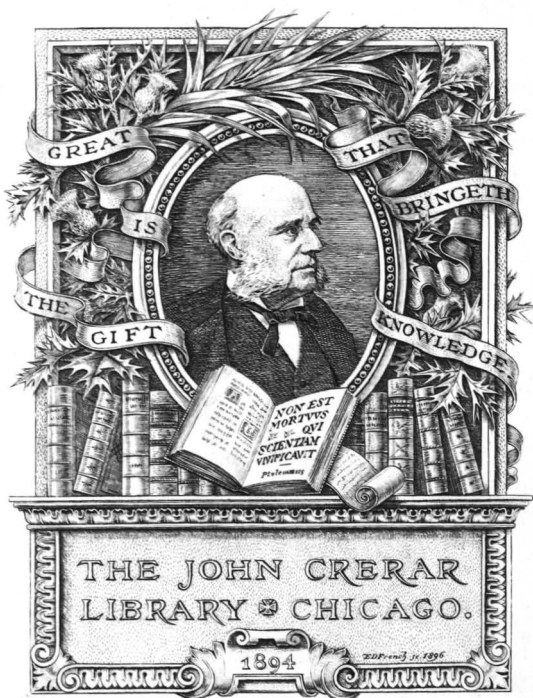


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W. W. Calkins

Geological formations
of La Salle County



Geological formations

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THE GEOLOGICAL FORMATIONS OF LA SALLE COUNTY, AND THEIR ORGANIC REMAINS.

BY WILLIAM WIRT CALKINS.

Of the ten great systems at present recognized by geologists, five are wanting in this State. These are: The Cretaceous, Jurassic, Triassic, Huronian, Laurentian. Of the other five, we have in this county, the Quaternary or Post-Tertiary, the Carboniferous, and the Lower Silurian Formations. It thus appears that we have in the county no Tertiary or Devonian deposits. These are developed further west and south.

We will consider each of our three great divisions seriatim.

THE QUATERNARY SYSTEM.

This embraces the soils, sands, gravels, clays, and other deposits forming the surface of the county, and varying in depth from a few feet to perhaps one hundred feet in certain localities on the prairies. This Formation nowhere attains a thickness of one hundred and fifty feet, as estimated by Freeman.

The "*Boulders*" form a peculiar feature of this system, and have given to it the name of the "*Boulder*" or "*Drift*" epoch, referring to the manner of its deposition. These boulders are familiar to all and found throughout the entire county, though more numerous in some localities than others. Col. D. F. Hitt, of South Ottawa, has an elegant collection of them on exhibition, showing the useful, scientific and ornamental purposes to which they may be put. I have at different times secured from the Colonel's "*fence*" more than twenty varieties of the primitive rocks containing minerals of mica, feldspar, garnets, copper, etc. Large deposits of boulders occur in the Illinois Valley, lying in some places directly upon the St. Peters Sandstone, and so numerous and closely packed as to exclude everything else. A good example may be found in West Ottawa, near D. S. Ebersol's resi-

dence, which shows their deposition to be conformable to the course of the valley and the direction assumed by the agencies that brought them from their original to their present location. Lake Superior is the nearest point from which these granite rocks could have been derived ; and the formation there which outcrops at the surface, is here buried many hundred feet below and beyond our reach. Ice and icebergs moving through the flood of waters coming from the the North, brought to us our boulder deposits. The scratchings and groovings found on many of them are sufficient evidence without examining localities where the formations in place during the Drift epoch, as on the west shores of Lake Michigan, show the same erosions, only to a greater extent. The area occupied by boulders shows that the great lakes once covered an immense country, and gives us some idea of the Ice period when these boulders were distributed. During the geological changes that followed, the lakes were contracted, but the Illinois river was for a time an immense stream, serving as an outlet for vast bodies of water that afterwards were diverted elsewhere. We can safely assume that the Illinois river once flowed from bluff to bluff, confined in its course so far north as Joliet, probably becoming at that point undistinguishable from the vast lakes above. The fossil remains found in the Drift are of course accidental and derived from *other* formations. Some of these are as follows : a *Lithostrotion*, species undetermined, found near Caton's spring in South Ottawa. This is an interesting coral and belongs to the Carboniferous Formation. Of *Crustacea*, several Trilobites have been found by Mr. U. Ellsworth, in Clark's Run at Vermillionville. The species is common to the Trenton Group, which is nearly denuded and approaches the surface where the Drift lies immediately upon it at this point. Fossilized wood is frequently found in digging wells. In the more recent deposits remains of the *Mastodon* have been found ; also species of land and fresh water shells identical with those now living in the county. The banks of our rivers will afford examples. Of valuable minerals—copper, lead and iron, occur in the drift, sometimes in quite large masses, but all these came here with the boulders and by the same agencies.

