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## **Vermilion Iron Range: eastern portion, no. 2: [specimens] 28281-28467. No. 311 Summer of 1898. July 1 - Sept 13**

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], Summer of 1898. July 1 - Sept 13

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U. S. GEOLOGICAL SURVEY  
FIELD SECTION BOOK

9-891



# LAKE SUPERIOR DIVISION.

## INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen*. Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand pages is also arranged so that, if desirable, a larger or a smaller scale can be used, eight inches, two inches, one inch, or one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section and the dip and strike when observable, the latter always being expressed from the north; for instance 4025, 250 N., 300 W., *Strike, N. 78° E., Dip 50° S.* Then follow with a full description of the ledge. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of  $2 \times 2\frac{1}{2} \times \frac{1}{4}$  inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of  $3 \times 4 \times 1$  inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

# 311



Vermilion

Iron Range

Eastern Portion

Summer of 1898. July 1 - Sept 13

W.S. Bayley

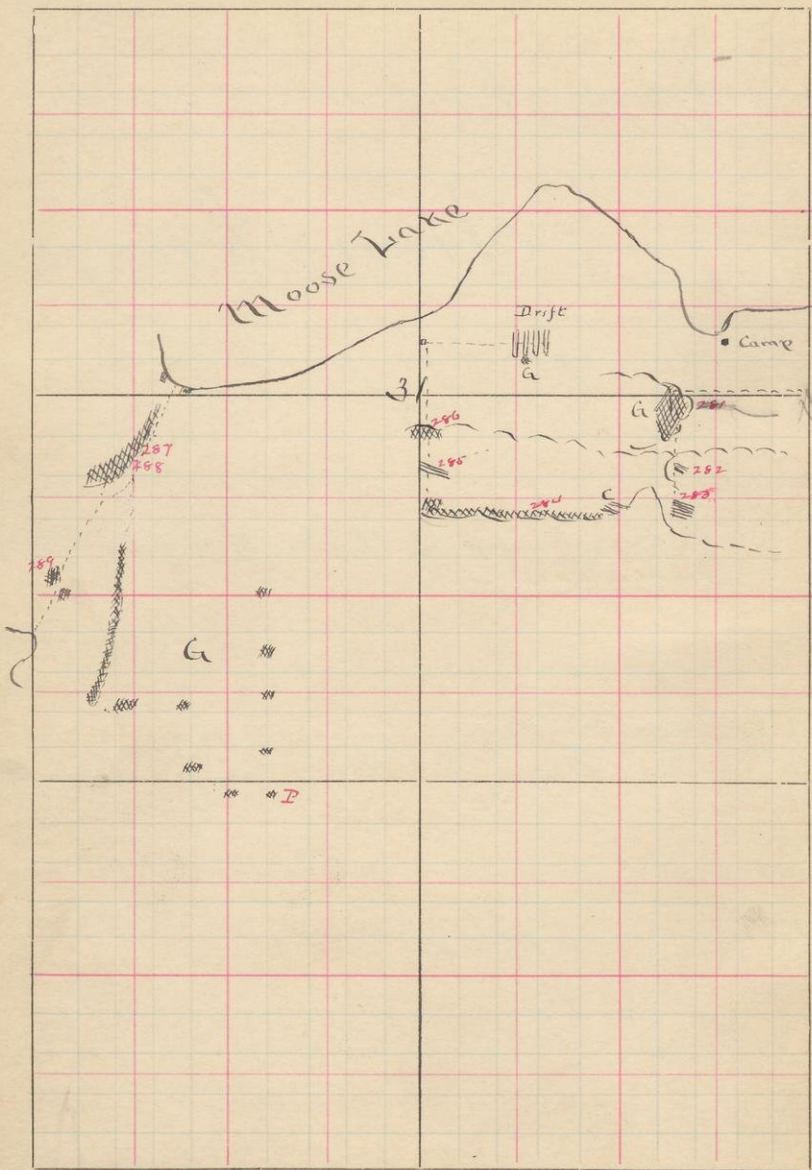
Oscar J. Weller, companion

No 2

S.

