Journal of the Minnesota Academy of Science

Volume 1 | Number 2 Article 6

1874

Geological Notes From Early Explorers in the Minnesota Valley

N. H. Winchell

GEOLOGICAL NOTES FROM EARLY EXPLORERS IN THE MINNESOTA VALLEY.

BY N. H. WINCHELL.

[First Paper.]

LE SUEUR.

The earliest accounts of the Minnesota river are connected with the name of Le Sueur. There is no account of his explorations published by himself. From Charlevoix and La Harpe may be made out a fragmentary account of his travels. The following notes are derived from a perusal of such early publications as are accessible in the libraries of this city and St. Paul together with the publications of the Minnesota Historical Society.

The discovery of the reputed copper mine on the Blue Earth must have been made between 1693 and 1695. He received a commission in 1697 from the government of France to work it, and was furnished with an outfit and means for defence against the Indians. He met with various obstacles till the year 1700, when, with nineteen men, he finally established himself at his post, situated in 44 degrees, 13 minutes, north latitude. It was the first of October. His fort was finished by the 14th, and was named Fort L'Huillier, from one of the chief collectors of the King, from whom he had received his first commission to work the mine. L'Huillier had assayed this ore in Paris in 1696. The ore of copper which attracted him is said to have been "a green and blue earth." It was obtained about a mile above his fort,* which was situated, according to the statement in vol. i, (p. 331), of the Collections of the Minnesota Historical Society, at the mouth of the Le Sueur river, a branch of the Blue Earth. Having spent a winter at his fort, in the spring of 1701 he descended the Mississippi with a large quantity of the ore, four thousand pounds of which were sent to

*Charlevoix says "three-quarters of a league" above his establishment.

France. He intended to return, but in 1703 the garrison left by him arrived at Mobile, having been compelled to abandon the post on account of ill treatment from the Indians. The mine is further described as being near a range of hills, (Keating says *mountains*) ten leagues long, that seemed to be composed of the same substance. Charlevoix says: "*After removing a black, burnt crust, as hard as a rock, the copper could be scraped with a knife.*"

Mr. W. W. Mather, of Ohio, who accompanied Featherstonhaugh, says that he "found the green earth, but it contained no copper." Mr. Keating did not visit the locality, but, judging from the accounts of the Indians, the blue earth used as a pigment by them must be the same substance, and he thinks, by the color, it was a posphate of iron.

Mr. Featherstonhaugh is very positive in his denial of the existence of any copper in that locality. He pronounces the whole account a fabrication of Le Sueur.

Le Sueur, in other respects, however, has been found to be a very reliable observer. There can be no question about the existence of both blue and green earth in that vicinity. The shales of the Cretaceous are common in that part of the State. Featherstonhaugh says the Indian pigment comes from a seam "between the limestone and the sandstone;" *i. e.* between the Shakopee limestone and the Jordan sandstone. The hard, black, burnt crust mentioned by Charlevoix can be no other than the ironstone incrustation that covers the same limestone as seen at Mankato, wherever the Cretaceous clays and sands lie unconformably immediately over the Silurian, (see under *Cretaceous*, Second Annual Report on the Geological and Natural History survey of Minnesota).

CARVER.

In 1766 Jonathan Carver explored the valley of the Minnesota. Although his book has a sounding title and professes to contain a description of the minerals, cataracts, mountains, soil and vegetable productions of the Northwest portions of "that vast continent," it contains almost nothing of value on the geology and natural history of the valley of the Minnesota.

His book is severely criticised by Mr. Keating, who pronounces him very unreliable, or almost fabulous, in some of his statements.

KEATING.

In 1823 the expedition of Maj. Stephen H. Long to the source of the St. Peter river, and lake Winnepeek, was undertaken by the order of John C. Calhoun, U. S. Secretary of War. Professor Wm. H. Keating, of the University of Pennsylvania, was the Geologist and Historigrapher of the expedition.

Prof. Keating's geological notes on the Minnesota valley begin with an account of the bluff on which Fort Snelling stands. It is said to be composed as follows, in a descending order:

1st. 8 feet limestone of a distinct slaty structure; compact, but with a splintery uneven fracture; filled with organic remains (*Producti*) of a light grayish-yellow color.

2d. 15–20 feet, limestone of a blue color, destitute of fossils, an excellent stone for building, and good for quicklime.

3d. 60 feet sandstone, constituting the principal mass of the bluff. This is friable, but every fragment examined with care seems to be a regular crystal. Keating inclines to the opinion that it must have been from a chemical precipitation, and not from mere mechanical deposition. The process of its formation may have been a very rapid one, such as is obtained in the manufacture of fine salt; and to this may be attributed the circumsatnce of its fine texture. The color is white—sometimes a little grayish, when it resembles the finer varieties of muscovado sugar.