THE CARBONIFEROUS FORMATION.

This is represented by the Coal measures and of variable thickness. The great axis of upheaval crossing the Illinois Valley at

Split Rock, running thence in the direction of Deer Park, Big Bend, and Lowell, has a direction nearly parallel with the Big Vermillion river, and the Coal measures on either side present distinctly marked features caused by the commotions of the period when they occurred. The thickness of the Coal measures west of the axis at La Salle, approximates six hundred feet, from the most reliable figures I can obtain. In this locality they rest upon the Silurian rocks. Their beds of coal are known as the upper, middle and lower, and some claim that there is a fourth bed. East of the great axis the Coal measures thin out, only one bed of coal appearing in a large area of the district. But there are two veins in Deer Park back of the Fishburn place, only one, however, of sufficient thickness to work, which is done mainly by stripping, though the main one was once worked by driving a shaft into the hillside. This was done by my father some years ago. On a recent examination by Col. Hitt and myself on the O'Connor place, we carefully traced the deposits from the edge of the timber down the ravines leading to the Illinois bottoms where these deposits rest upon the St. Peters, and found very interesting outcrops. We could have loaded a wagon in a short time with fossil *Lepidodendrons* which were then lying exposed in the ravines. These Coal plants were most numerous at the head of the ravines and near the surface.

Freeman remarks (3 Ills. Repts.), that with one exception, only one bed of coal appears east of the anticlinal axis, which he says is the "lower La Salle bed." Such, however, is not the case, as recent developments show. Neither do I believe that all the beds referred to are equivalents of the La Salle lower bed. On page 267, (3 Ills. Repts.) Freeman says: "Fossils are rare in this county, associated with this coal, so far as my observations extend." He refers to the "lower bed." And the fact of there being immense quantities of fossil coal plants as well as other fossils, found east of the axis as stated above, would warrant the conclusion that neither the beds of the Ottawa and Deer Park districts, or those east of the Big Vermillion, are in reality the third or "lower La Salle bed." For additional evidence, I may say that I have myself taken out at different times a full wagon load of fossils from the so-called "lower beds," east of the Vermillion, in the vicinity of Lowell and above, so far as Kirkpatrick's Mines. These latter are undoubtedly *upper beds*, and the same is true of those at Clark's Run, which ac-

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according to Freeman are "lower beds." Much confusion has been caused by the diversity of ideas about our coal strata, and the unsatisfactory conclusions of the State Report. We can determine certainly that where the coal rests upon St. Peters, as at Ottawa, it is a lower bed and the lowest in the State.

The immense coal mining operations now carried on all over the district will afford excellent opportunities for studying our coal strata, which should be improved. The Cannel coals on the Vermillion also deserve attention. Only the Coal Measures Group of the Carboniferous System is developed in the county.

The Subcarboniferous does not appear at all, hence the absence of crinoidal forms in the abundance represented elsewhere. The Group is however prolific in numerous organic remains, both animal and vegetable. A list of these appears elsewhere. The coal beds, shales, clays, sandstones and limestones, of this Group, show good outcrops, and I know of no section where better opportunities are afforded for investigation. The Bluffs of the Big and Little Vermillion are good localities for obtaining fossil shells, while the coal mines swarm with various types of past vegetable life.

From the city of Streator to the mouth of the Big Vermillion, all on the line of the great axis, there will be found a greater representation of fossil species than elsewhere, owing to the upheaval. In the banks and bed of the Vermillion occur many fine *septaria* or *turtle-stones*. These assume various fantastic forms, and sometimes contain shells. Mr. Hurd, of Lowell, exhibited one to me before the war, in which was a perfect *Nautilus*. They are, of course, referable to the Carboniferous era. A good story is told of a certain reverend gentleman, (who was also a lover of science,) and his studies of *turtle-stones*. Having resolved to investigate, he exhumed a large one after much labor and expense, from the bluff at Lowell. This was carefully transferred to his home in Tonica and scientifically set up in the front yard. The gentleman labelled it *Cetacea* or *Whale-fossil*. It was a big one, though not of the species he supposed. I traveled on foot six miles to see the wonderful *whale*, and still had my doubts.

THE SILURIAN FORMATION.