T. 64

R. 9





July 26.

Examined in more detail the rocks in Sec 31. T. 64 R. 9.

Near the center of this sec. there has been considerable work done in digging pits and sinking a shaft for iron ore. Though but little of practical value resulted from the work it is evident that a large amount of money was spent in prospecting.

Ran in from lake on E line Sec 31 to  $\frac{1}{2}$  pt, then west 350 paces and South 300, then west, north and east according to dotted line on map. Crossed the hill of conglomerate twice and studied its top.

W.  
28281 At 350 W of  $\frac{1}{2}$  pt is a high, bare knob of greenstone

C  
28282 At 200 S. of this is a small ledge of conglomerate and at 300 S is the top of the conglomerate hill.

W  
28283 Quartzite (?) thin bedded with conglomerate.

The great conglomerate hill runs nearly west from this point. Its south escarpment as noted yesterday is a

H.

28284

dense, black rock that weathers spheroidally. Am inclined to think this an igneous rock. The contact with the conglomerate is not an unconformable one, but the two rocks appear to grade. If this is actually the case the conglomerate may also be an igneous conglomerate. The absence of quartz pebbles in it would point to this decision.

C.

28285

is well defined conglomerate in top of hill at 900 W. 800 N. of Sec 31.

H.

28286

is from northern Escarpment hill in top.

Ran north to little pit at 120 N of Center Sec 31, then East to old camp. Found a series of pits near center of the Sec. but no jaspers in place. The pits are in drift, through which are scattered quite a few jasper boulders. The variation is very high indicating possibly, the presence of a thin vein of jasper in the greenstone. Cores of diam and drills found in the camp show principally greenstone, but one piece is white and red chert.



Jaspered.

Went in on portage trail between Moose and Jasper Lake to see whether or not the Conglomerate crossed it or not. From 100 to 250 paces from Moose Lake found trail bordered on north by large cliff of greenstone or graywack from talus of which took

28287 greenstone, is fine grained dense gray-wacke

28288 Conglomerate a little S.E. of 287. These the talus blocks are plainly conglomeratic, but the Conglomerate looks more like a greenstone Conglomerate than like a sedimentary one.

28289 At 500 from Moose Lake on the north side of trail is another large ledge of greenstone, very much like the dense rock (28284) south of the Conglomerate further East.

Ran over the country S. and S.E. of this finding very greenstone ledges scattered through a terrible windfall.

Could not make the portage trail agree



at all with that marked in topographic  
map. Think the relative positions of  
Moose and Jasper lakes must  
be slightly wrong. The rock, however,  
is all greenstone south of the Conglome-  
rate ridge so that absolute position  
of J. is not of such great impor-  
tance.

July 27

Newfound Lake.

Made a trip around Newfound Lake and into Cap and Duckers lakes, following shore.

Found the rocks continuation of those of Moose Lake as might suppose from strike of the schist. There had some difficulty as in Moose in distinguishing sediments from green-schist.

The map around Cap and Duckers lakes is so bad that cannot locate in it.

The west end of the lake is bordered by greenstone schist.

