

**ANNUAL REPORT OF THE
WISCONSIN
GEOLOGICAL SURVEY
FOR THE YEAR 1877**

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Annual Report of the Wisconsin Geological Survey for the Year 1877 by T. C. Chamberlin

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T. C. CHAMBERLIN

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FOR THE YEAR 1877.

BY T. C. CHAMBERLIN,
CHIEF GEOLOGIST.

MADISON, WIS.:
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1878.

ANNUAL REPORT.

1877.

To His Excellency, WM. E. SMITH,

Governor of Wisconsin:

SIR: I have the honor to submit herewith, in accordance with legal requirement, a brief report of the progress and results of the Wisconsin Geological Survey for the year 1877.

Most Respectfully,

Your obedient servant,

T. C. CHAMBERLIN,

Chief Geologist.

BELLOTT, Dec. 31, 1877.

REPORT.

The evident purpose of the annual reports required by the law under whose authority the survey is being prosecuted, is to lay before the governor, the legislature, and the people, an outline of the progress made by the survey during each year, and a summary of its leading results, without attempting to present in detail the voluminous material accumulated, which, at the best, could only partially be given at so early a date as that designated for the rendition of the report. This view has been sanctioned by the action of successive legislatures, who have deemed it advisable to reserve the publication of details until they could receive careful study and be arranged in a systematic and convenient, as well as economical form, in the final report.

In accordance with this view, the present report will be made as brief as is consistent with the purposes it is designed to subserve, and the energies of the corps devoted to the elaboration of the more complete report.

In my last annual report, an outline of the work then remaining to be done was presented. The plan of work there foreshadowed has been carried into execution during the present year, as will be seen by the following outlines:

WORK ON THE COPPER RANGE IN BAYFIELD AND DOUGLAS COUNTIES.

The field work of the season was begun by Mr. E. T. Sweet, then of Madison, more recently of Colorado, in Bayfield and Douglas counties, on April 10, a date considerably earlier than that on which field work had been begun in previous years. The leading features of this survey are given in the following preliminary report by Mr. Sweet:

PROF. T. C. CHAMBERLIN, *State Geologist:*

DEAR SIR: I have the honor to submit, according to your request, the following brief summary of the principal facts connected with, and observed during, my late geological examination of a portion of Douglas and Bayfield counties.

Starting from Madison on the 6th of April, I arrived at Ashland on the 9th following. Here I engaged the services of a packer, and at once proceeded to Bayfield, where provisions and necessary supplies were obtained for a trip of two weeks to Superior City. A short distance from Bayfield, I entered the unbroken forest and established my first working camp at Siscawet lake, on Sec. 21, T. 50, R. 6 W. From here Siscawet river, and other neighboring small streams were followed to the shore of Lake Superior.

Proceeding westward, Bark, Cranberry, Flag and Iron rivers were followed, either up or down, from near the source to the mouth or near the mouth of each. Red sandstone is found within one or two miles of Lake Superior, in the banks of these streams. Ledges of the same rock also often cross the channels of the streams near the lake, causing falls of from two to ten feet in height. No exposure of any member of the Copper-bearing series was found along these streams nor in the highlands adjacent to them. At the Brulé river in Secs. 23 and 24, T. 48, R. 10 W., the Copper-bearing rocks are largely exposed. A half mile east of the river there are cliffs from 60 to 80 feet high. The rock is quite distinctly bedded, dipping to the southeast at an angle of 35°. Following the "range" east from this point, it drops down from 80 to 100 feet in the course of a mile, to the general level of the country, and is not again found prominent. That the Copper-bearing rocks form the nucleus of the peninsula of Bayfield, there can be little doubt; but the enormous thickness of the drift completely hides them from view. West of the Brulé river, there are numerous ridges or exposures of the Copperiferous rocks, all trending in a nearly N. E. and S. W. direction. As the "Copper Range" of Douglas county, consisting of the lines of exposures of the Copper series, extending in a more or less broken line from Black River Falls, on Sec. 21, T. 47, R. 14 W., to the Brulé river, on Sec. 23, T. 48, R. 10 W., was quite thoroughly examined by myself in the summer of 1873, while connected with the State Geological Survey, I did not deem it necessary to minutely

re-examine it. Some attention, however, was given to the old mining locations.

The Percival mine, on Sec. 22, T. 18, R. 10 W., was worked in the fall of 1873, by Gen. Sargent, with a small force of men.

A couple of shafts were sunk, not over twenty or thirty feet, however, and these with a little surface stripping constitute the extent of the work upon the vein. The "surface show" was exceedingly flattering, good stamp and barrel work being found near the surface. Several large nuggets of copper were encountered in stripping the vein, and in test-pitting. The work, however, was not continued a sufficient length of time to determine with precision even the character of the vein. The country rock is a dark, grayish, fine-grained melaphyre, often very amygdaloidal. The vein is from one to four feet thick, and is probably bedded, as it appears to dip with the formation. Epidote, with a small proportion of calcite, laumontite and native copper, make up the vein matter. I can see no reason why this mine should not prove to be a profitable one.