4th. 10 feet limestone; slaty, striped with curved zones; very argillaceous, softer than the preceding; structure quite earthy; color light yellow.

5th. 7 feet limestone, bluish or yellowish-gray, conglomeritic with small, black pebbles of quartz; more crystalline than the last; vesicular; rises four feet above the level of the river.

6th. 4 feet limestone, much finer grain, and more earthy than the last. The bed of the river near the fort is excavated in this limestone.

He remarks that at the Falls of St. Anthony the same section may be seen, except that the lower limestones are there not visible. Keating is the only geologist that has ever reported limestone *in situ* below the sandstone at Fort Snelling.

At the village of Taoapa, which is probably the same place as Shakopee, Major Long observed limestone which appeared to him to be *in situ*. This village was about six miles below "Little Prairie."

He mentions the little rapids "caused by two bars of sandstone," the first forming a fall of four feet in twenty yards. Half a mile above this is the second bar. The aggregate fall is seven feet. This sandstone is seen in the bank, and *"resembles that at Fort Snelling*. It has a fine crystalline grain and a color varying from white to yellow."

At Traverse des Sioux the party abandoned the canoes, and followed the trail to Redstone, thus cutting off the great bend where the Blue Earth river enters the Minnesota, and losing the opportunity of examining the copper mine of Le Sueur.

He remarks that up to the point of abandoning the canoes the banks of the Minnesota are "chiefly, if not altogether composed of sandstone." He saw the "white rock" bluff supposed to be at Ottawa, and at a distance observed horizontal ledges of rock that were considered as "the limestone that lies above the sandstone." This point was probably at or near Kasota.

The party seem not to have passed near enough to the quartzite outcrop to have seen it. No mention is made of it by Keating.

Passing up the valley of the St. Peter on the south side, he remarks: "A feature which struck us was the abundance of fragments of primitive rocks, which were strewed in this valley. They were, for the most part, deeply imbedded in the ground, and bore but few traces of attrition. Their bulk was very large. For a time we doubted whether we were not treading upon the crust of a formation of primitive rocks which pierced through the superincumbent formations. But a close observation evinced such a confusion and diversity in the nature of the primitive blocks as well as such signs of friction, as satisfied us that these were out of place. Still they appeared to warrant

the geologist in his prediction that the party was approaching a primitive formation, and that certainly the valley of the St. Peter had been one of the channels through which the primitive boulders had been removed from their original site. This assertion was fully substantiated, two days afterward, by the discovery of the primitive rocks *in situ*." At another place he remarks: "The boulders that are so common in the valley of the St. Peter are but seldom seen on the prairies."

No further geological notes are made till reaching the Redwood river, where he makes the statement that its banks "are formed of a fine white sandstone." It is probable that he mistook, at a distance, the white kaolin bluffs which occur at that point, made of decomposed granite, for sandstone. There is a little sand in the Cretaceous at that point, but there are no *bluffs* of white sand.

No primitive rock *in situ* was noted till reaching a point several miles above Patterson's Rapid, although a "very interesting fragment of rock was observed" at the point where the Redwood joins the Minnesota, said to be forty or fifty feet in circumference. On making the discovery of these granite rocks in place he remarks on "the certainty that we had at last arrived at what we had long been looking for in vain. We had traced these scattered boulders, which lay insulated in the prairies, from the banks of the Muskingum to this place; we had seen them gradually increasing in size and number and presenting fewer signs of attrition as we advanced further on the journey. Two days before, their number, size and features had induced the geologist of the party to predict our speedy approach to the primitive formations, and it was a pleasing confirmation of his opinions to find these rocks really *in situ*, within thirty miles in a straight line of the place where he had made this assertion." The character of these rocks was examined with care. In general he arrived at this conclusion; "It seemed as if four simple minerals, quartz, feldspar, mica and amphibole, had united here to produce almost all the varieties of combination which can arise from the association of two or more of these minerals: and these combinations were in such immediate contact that the same fragment might, as we viewed one or the other end of it, be re-

ferred to different rocks, while in some places granite was seen perfectly well characterized."

At the mouth of Spirit Mountain creek, (Yellow Earth river) which joins the Minnesota from the south about eight miles below Big Stone lake) he again notes the occurrence of granite, remarkable for the beauty of its feldspar.