The divisions proper are "Upper" and "Lower." Only the latter outcrops in La Salle County. The Groups or Subdivisions exposed are: the *Trenton*, the *Calciferosus*, and the *St. Peters*

The first contains numerous fossils of great interest, and is well exposed in various parts of the county. The Homer beds are *Trenton* and regarded by Freeman as local, being left after the denudation of the drift movement. I do not, however, concur in this view, but regard the deposit as extensive, extending south, east, and north-west, though only slightly exposed on the Little Vermillion at other points. The Trenton also appears near the railroad tunnel below Utica, and within the city limits of Ottawa, where it is quarried for building purposes. The McPherson and Reddick Quarries, west of town, are Trenton, as shown by the fossils; and resting upon St. Peters at this point in more than usually heavy masses, it seems to fill a depression or gap left in the underlying rock. It appears on the Fox river at different points, but generally thin bedded, silicious in character, and the fossils hard to obtain perfect. South of the Illinois good outcrops are seen on Covel creek resting on St. Peters sandstone. These finally disappear beneath the Coal measures in the bluffs. The thickness is from twenty to forty feet. Some very fine fossils have been obtained here.

On the Big Vermillion the Trenton appears at Deer Park abruptly upheaved against the St. Peters, affording a fine opportunity to study the two groups. Thickness, ninety feet. Above Deer Park there are exposures at several points: at Big Bend, Clark's Ford, Lowell, and Eaton's Mill. At the latter points the development is unusually large. The thickness here is one hundred and seventy feet, according to the boring at the petroleum well. It forms the bed of the river, and contains many fossils. Above the dam at Eaton's, when the river is low, there is shown a regular coral reef of the Silurian era. Pieces of this coral are circulated locally as *petrified honey-comb*. The Calciferous Group of the Potsdam period is developed at Utica, and known as the *cement rock*. It is the only outcrop in the State, and covers an area of a few square miles north of the Illinois river, but on the south side disappears beneath the St. Peters. So far as I know no fossils have been found in this rock.

The St. Peters Sandstone Group is familiar to all. It outcrops at Ottawa, Buffalo Rock, Split Rock, Deer Park, Starved Rock, etc., covers one-third of the county, and is of great thickness—from 161 feet at Ottawa to 600 on the Vermillion, as determined by

borings. North of the Illinois river it thins out towards the west, near Utica, where its junction with the Calciferous may be seen.

I have now given a sketch of all the geological formations developed in La Salle County, without enlarging upon the peculiar features of any, which would be desirable if space permitted. I can not, however, leave the subject without referring to one or two points of particular interest. Near the railroad tunnel in the Illinois Valley, and west of Utica, may be seen within a short distance, outcrops of four different formations: the Coal Measures, Trenton Group, St. Peters, and the Calciferous. Here will also be noticed immense detached masses of rock scattered around in the valley. This is opposite Little Rock, and all on the line of upheaval. The evidence presented shows that along the great axis powerful convulsions occurred at some former period, resulting in the juxtaposition of the formations mentioned above. Portions of the Carboniferous and Trenton east of the axis were swept away. The strata on the west suffered a sinking process, and a strong dip to the southwest, in some places fifty degrees. At the same time a corresponding dip occurred east of the axis. The coal shafts at Little Rock also show a displacement of the strata there. To a person familiar with geology the question will arise, as he looks over the ground and the facts presented, whether or not, there once existed here an immense wall of rock, extending from Little Rock to Split Rock, on the opposite side, and forming a cataract far excelling Niagara in size and grandeur. I have no doubt of it myself, though positive proof is wanting.

THE ORGANIC REMAINS OF LA SALLE COUNTY.

These have been referred to in a general way. A list of species will now be given. As is known to some, I have made a study of these for twenty years; and prior to the great "Chicago Fire" of 1871, had collected representatives of all the species known. I lost in that "Fire" more than two thousand species, among them the La Salle County collection, but fortunately had preserved a list of those from this county, which is now embodied in this paper. The greatest care has been taken to verify species and localities, and though the specimens were destroyed, every one is even now, after the lapse of six years, as familiar to me as though they were still in my hands. I only regret that figures and descriptions can not, for obvious reasons, be given in this book. For these the lover

and student of geology must refer to the State Reports and the various other scientific publications of the time—a labor requiring a vast amount of patience and research, but one that will not intimidate the zealous explorer after knowledge.

FOSSILS OF THE COAL MEASURES GROUP.

CARBONIFEROUS FORMATION.

Brachiopoda. Mollusca.

Martiniæ (*Spirifer.*) *plano-convexa*, *Shum.* Abundant at La Salle and elsewhere.

Terebratula bovidens, *Morton.* Abundant, same localities as the preceding.

Athyris subtilita, *Hall.* Has a wide distribution in the Coal Measures.

Chonetes millepunctata, *M. and W.* In the upper Coal Measures at La Salle.

