is much fall in the River to where it strikes the coal measures east of La Salle, but from this point the descent is slight, and ^{the valley} subject to annual overflow.

Concerning the origin of prairies there is no doubt among geologists, for prairies are at our times still in process of formation along the shores of our lakes - as Lake Erie - and rivers, as the Mississippi and Minnesota. Where the currents strike the shores on low ground and deposit sand, pebbles, mud, etc., they build up more or less elevated dams, which often enclose wide shallow basins whose waters are sheltered against any movement. There the aquatic plants soon grow and the basins become swamps, on which ^{the prairie grasses grow but no} ~~no other~~ ^{trees except} ~~one but~~ the tamarac ^{unless} grows, even if the swamps are drained. By successive inundations and ~~their~~ deposits, and the detritus of their ~~own~~ ^{own} vegetation they are raised above the level of their river. The soil of the prairies is a black soft mould, impregnated with a large proportion of ulmic acid, produced by the slow decomposition of aquatic plants, on which ~~swamps even to-day~~ trees grow with difficulty.

COAL MEASURES.

La Salle County is one of the most interesting of the State, both as to its mineral resources and geological phenomena. Its southern part, occupying about two-thirds of its area, is situated on the northern limits of the Illinois coal field. ^{Several} Four coal seams are found whose aggregate thickness is from twelve to sixteen feet. The coal constitutes the great mineral wealth of the County; it is extensively mined, gives employment to a busy mining population, and insures a good and cheap fuel for many centuries. The coal measures are composed principally of slate with several prominent beds of limestone. The limestone strata in the upper part of this formation form the rocky ledges and cliffs in the Bluffs of the Illinois River at La Salle, and along the lower course of the Little Vermillion. The clay strata of this formation afford an excellent material for superior clay-ware, which is extensively manufactured into drain tiles, pressed brick and fire brick.

TRENTON LIMESTONE.

Artesian borings at Peru have penetrated hundreds of feet of strata which nowhere in the county have been discovered reaching the surface, while others which show considerable thickness in the boreholes reach the surface only in a few unimportant outcrops. For instance, the Trenton limestone, representative of the Silurian age, which is ^{Exposed} ~~represented~~ over a ^{small} narrow area in the Valley of Covell Creek, and ⁱⁿ a narrow strip across the Illinois Valley west of Ottawa, also occurs at several points on Fox River, and on the Little Vermillion as at Homer. The entrance to Deer Park occurs through this limestone, which forms portals at both sides, where it terminates abruptly against the St. Peter's sandstone. ~~Another~~ ^{are} outcrops ~~is~~ found at the west end of the tunnel at Split Rock and at Lowell on the Big Vermillion. The exposures are widely scattered, and are nowhere of great extent.

The Trenton is a dense, hard, bluish fossiliferous limestone that is quarried to some extent. It is so much eroded wherever it appears in natural outcrops, that no accurate estimate of its thickness can be made from its surface exposures, but borings at Peru show the formation to be three hundred and seventy-six feet. ^{thick}

ST. PETER'S SANDSTONE.

The St. Peter's sandstone named from the outcrops of the same formation at St. Peter's, Minnesota, is also of the Silurian age. At Peru it lies thirteen hundred feet below the level of Water Street. ³it reaches the surface by an uplift east of La Salle, at Split Rock, and from there extends eastward through the county to a point two or three miles east of Ottawa, forming the main portion of the Illinois River bluffs. On the Fox River it ^{extends from} ~~forms~~ its mouth to the vicinity of Indian Creek, a distance of about ten miles. This sandstone forms the bold and conspicuous cliffs of which the romantic Starved Rock, Lover's Leap and Buffalo Rocks are widely known and admired. It also contains the picturesque canons of which Deer Park is best known, although a number of smaller ones not less beautiful are found near Starved Rock.

This sandstone is generally quite soft, consisting of slightly agglomerated grains of pure white quartz sand, which furnish the best material for the manufacture of glass, for which purpose it is used extensively at the glass works of Ottawa, Streator and La Salle.