Although he did not visit the Coteau he makes some interesting notes on its character and its direction which may be thus briefly summarized: Its height above the St. Peter (at Big Stone lake) is thought to be "not short of 1,000 feet." According to the best information which he could obtain, "this ridge commences about the 49th parallel of north latitude, and between the 98th and 99th degrees of west longitude from Greenwich. It proceeds in a direction nearly south-southeast, passes east of the group of small lakes called Devil's lake, divides the tributaries of the St. Peter from those of the Missouri, and extends southerly as far as the head of the Blue Earth, where it gradually widens and sinks to the level of the surrounding country."

He mentions a second ridge or coteau, commencing at the southern bend of the Mouse, near the 48th parallel, which continues in the same general direction to beyond the 44th parallel where it is said also to sink away and disappear. He was "generally informed that no rocks are seen at its surface, that it presents a uniformly smooth, prairie-like appearance, the ascent being gradual and easy on both sides." He thinks, however, it is formed by an elevation of the granite rocks above their usual level, although perhaps covered as with a mantle, by the secondary and alluvial rocks.

There are many indications in the narrative that this hasty reconnoissance of the Minnesota valley was not satisfactory to Prof. Keating.

FEATHERSTONHAUGH.

In the fall of 1835, Mr. G. W. Featherstonhaugh, accompanied by Prof. W. W. Mather, made his "Canoe Voyage up the Minnay Sotor." His geological notes are very meagre, although he bore a commission as United States Geologist. He

regarded the limestone of the Minnesota as of Carboniferous age. He visited the locality of Le Sueur's copper mine, and makes the following observation: "As soon as I had reached that part of the bluff whence the pigment had been taken, Le Sueur's story lost all credit with me, for I instantly saw that it was nothing but a continuation of the seam which divided the limestone from the sandstone, and which I have before spoken of at the Myah skah* as containing a silicate of iron of a bluish green color. The concurrent account of all the Indians we had spoken with that this was the place the aborigines had always resorted to, to procure their pigment, and the total silence of everybody since Le Sueur's visit respecting any deposit of copper ore in this, or any other part of the country, convinced me that the story of his copper mines was a fabulous one, most probably intended to raise himself in importance with the French government of that day. Charlevoix, having stated that the mine was only a league and three-quarters from the mouth of the Terre Bleu, made it certain that I was now at that locality and the seam of colored earth gave the key to the rest. Le Sueur's account of the mine being at the foot of a mountain ten leagues long was as idle as the assertion that he had obtained 30,000 pounds of copper ore in 22 days, for there is nothing like a mountain in the neighborhood. The bluff, to be sure, rises to the hight of about 150 feet from the river, but when you have ascended it, you find yourself at the top of a level prairie, so that what might, to an inexperienced traveler, appear to be a mountainous hight, is nothing but the summit of the gorge which the river has cut out.

In his report to Congress "of a geological reconnoissance to the Coteau des Prairies" are fuller geological notes that may be summarized somewhat as follows:

After mentioning the Fort Snelling bluff, and correcting Keating's error in stating that a limestone outcrops below the sandstone at that point, he says: "Something short of fifty miles from the fort there is a short rapid with a strong current. Above this is another rapid, with sandstone in place on the right bank, the same as at the Fort."

*Myah Skah is "White Rock Bluff," supposed to be the bluff at Ottawa.

Further up the Bois Franc district, a stream comes in from the left bank, called Weetahwakatah, or Tall Island, "and about five miles higher up, some ledges of horizontal, fawn-colored limestone, jut out on the right bank, very cherty and somewhat vesicular. Near the surface, it takes a reddish, salmon color, resembling very much some beds I had previously seen on the Wisconsin and upper Mississippi. Within a few yards of these ledges, and north of them, is a stream of clear water, which he named Abert's Run.

Eight or nine miles below Traverse des Sioux, is Myah Skah, or White Rock, where he mentions an escarpment consisting of about forty feet of granular sandstone, surmounted by ten feet of fawn-colored limestone, the same as that at Abert's Run.

About two miles above Traverse des Sioux, he saw the sandstone and limestone again in place. Again, at three miles more, a long bluff, twenty-five feet in hight. Five miles further, the White Earth bluff occurs, where he mentions multitudes of large boulders.

"About twenty-five miles above Makato, some red earth bluffs occur on the left bank, with numerous boulders. From this point, the general appearance of the soil and country begins to vary, and announces a change in the formations, and five miles further, some rocky bluffs come in on the right bank, the lower beds of which are a brick-red color, and of a fine grain. On landing and leaving the bank, I found the country covered with beds of red gritstone, of a very hard quality, inclined about fifteen degrees. These rocks are full of potholes, some of them a foot in diameter and eight inches deep, and are as smooth as metal. The Carboniferous limestone formation seems to terminate here, and to be stopped by a conglomerate resembling in its mineral characters the upper beds of the old Red Sandstone. The river has in old times passed over these rocks, worn the potholes, and made them so glassy smooth."