Chonetes mesoloba, *Hall.* Very plentiful everywhere in the Coal Measures.

Chonetes Flemingii, *Hall.* Found at La Salle in same location.

Chonetes granulifera, *Hall.* Same as the preceding.

Discina nitida, *Phil.* Found at La Salle.

Discina subtrigonalis, *McChesney.* Same locality as preceding.

Discina capuliformis, *McChesney.* Found at La Salle.

Productus Nebrascensis, *Owen.* Abundant at La Salle in the upper limestones. Also found on the Vermillion—equals *P. Rogersii*, *N. and P.*

Productus symmetricus, *McCh.* Abundant at La Salle.

Productus punctatus, *Martin.* Very fine and large. Loc. At La Salle and on the Vermillion.

Productus inflatus, *McCh.* Extremely abundant at La Salle and other localities. Resembles *P. semireticulatus*, of *Sub Carb.*

Productus longispinus, *S'by.* From the La Salle limestones. Also found by me on the Vermillion. Equals the *P. Wabashensis*, *N. and P.*

Productus costatus, *S'by.* Abundant at La Salle in the upper limestones.

Productus La Sallensis, *Worthen.* A variety of the preceding species.

Productus Wilberanus, *McCh.* From La Salle. Is larger than *P. Nebrascensis*, which it resembles.

Orthis La Sallensis, *McCh.* (*Hemipronites*.) Found at La Salle and west of the Big Vermillion.

Orthis crassus, *Meek and W.* (*Hemipronites*.) Found at La Salle, (equals *H. crenistria*. *Eur.*)

Orthis carbonaria, *Swallow.* Abundant in the upper Coal Measures, at La Salle and elsewhere.

Retzia punctulifera, *Shum.* Same as last.

Spirifer Kentuckensis, *Shum.* Same locality as last.

Spirifer cameratus, *Morton.* Abundant everywhere in the upper Coal Measures.

Rhynchonella Osagensis, *Swallow.* Found on the Vermillion near Big Bend.

Rhynchonella Wortheni, *Hall.* Found at La Salle.

Meekella striato-costata, *W. and St. J.* Same as last.

Lingula mytiloides, *S'by.* From the Big Vermillion Coal Measures.

Lamellibranchiata. Solenomya soleniformis, *Cox.* Found near Kirkpatrick's and at La Salle.

Solenomya radiata, *M. and W.* Same as last.

Aviculopecten Cozanus, *Hall* (?). Two miles below Kirkpatrick's, in black shales.

Aviculopecten neglectus, *Gein.* From shales on the Big Vermillion.

Aviculopecten interlineatus, *M. and W.* Upper Coal Measures at La Salle, very fine.

Nucula ventricosa, *Hall.* Lower Clay shales at La Salle and Ottawa.

Nucula parva, *McCh.* Lower Coal shales, Big Vermillion.

Cardiomorpha Missouriensis, *Shum.* Coal shales at La Salle.

Myalina Swalovi, *McCh.* Coal Measure shales at La Salle.

Myalina recurvirostris, *M. and W.* Same as last.

Edmondia peroblonga, *M. and W.* La Salle Upper Coal Measures.

Lima retifer, *Shum.* Lower Coal Measures.

Gasteropoda.

Naticopsis Shumardi, *McC.* Found in the blue limestones of the Coal Measures along the Little Vermillion at La Salle.

Naticopsis Altonensis, *McC.* Same as last.

Naticopsis nodosa, var. *Hollidayi*, *M. and W.* Coal Measures at La Salle.

Naticopsis subovatus, *Worthen, M. S.* La Salle Coal Measures.

Euomphalus subquadratus, *M. and W.* Upper Coal Measures.

Euomphalus pernodosus, *M. and W.* Lower Coal Measures.

Euomphalus subrugosus, *M. and W.* Shales of the lower Coal Measures on the Vermillion.

Bellerophon carbonaria, *Cox.* Same as last.

Bellerophon Blaneyanus, *McC.* Same as last.

Pleurotomaria Grayvillensis, *McC.* La Salle and elsewhere in Coal shales.

Pleurotomaria Shumardi. An elegant species from Wild Cat Point.

Murchisonia archimidea, *McC.* Limestones at La Salle and on the Big Vermillion. Found by A. C. Baldwin.

Cephalopoda.

Goniatites Hathawayanus, *McC.* La Salle.

Nautilus La Sallensis, *M. and W.* Same.

Orthoceras Vermillionensis, *Calkins, M. S.* From the Coal strata shales.

Leaia tricarinata, *M. and W.* Lower Coal Measures, Big Vermillion.

Vertebrata.

Cladodus mortifer, *N. and W.* From the Coal shales at La Salle.