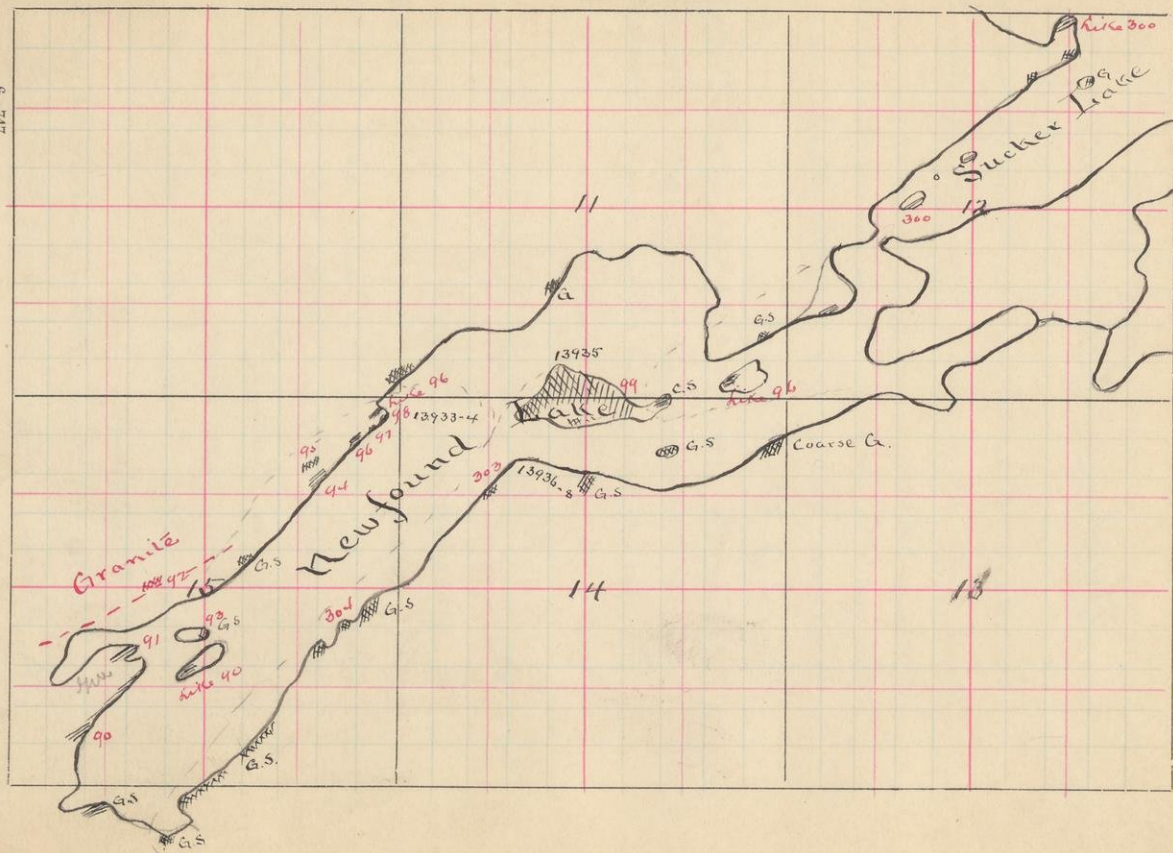
sl  
28290.

The peninsula reaching N.E. from this west shore is composed of a crinoid bedded slaty schist, like the white schist in Moose Lake. It strikes about N.E. and dips vertically. Between the layers of the schist are seams of red acid material.

ms.  
28291

On the north side of this point at its end the green-schist is more normal.





S.

T. 64

R. 9

M.

28292

North of the bay is a hill 175 paces  
North of here. The rock in it is a gray  
gneiss or granite - that is a little  
different from the Basswood granite  
though of approximately the same  
character.

sl

28293

Green schist from East End little  
island.

sl

28294

The shore at about the center of the U.E.  
Dec 15 is greenstone-schist, but back  
of shore about 100 paces is a porphy-  
ritic rock that may be either a green-  
stone or a peripheral phase of the  
granite?

M.

28295

No granite like 28292 could be  
seen from the top of the hill to the  
North.

sl

28296

Just before we reach the Meander  
Corner on the U. side Dec 15 there  
are several low ledges on the shore.  
The westernmost is a crinkled schist  
like the crinkled slates of Moose  
Lake.

sl.

