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WITH XIV PLATES.

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Besides the testimony of marine fossils, one further observation contributes greatly to our knowledge of the relation of land and sea on the south side of Massachusetts bay while this area was enveloped by the continential glacier. On the shore of a peninsula in Cohasset Little Harbor, fifteen miles southeast of Boston, pot-holes similar to those of water-falls on rivers are found in two localities, reaching from sea level to a height of fifteen feet. The contour of their vicinity precludes the possibility of referring their origin to any stream since the close of the glacial period; and they must doubtless be attributed to the action of a water-fall plunging down hundreds of feet through a *moulin* of the ice sheet.* To Mr. Bouvé, long the president of this Society, belongs the honor of first observing these pot-holes and appreciating their significance. It was under his guidance that my visit to them was made; and it is with his permission that I speak of them here, previous to the detailed description which he will later present before the Society. Such water-wearing of the bed-rock could not take place beneath the sea level, so that they prove that here during a part, probably the later part, of the time when this area was covered by the ice-sheet, the land stood at least as high as now, not being depressed under its vast weight.

Art. XXXIX.—*A Platiniferous Nickel Ore from Canada;* by F. W. Clarke and Charles Catlett.

During the autumn of 1888 we received, through two different channels, samples of nickel ores taken from the mines of the Canadian Copper Co. at Sudbury, Ont. From one source we obtained two masses of sulphides, to be examined for nickel and copper; from the other source came similar sulphides, together with a series of soil and gravel-like material, seven samples in all. In the latter case an examination for platinum was requested, and in five of the samples it was found, the gravel above mentioned yielding 74·85 oz. of metals of the platinum group to the ton of 2000 lbs. At the outset of the investigation we were decidedly incredulous as to the existence of platinum in such ores; but the discovery of sperrylite by Mr. Wells in material from the same mines gave our work a wholesome stimulus, and the assays were carefully carried through.

The sulphide ores submitted to us from Sudbury were all of similar character. They consisted of mixed masses, in which a gray readily tarnishing substance was predominant, with

* Compare Quart. Journ. Geol. Soc., vol. xxx, 1874, pp. 750–771.

some chalcopyrite, possibly some pyrite, and a very little quartz. Two samples were examined in mass; one gave 31·41 per cent of nickel with a little copper, the other gave 35·39 per cent of nickel and 5·20 of copper. The nickel mineral itself proved to be a sulphide of nickel and iron, and as ores of that composition are not common, it was thought desirable to examine the substance further.

As above stated, the nickel mineral is the predominating constituent of the masses submitted for examination. It is steel-gray, massive, and exceedingly alterable in the air, and its specific gravity, determined by pycnometer, is 4·541. An analysis of carefully selected material gave the following results:

Ni	41·96
Fe	15·57
SiO_2	1·02
Cu	·62
S	40·80
	99·97

Neither cobalt nor arsenic could be detected.

The foregoing figures work out sharply into the ratio R : S :: 4 : 5; and approximately into the formula Ni_4FeS_5. If we deduct silica, together with the copper reckoned as admixed chalcopyrite, and recalculate the remainder of the analysis to one hundred per cent we have the following figures:

	As found.	Calc. as Ni_4FeS_5.
Ni	43·18	44·6
Fe	15·47	14·4
S	41·35	41·0
	100·00	100·0

In short, the mineral has the composition Ni_4S_5, with *about* one-fourth of the nickel replaced by iron. The only known species with which this agrees is Laspeyres's polydymite, of which the Sudbury mineral is evidently a ferriferous variety. What relations it may bear toward beyrichite, pyrrhotite, etc., is as yet a matter of considerable uncertainty. Probably in most cases the niccoliferous constituent of pyrrhotite is millerite, but other sulphides, like the polydymite, may perhaps occur also.

The polydymite which was selected for the above analysis came from the mass in which, in average, 35·39 Ni and 5·20 Cu had previously been found. The mass weighed several kilograms, and was remarkably free from quartz. The same mass, with two smaller pieces resembling it, were also examined

for platinum, by the following method: One assay ton of the finely ground ore was treated with nitric acid until all or practically all of the sulphides had been dissolved. The dried residue was then assayed in the usual manner; except that, to facilitate cupellation, a little pure silver was introduced into the lead button. From the final bead the silver was dissolved out by sulphuric acid, leaving the platinum in a finely divided gray powder. The latter dissolved easily in aqua regia, and gave all the reactions needful to identify it thoroughly. The results were as follows, "A" representing the large mass in which the polydymite was determined.

A,	2·55 oz. Pt	to the ton,	or 0·0087	per cent.
B,	1·8	"	·0060	"
C,	7·	"	·024	"

That the metal weighed was nearly all platinum is certain; but it may have contained small amounts of other metals of the same group. The material separated was not sufficient to warrant a search for the rarer associates of platinum. Probably the platinum exists in the ore as sperrylite, although this point was not proved. The amount of platinum in the mass most thoroughly examined would require, to form sperrylite only about 0·007 per cent of arsenic, which is too small a quantity for detection by ordinary analysis. That platinum should exist in appreciable quantities in an ore of such character is something quite extraordinary. Whether it could be profitably extracted is an open question.

Washington, Feb. 2, 1889.

ART. XL.—*Stratigraphic Position of the Olenellus Fauna in North America and Europe;* by CHAS. D. WALCOTT, of the U. S. Geological Survey.*

IN reviewing the history of American opinion on the succession of the Cambrian faunas, we find that the first systematic arrangement of the terranes containing them was made by Sir William Logan, on the basis of the paleontological determinations of Mr. E. Billings. In a table published on page 46 of the report of the Geological Survey of Newfoundland for 1864, the order of succession of the Lower members of the series is:

3. UPPER POTSDAM.
2. LOWER POTSDAM.
1. ST. JOHN'S GROUP.

* Read before the Philosophical Society of Washington, March 16, 1889.