The first granite met was "about forty miles from the mouth of the Waraju," known as "Little Rock." "Nor was any other kind of rock seen in place during my further progress to the northwest."

He estimated the Coteau to rise four hundred and fifty feet above the level of the general prairie.

In reference to the Coteau, he says: "As there is no rock in place around here, conjectures only ean be formed upon the nature of the subjacent beds."

Also: "To the south, it (the Coteau) comes down to the sources of the Makato, whilst to the north, it terminates for awhile near the sources of the Psee, when a flat country comes in, intersected by the Shyen and Goose rivers. Lac du Diable is in this area, with Turtle river. Here the Coteau rises again toward the north, but is called 'Pembina Hills' by the traders. These extend beyond the Assiniboin river, and die away about Flat Lake, near seventy miles from Lake Winnipeg. East of the Pembina Hills are salt springs."

NICOLLET.

The report of J. N. Nicollet, "intended to illustrate a map of the hydrographical basin of the upper Mississippi," is dated February 16, 1841, though his travels were extended through a number of years. In reference to Le Sueur's mine of copper he makes the following remark: "On the left bank of the Mankato, six miles from its mouth, in a rocky bluff composed of sandstone and limestone, are found cavities in which the famed blue or green earth used by the Sioux as their principal pigment, is obtained. This material is nearly exhausted, and it is not likely that this is the spot where a Mr. Le Sueur (who is mentioned in the narrative of Major Long's second expedition, as also by Mr. Featherstonhaugh) could, in his third voyage during the year 1700, have collected his four thousand pounds of copper earth sent by him to France. I have reason to believe that Le Sueur's location is on the river to which I have affixed his name, and which empties into the Mankato three-quarters of a league above Fort L'Huillier, built by him, and where he spent a winter. This location corresponds precisely with that given by Charlevoix, whilst it is totally inapplicable to the former. Here the blue earth is abundant in the steep and elevated hills at the mouth of this river, which hills form a broken country on the right of the

Mankato. Mr. Fremont and myself have verified this fact—he during his visit to Le Sueur river; and I upon the locality designated by Mr. Featherstonhaugh, where the Ndakotahs formerly assembled in great numbers to collect it, but to which they now seldom resort, as it is comparatively scarce—at least so I was informed by Sleepy Eye, the chief of the Sissitons, who accompanied me during this excursion."

In stating the mineralogical characters of this blue earth, he says: "It is massive, somewhat plastic, emits an argillaceous odor when breathed upon; color, bluish-green; easily scratched with the nail when formed into hardened balls. The acids have no action upon it. It is infusible before the blowpipe, but loses its color and becomes brown. This color is due to the peroxide of iron, which it contains in the proportion of ten per cent. at least. It contains no potash, and but a small proportion of lime. It is a very different mineral from that described by Dr. Thompson under the name of pipe clay."

His "Undine Region" includes the Mankato river and its various fan-like tributaries, with the lakelets drained by them. In reference to this region he says: "The geological formation that characterizes the Undine Region, as well the St. Peter's, as far nearly as the mouth of the Waraju, is the same as that of Fort Snelling, which I shall describe fnrther on. It consists mainly in a thick stratum of friable sandstone as the basis, succeeded by a deposit of limestone which is sometimes magnesian and occasionally contains fossils; the whole covered by what I have called the erratic deposit. The sandstone forms the Little Rapids of the St. Peter, and, reappearing at the Traverse des Sioux, determines other rapids that are observed in a beautiful stream two miles northeast of the trading post in this place. At other intermediate localities the sandstone and limestone both appear; but further on the limestone disappears altogether, because it goes thinning out as the western limits of the formation are approached. This may be observed near the Waraju, and toward the upper parts of the Mankato, where the limestone, and indeed the sandstone, are replaced by beds of clay, or of calcareous marl. In the argillaceous deposits last referred to

there are red ochre, other ferruginous minerals, and lignites. Between the sandstone and the limestone there is a bed of whitish clay, enclosing nodules of the blue earth; and sometimes between the strata of limestone bands of argillaceous iron intermixed with siliceous and calcareous incrustations."

Nicollet, in his observations on the sandstone and limestone at Fort Snelling, and the bluffs of the Minnesota and Mankato, has fallen into the same error that Mr. Featherstonhaugh did, in regarding them on the same horizon. He here also confounds the Silurian rocks with those of the Cretaceous.