28297

28298

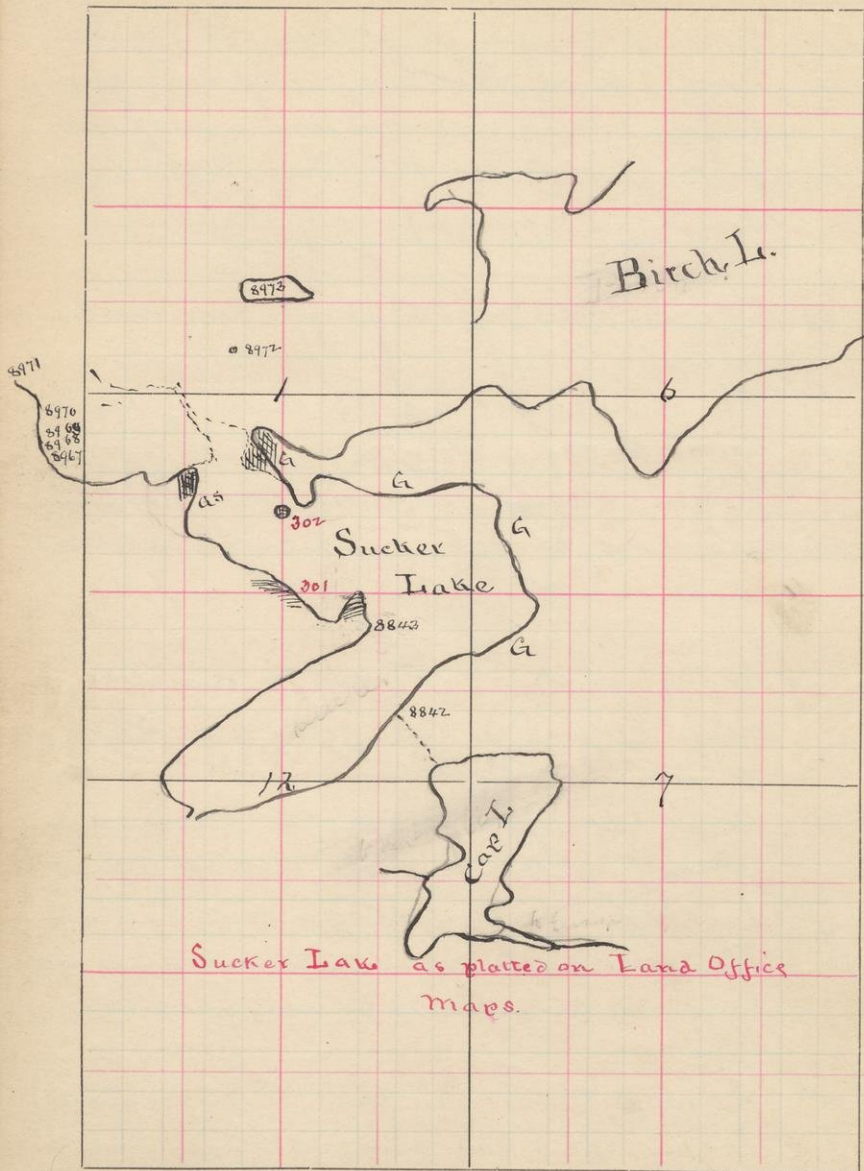
Beyond there are two other small  
ledges that are unquestionably  
greenstone-schists?



S.

T. 64

R. 8-9





91  
28299

The island on which is the O. 1/4 post Sec 11 is much jointed greenstone-schist, on the north and west sides; but at the East end it is the crinkled schist or slate?

The little island East of this is composed of the same schist apparently, but this schist has more the character of a slate than it usually possesses. It is very much like 28296. It appears again on the shore in the direction of its strike.

Continued into Tucker Lake.

On the island immediately west of the inlet is a purplish schistose rock that is very fissile. Its dip is vertical and its strike  $N. 70^{\circ} E.$  It is probably a greenstone, though like other <sup>supposed</sup> greenstones of this general character it may possibly be a fragmental. Along the west shore of this lake as far north as the line between Secs. 1 and 12 find green-schist-and rock like 28300.

51  
28300  
Carbonaceous

91  
28301

Beyond this, on the south side of the N. W. Bay are high cliffs of whole <sup>weathered</sup> weathered.

ering schist not unlike 28300.

Did not locate carefully the rock ledges in this bay, for to do so would have been compelled to make an entirely new map. Since the rocks are all of the same character it was not thought worth while doing so.

9.  
28302 Massive jointed greenstone from island on East side of Narrows.

