Journal of the Minnesota Academy of Science

Volume 3 | Number 1 Article 16

1886

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N. H. Winchell

the Gulf of Finland and described it as *Rivularia Flos-aquæ*. He subsequently stated it to be the same as Cohn's plant. Dr. Gobi has also examined the Minnesota plant from specimens forwarded by Dr. Farlow, § and pronounces it to be the same as his *R. Flos-aquæ*. These, together with a single gathering in Sweden, comprise all the stations for the floating form at present known to the writer.

A phenomenon so conspicuous, and to the popular mind so mysterious, is deserving of careful study. Although the plants are probably not poisonous, a knowledge of their habits and mode of development may yet be of considerable value from a sanitary point of view.

June 2, 1885.

[*Paper P.*]

NOTICE OF THE DISCOVERY OF LINGULA AND PARADOXIDES IN THE RED QUARTZITES OF MINNESOTA.—*By N. H. Winchell.*

On the occasion of a late visit to Pipestone, in the southwestern corner of Minnesota, my attention was attracted by the aspect of a number of slabs of catlinite, or pipestone, taken from the quarry which has long been wrought by the Aborigines for the material of their calumets or peace-pipes. These slabs lay in a pile of this material gathered by Mr. C. H. Bennett, and had evidently been exposed to the weather for two or three years. They are nearly covered on one side by the impressions of small shells resembling *Discina* but which, on more careful examination, seem more likely to be a species of *Lingula*. The shell itself is wholly wanting, only the casts remain. On some smaller pieces there remains apparently a trace of the shell in the form of a white incrustation. This incrustation is quite conspicuous by reason of its contrast of color with the blood-red color of the slabs themselves, and it might at first be supposed to be the same, or analogous to the light spots which may often be seen in specimens of the catlinite, producing a kind of spottedness which has given the stone the appellation of "porphyry," by Messrs. Squier and Davis, in

§ Bot. Gaz., VIII, page 224.

their description of pipes made from it. But these white spots are wholly distinct from those. These are formed by the merest, most volatile, thin scale, which in the weather seems to disappear soon. On scraping off a quantity of the stone containing these thin scales, they are found to contain a trace of phosphoric acid, though consisting largely of carbonate of lime. These little shells are about a quarter of an inch in diameter, and one valve sometimes seems to have a beak that projects slightly more than the other, indicating the genus *Lingula* rather than *Discina*. There is on some of the impressions a faint sub-central protuberance which at first I thought indicated *Discina*, but this seems not constant in position nor in form, and is not surrounded by any concentric striation or other structure.

A short time after finding these impressions Mr. A. W. Barber of Yankton, Dak., sent me another supposed fossil found by him at the same place and in the same beds. It has the form of a distorted and folded trilobite, from which the anterior portion, and the testaceous covering of the whole animal is wanting. The trilobed structure is made more evident by supposing the left lateral lobe is turned under the animal and folded upon itself. The ridges and furrows formed by the folded segments of the left lobe are plainly seen on the under side of the animal running transverse to those on the upper side. This seems to be a species of *Paradoxides*, and points to the horizon of the St. Johns' group as the probable equivalent of these red quartzites.

The simple discovery of fossil remains in these red quartzites would not be of sufficient importance to warrant any special notice had not the age of these strata been a subject of some difference of opinion among the geologists of the northwest, and had not the organic nature of these impressions been doubted by some to whom they have been shown.

It is not necessary here to enter into the detailed history of opinion and investigation respecting the age of these rocks. They have been classed as Huronian, as Archæan, and as Potsdam. They are extended over a wide belt in southwestern Minnesota. At New Ulm they are separated by a quartzose pebbly conglomerate from a coarse red granite. At several places in Wisconsin they are associated with red felsite and porphyry, and become gneissic, and in the same manner they have been assigned to different ages. Red quartzites and gneisses, and red felsites and por-

phyries undistinguishable from these, are seen in the *Cupriferous series* of Lake Superior, there associated with dark basic igneous rocks, the nature of which is not disputed.

If these fossils be taken as guides—and they are the only ones that have ever been found in these rocks—the age of the red quartzites of Minnesota seems to be the same as the so-called lower Potsdam, or St. Johns' group, and they at the same time indicate that the Cupriferous series of Lake Superior belongs to the same age.

October 6, 1885.

[*Paper Q.*]

A BRIEF HISTORY OF COPPER MINING IN MINNESOTA.—*C. W. Hall.*

I.

THE CUPRIFEROUS ROCKS. The copper-bearing rocks in Minnesota are those comprised in the so-called Keweenaw formation or group of rocks. There are only one or two localities at present known where attempts at copper mining have been made, which are not referred to that group of rocks, and these attempts will be mentioned further on.

The Keweenawan rocks, frequently called the Cupriferous series, enter the state in its northeastern corner, a little to the west of Grand Portage bay, Lake Superior, and are continuous along the north shore of the lake to and beyond Duluth. Passing away from the lake shore, which by the way forms the southern and southeastern boundary of this northwestern Cupriferous, and we also see the northern and northwestern border passing from Grand Portage in an almost due west course for fifty miles, and then quite likely in a very regular curve to the southwest, closing in on the southeastern boundary just mentioned, to the west of Duluth, doubtless not far from Fond du Lac.*

Another area of the Keweenawan in Minnesota lies along the eastern border of the state, entering it from Wisconsin, and exposed along the Kettle, Snake and St. Croix rivers, and in the vicinity of Taylors Falls southward from these first two named streams.

*This portion of the state, owing to the difficulty of access on account of almost impenetrable forests, has not yet been explored.