MAGNESIAN LIMESTONE.

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 The anticlinal axis ~~that~~ crosses the country from northwest to southeast, has its centre in the Illinois Valley between La Salle and Utica, where the lower magnesian limestone, the upper portion of the calciferous division of the Potsdam ^{period}, the oldest rock discovered in the State of Illinois, is elevated about eighty feet above the surface. Its area is limited to from seven to eight square miles. Its northern exposure is on the Little Vermillion, where it can be traced above river level. In the bluffs on either side it is capped with St. Peter's sandstone. The Tomahawk Valley also presents some fine exposures. The Pequamsoggin for one mile and one quarter gives a continuous exposure from the Illinois River bluff northward, and it appears in the north bluff of the Illinois River for two miles. It is the surface rock over the whole width of the valley opposite its exposure in the north bluff, but on the south side of the Illinois it dips under the St. Peter's, and its eastern boundary extends from the eastern side of the town of Utica across the valley to Starved Rock.

This limestone stratum contains the cement rock which furnishes the material for the important limestone industries in and near Utica, and is the best hydraulic rock found in the state.

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HISTORY OF THE ILLINOIS RIVER.

After the ice age, the region of the Great Lakes was probably one immense sea, the waters spreading far into Illinois, and discharging from Lake Michigan into the Mississippi Valley. During the glacial epoch, the era of erosion, the rivers were deepening their beds, but ~~during~~ ^{period} the Champlain, when the land to the north was depressed, the rivers filled the valleys, making gravel deposits. During this period the Illinois became the outlet for the Great Lakes, and continued to be so until the elevation opening the recent period.

There are some reasons to suppose that this outlet of the Great Lakes formed a grand cataract, an older Niagara, the ~~real~~ geological predecessor of the Niagara of to-day. West of utica, the calciferous limestone ~~over which the river bed extends,~~ forms the geological feature of the county, ^{over the} presenting an anticlinal axis of the ~~oldest~~ ^{which forms the geological rising} rock found in the state, about one hundred feet above river level. According to various borings it is presumed that erosions of the old bed of the river where it reaches the coal measures, is forty feet below the present surface. So it does not seem impossible that this older and southern outlet of the four Great Lakes was very similar to their present northern drainage. An elevation of about one hundred and forty feet, in connection with the magnificent breadth of the valley, must have formed as glorious a cataract as that which we admire in the Niagara of to-day.

RELICS OF LIFE.

The history of the plants and animals of our country as written in its fossils, will be of varied interest to every collector, as its limestones, even the upper layers, contain innumerable varieties as Productus La Sallensis, Spirifers, Chonetes, Flemingi, Athyris subtilata, while in the coal formations are found Lepidodron, Siggillaria, Calamites, (Chonetes) Mesaloba, Crinoid stems and ferns, and the Trenton limestone abounds in Orthoceras of several species, Goniatoceras, Phragmoceras, also Cyroceras, Maduria Srochilises.

The St. Peter's sandstone is bare of life and also the calciferous seems to have preserved but few of the living forms which were in existence during its formation. Although no paleolithic implements have been found in the drift of Illinois, discoveries of chipped implements in New Jersey, Ohio and Minnesota, in a formation declared to be a direct result of the melting of the glaciers has led men of science to believe that man has occupied North America from the Mississippi to the Atlantic Ocean, towards the close of the great ice age, at least at the time, the ice front had withdrawn nearly to the water-shed of the St. Lawrence basin.

RETROSPECT.

Each of the strata of La Salle County is utilised in some manner to-day for the wants of the present generation, be it the prairie soil, the gravel beds of the drift, the coal and clay of the coal measures, the limestone of the Trenton epoch, the pure sandstone of the St. Peter's, and the cement rock of the calciferous formation. Thus we see that the past history of this ^{region} (piece of ground) influences the present, it helps to form the character of our life, and thus becomes a most potent factor in building up the future, Whatever the future may have in store for us we know that all these changes are but phases of one grand evolution. In spite of all transiency there is a continuity that connects the remotest ^{past} fact with the most distant future.