On return through Newfoundland Lake coasted along south shore finding no greenstone and greenstone schist as indicated.

N.S.?  
28303 from ledge on shore in N.W.  $\frac{1}{4}$  Sec 14.

N.S.?  
28304 " " " " S.E.  $\frac{1}{4}$  Sec 15 represent the schists.

N.B. It should be said that land plants of Duck Lake are so poor that had to give up attempts to locate specimens. All rocks around the lake however are of the same character. All those that looked the least like anything but well defined greenstones were specimens.



Merriam collected quite a large series of specimens on and near Becker Lake - and these are referred to for study. Their numbers are given in maps in black ink. Cannot certainly identify their locations because of inferior character of maps.

July 28.

Rained. Turned to Snowbank.

July 29.

Followed north shore of lake from near East Sec line 26, Eastward.

The rocks are largely hornblende and mica schists - that have apparently been formed from sediments - by the intrusion of granite.

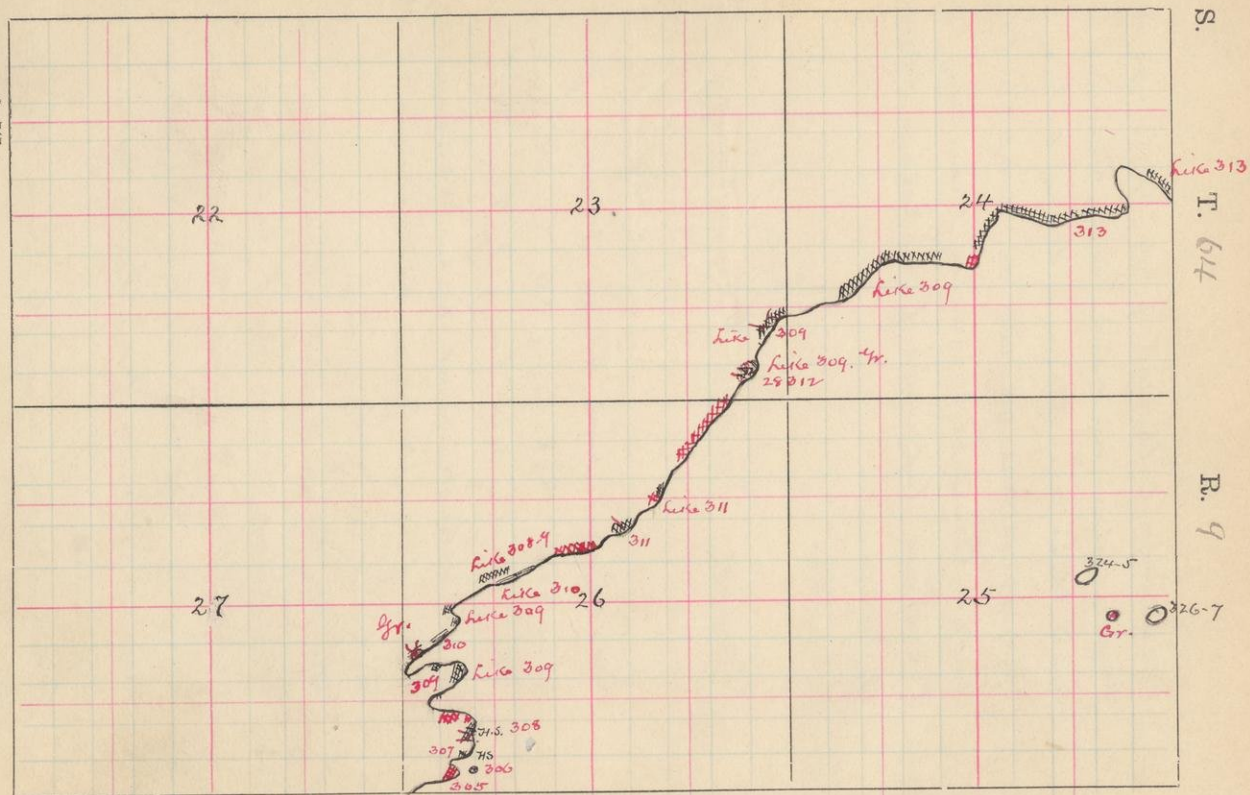
W 5  
28304

On the little point about 400 S. of meander comes in S. line Sec 26

W. 6  
28305

found ledge of platy red granite - that may be Crompton's hornblende granite - dense diabase from little island off this point.