The Wisconsin mine, locally known as the Edwards mine, is located on Sec. 2, T. 47, R. 13 W. This mine is upon a true fissure. Two perpendicular shafts have been sunk upon the vein, one sixty and the other eighty feet, at an expense of about \$14,000. At the bottom of the shafts the vein has a width of six feet, and carries a small amount of native copper. A large number of fine specimens have been taken out. I am informed by Capt. Edwards that a half ton of copper was taken out in sinking one of the shafts the first fifteen feet. I consider this property as the most desirable mining location yet operated in Douglas county, and it is probably the only one upon a true fissure vein. Very little work has been done upon this mine since 1865.

The Fond du Lac mine is located upon Sec. 8, T. 47, R. 13 W. It has long been abandoned. Two shafts were sunk upon a bedded vein, dipping 30° to the S. E. A small amount of copper was found in the hanging wall. There was never a "good show" at this location, although about \$12,000 were spent here.

The Copper Creek mine was worked by Gen. Sargent in 1864-5. It is located at the junction of the forks of Copper Creek on Sec. 15, T. 47, R. 14 W. Here the most extensive mining operations of Douglas county have been carried on. Four shafts from 30 to 40

feet in depth were sunk in 1846 by the North American Fur Co. Gen. Sargent sunk three shafts, and ran adits and tunnels from them, involving an expense of between \$30,000 and \$40,000. After thorough exploration, the location was abandoned as worthless. Copper to a considerable extent is scattered through the wall rock and vein matter. The veins, of which there were supposed to be several, were found to vary greatly in character at different depths. I am unable to indicate with certainty more than one. That is bedded and dips 55° to the S. E. It is an epidote vein, carrying calcite and quartz.

At Black River Falls, one and a half miles from Copper Creek, exploration to a limited extent has been carried on.

The river here descends in a nearly perpendicular leap of 160 feet. The vertical walls of the gorge for a half mile below the falls are nearly 175 feet high, affording a magnificent opportunity for examining the rock and taking a section, as the sandstones and conglomerate unconformably overlie the Copper-bearing rocks. A gorge existed at this place without doubt, previous to the laying down of the Lake Superior sandstone. It was filled with conglomerate and breccia from the Cupriferous rocks, and red sandstone, which have subsequently been but partially removed from the ancient gorge, in the formation of the present gorge. Detailed sections of the different beds of the Cupriferous series, so far as I am able to make them out, together with others taken on Middle river, Aminicon river, Copper creek and Black river, showing the relationship between the Lake Superior sandstones and Copper-bearing rocks will accompany my detailed report.

Upon arriving in Superior, I thought best to spend a day along the banks of the St. Louis river, and determine, if possible, the relationship between the slates and quartzites so largely exposed on that stream, and the Copper-bearing rocks located to the south and east of them. I find the strike of the slates to be always nearly east and west, and the dip always to the south at an angle varying from 36° on Sec. 11, T. 48, R. 16 W., the most southern exposure, and junction with the Lake Superior sandstones, to 58° on Sec. 5, T. 48, R. 16 W., just north of Thompson.

Although the junction of the slates and Cupriferous rocks was not observed, it is highly probable that the former are Huronian, and underly the Copper-bearing rocks, which are found a few miles

to the south. In the vicinity of Fond du Lac, and also southeast from Superior, evidences of ancient lake terraces are quite plain. I place them at about fifteen feet, eighteen feet, one hundred and twenty feet, and an indistinct terrace between three hundred and four hundred feet above the present level of the lake. From Superior City, I went to Copper creek and Black River Falls, and succeeded in tracing the "Range" to a branch of Black river, two and one-half miles from the falls of Black river. West from that point no exposures could be found. One and a half miles above Black River Falls there is a fall of thirty-one feet over greenstone. Above here for eight or ten miles along Black river there are no outcrops. I have been informed by Mr. Geo. Stuntz, who conducted the government surveys in nearly all of the townships in Douglas and Bayfield counties, that he saw only one exposure in townships 44 and 46, ranges 14 and 15 west. In 45, 15 W., he saw an outcrop of one of the members of the Copper-bearing series, which contained a few small veins, from which he pounded two or three small nuggets of native copper. As he was unable to locate it closer than the township, I thought it absurd to lose any of my limited time in searching for it.

From Copper creek, I followed the range nearly to the Wisconsin mine. Taking a S. E. course, I left the most southern exposure of the Cupriferous series that I found in following up the Aminicon river, in Sec. 15, T. 47, R. 13 W. After ascending the Aminicon river to Sec. 11, T. 46, R. 13 W., I made an excursion to the west six miles, to Aminicon lake, but found nothing worth mentioning except cedar, and tamarac swamps. Continuing in a southward direction, I struck the head waters of Moose river, and followed that stream nearly to the mouth. There is no outcrop of the Cupriferous series along the stream north of township 44. Although in that township they are frequently met with, but were not carefully examined by me on account of high water, and also from the fact that the southern boundary of my district is the south line of township 45. From Moose river, I went to Gordon's, at the mouth of the Eau Claire, for fresh supplies, and proceeded thence across the Barrens a short distance to the east of St. Croix lake, to near the head of Brulé river. After spending a day in canoeing upon the stream, the banks were followed to the mouth of the Nebagamin, and three days spent in searching for exposures along