Petalodus destructor, *N. and W.* Limestones at La Salle.

Petrodus occidentalis, *N. and W.* Coal shales.

Agassizodus variabilis, *N. and W.* Upper Coal Measures at La Salle.

Agassizodus scitulus, *W. and St. J.* Lower Coal Measures Vermillion and La Salle.

Lophodus variabilis, *N. and W.* La Salle.

Peltodus unguiformis, *N. and W.* La Salle.

Cymatodus oblongus, *N. and W.* La Salle.

FOSSIL COAL PLANTS.

The species from this county have been studied but little. From Streator I have identified the following: *Pecopteris villosa*, *Brong.*
Pecopteris unita, *Lesq.* *Neuropteris hirsuta*, *Lesq.*

From Little Vermillion river, *Pecopteris Bucklandi*, Brong. has been found.

Sigillaria Massiliensis, (Sp. nov.) In the Marseilles and Deer Park sandstones.

Sigillaria corrugata, (N. S.) Found at Marseilles.

Stigmarias. Several species, undt.

Lepidodendron rugosum, Brong. From the Little Vermillion. There are still a large number of unidentified and undescribed forms from Deer Park and Streator.

RADIATA.—CORALS.

Lophophyllum proliferum, McC. Very abundant on the Big Vermillion, La Salle, etc., in the limestones.

Scaphiocrinus hemisphericus, Shum. La Salle.

The *Radiata* do not appear to be numerous in species. A. C. Baldwin found near Wild Cat Point a species which I recognized as *Chaetetes lycoperdon*, Lay. Its position and occurrence here still puzzles me. The strata there and at Bailey's Falls need further study. While the majority of the fossils are *Carboniferous*, there are forms which appear to belong to the *Cincinnati Group*, *L. Silurian*. All along the Big Vermillion, at Clark's Ford, etc., will be found numerous *Eucrinite* stems (*Crinoidea*,) occurring separately and in large masses, which in places are deposited in regular strata, as near Clark's Ford, high up in the *Carboniferous*. These are called by the local geologists *petrified buttons*, and other curious but expressive names. None have been found sufficiently perfect to identify. They are very beautiful and very abundant.

FOSSILS OF THE TRENTON GROUP.

Lower Silurian Formation.

Articulata. Crustacea.

Calymene Blumenbachii. Brong. (*Trilobite*.) Supposed to equal *C. senaria*, Con. Locality, Clark's Run. Also on the Vermillion and at Ottawa. This suggests the close proximity of the *Cincinnati Group*—or its destruction in the general denudation.

GASTEROPODA.

Trochonema umbilicata, Hall. At Deer Park.

Raphistoma lenticularis, Con. Big Bend.

Cyrtolites trentonensis, Con. Loc. The Big Vermillion.

I have identified from the Trenton at Homer the following species: *Lituites undatus*, Con. *Gonioceras anceps*, Hall. Very fine. *Ormoceras Backii*, Stokes. *Orthoceras fusiforme*, Hall. *Endoceras annulatum*, Hall. *Endoceras protiforme*, Hall. Several varieties. *Cyrtoceras dardanus*, Hall. *Vanuxemia* (?) *Ctenodonta* (?) *Leptaena sericea*, Hall. *Strophomena alternata*, Con. *Asaphus* (?) *Pentamerus* (?) Very fine.

From the Trenton of the Big Vermillion and Covel creek we have: *Orthoceras anellum*, Con. *Orthoceras Junceum*, Hall. *Orthoceras vertebrale*, Hall. *Cyrtoceras macrostomum*, Hall. *Cyrtoceras constrictostriatum*, Hall. *Maclurea* (?). *Orthoceras Titan*, Hall. This is our largest species. All *Cephalopoda*. Other species are: *Conularia trentonensis*, Miller. Found near Lowell by A. C. Baldwin. Very rare. *Streptelasma corniculum*, Hall. *Leptaena sericea*, Hall. Abundant. *Orthis*—*Rhynchonella*—*Strophomena*. Last three species not positively identified. The *Fucoides* are represented by several species. The observer will see at Lowell—*Buthotrephis succulens*, Hall, and *Buthotrephis gracilis*, Hall.

Of Corals we have two species of *Halysites* not named, and *Favistella stellata*, Hall, at Eatons—before referred to as *Honeycomb Coral*, which all will recognize. A few good specimens of the *screw-coral*, *Archimides reversa*, Worthen, were found near Wild Cat Point by A. C. Baldwin, and are the only ones that I have seen from this county.

This completes the list of identified species coming under my notice. There are many others still undiscovered, which future research will reveal.

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