In reference to the Fort Snelling bluff he says: "Mr. Featherstonhaugh has corrected an error into which Mr. Keating had been led by mistaking the fallen masses of the uppermost stratum of limestone in the bed of the river at St. Peter for underlying rocks in place. These fragmentary rocks were there indeed when Mr. Keating visited the spot, of which I have satisfied myself; but they have since disappeared, and, at all events, were not there in July, 1836."

Mr. Nicollet traveled over and prepared a map of a vast extent of country. His object was geographical rather than geological, and the foregoing notes on the Minnesota valley are rather incidental to his main purpose.

In reference to the Coteau des Prairies, although he crossed it in different directions a number of times, he remarks "that it is composed in a great measure of the materials belonging to what I have named the *erratic deposit*, as is evidenced by the nature of the soil, the physiognomy of the ridges and hillocks that diversify its surface, the deep ravines by which it is flanked, and the innumerable *erratic blocks* strewed over the borders of its lakes."

SHUMARD.

Dr. B. F. Shumard ascended the valley of the Minnesota in June, 1848, as far as the Redwood river, where he was compelled to abandon the journey by a severe attack of the pleurisy. His report, printed in the report of Dr. Owen on the geology of Wisconsin, Iowa and Minnesota, is easily accessible, and need not be summarized here. (See the Second Annual

Report on the Geological and Natural History Survey of Minnesota for notes on this report.)

HALL.

More lately in 1865, Mr. James Hall visited some portions of the valley of the Minnesota, his object being to ascertain the age of the coal that was then being explored on the Waraju river. Subsequently he read an interesting paper "On the geology of some portions of Minnesota from St. Paul to the western part of the State," before the American Association for the Advancement of Science.

The following points are made in this paper:

1st. The Lower Magnesian and the Potsdam are seen in the bluffs of the river to Mankato.

2d. A small portion of the St. Peter sandstone was seen at St. Peter, still preserved above the Lower Magnesian.

3d. The rock at Redstone he regards as Huronian.

4th. At Redwood Falls, and at other places, he mentions "the steatitic or glauconitic" beds resulting from the decomposition of the granite under the Cretaceous.

5th. The limestone and green marls at New Ulm he regards Cretaceous.

6th. The red marls and sandstone underlying he thinks "are not older than the Triassic."

7th. He suggests the former probable continuity of western and eastern Cretaceous areas, with the southern prolongation of the same rocks up the Mississippi.

8th. Suggests the parallelism of the red marls and ferruginous sandstones at Winkelmann's, near New Ulm, with the gypsiferous deposits in the valley of the Des Moines.

9th. He regards the Coteau des Prairies as made by a broad synclinal in the quartzite outcropping at Redstone, and illustrates it by a diagram. It is singular that this theoretical explanation of the Coteau should have been incorporated on the late geological map of the United States by Profs. Hitchcock and Blake, accompanying the last U.S. census report, rather than the positive statements of all other observers who have crossed it, to the effect that no rocky outcrops are to be found. If

the Huronian rocks underlie the Coteau they would certainly appear at the surface at a great many places. Prof. Hind visited this ridge near the 49th parallel; so did Dr. Owen. Mr. Featherstonhaugh has described it. Keating has given us information concerning it. Nicollet's opinions are on record. These all testify that it is made up of drift. Probably the basis rock is Cretaceous, as that formation appears on both sides in the adjoining streams.

Some of the conclusions advanced by these early explorers have proved untenable, in the light of later investigations, and will form the subject of another paper.

GEOLOGICAL AND ARCHEOLOGICAL EVIDENCES OF THE ANTIQUITY OF MAN.

BY A. E. JOHNSON, M. D.

[Delivered before the Academy, January 6th, 1874.]

Gentlemen: Our by-laws make it the duty of the retiring President to address the Academy, when he surrenders the chair to his successor in office. On this occasion, I thought it would be at least interesting, if it does not prove instructive, to engage your attention for the hour, in considering the antiquity of our race, in the light of geological revelations and archeological confirmations.

History and tradition afford no *certain* evidence of man's existence upon the earth, beyond, perhaps, six or seven thousand years, which appears to be a short chronological record, when compared to that reasonably and certainly revealed by geology and archeology.

It is not with man's historical nor traditional records that I have to do at this time, for these are not very ancient. There are men now living upon the earth, who have seen one-sixtieth of this period. These, then, are but the records of a few generations past, compared with the generations that preceded all written history and all traditional accounts of man's existence.

In all inhabited regions of the globe, we pass backward from