Further north along the shore the rock changes to a dark gray, slightly-foliated





28308 schist cut by red granite dykes and veins. This rock, in weathered surface, is cut into as though by fluvial lines

This rock and granite form ledges that alternate, and in some cases the two rocks appear to have been interfused, resulting in a third form represented by 28309. This also is cut by red granite dykes.

U. Sc  
28309  
met. gw?  
In the north side of the bay, narrow bay in the S.W. 1/4 Sec 26, the rock is banded, with bands running parallel to the shore. The heights beyond this rock are occupied by granite. The banded rock looks like a dense diabase or basalt. It may be a hornfels.

sl  
28310  
adiro  
Beyond this for half a mile are rocks like 28308-309, then on point in center Sec 26 is red granite. This series of rocks extends eastward for several miles. At places the granite looks more like a schist (28311) cut by red granite dykes. It is cut into by a few structure markings and is in appearance of fresh fracture like a hornfels.

M. S.  
28311  
met. gw. & c.

or mica-schist.

Practically the same rocks occur all along the shore as far as the East line Sec 24.

Mr.  
28312

Just west of the E. line Sec 23 it forms high bluffs cut by white granite (28312).

M<sup>9</sup>  
C

28313

Normal schist, about 1/4 mile west of East line Sec 24.

At the meander corner between Secs 19. T. 64 R. 8 and 24 T. 64 R. 9 granite dykes are abundant.

M<sup>5</sup>

28314

The greenstone near this corner is full of phenocrysts of red feldspar.





July 31.

Continued examination of lake shore  
for a mile east of W. end Sec 19. T.

64 R. 8 and went around Black Lake.

On the point north of the island in Sec.  
19 found practically the same rock  
that occurs to the west - viz: a rock  
that appears to be rhyolite fused gran-  
ite and gneiss. It is schistose  
and contains fragments of foreign  
substances so small that could not  
determine their nature.

On the Portage Trail to Black Lake,  
however, the fragments are larger,  
and the rock is plainly a conglomer-  
ate. No 28015 is probably a grit

saturated with granitic substance.  
On the north side of Black Lake are  
ledges of massive quartzite cut by  
small joint cracks. It is quite a  
different rock from anything else  
seen in Lake Superior region.

Quartzite containing pebbles frag-  
ments - further east in Black Lake.  
From point at N.E. end of lake.

HV  
28015

HV  
28016

HV  
28017

HV  
28018



S.

T.

R.

28321 <sup>juv</sup> Probably quartzite from East  
side of bay into which passage  
from Black Lake enters.

The Conglomerate in the postage stamp strike N. to W. as near as could be determined without the sun. It contains large round and angular fragments of jaspers, some of typical green-schist and a number of white weathering ones that have a dark color and a dense texture in fresh fracture surfaces.

<sup>C</sup>  
28319 Conglomerate with jaspers and other fragments.

<sup>C</sup>  
28320 White fragments -  
A few red granite veins cut the conglomerate, but cannot determine whether or not they are true dykes from the intruding granite?

<sup>Aug. 19.</sup>  
28322 The island in Sec 19 is composed of a light, purplish granite? which according to C. F. Meade is an angular granite? while the red granite on the shore is a hornblende variety -  
The little island near the N. W. cor Sec 30 is the usual red granite?

<sup>Mr</sup>  
28323 The little island near the N. W. cor Sec 30 is the usual red granite?  
In the next little island to the S. E. the rock is a dense purplish rock varying to a porphyry containing

<sup>F. P.</sup>  
28324

<sup>F. P.</sup>  
28325



red feldspar phenocrysts?

Mr. The small island W. of S.E. of this one  
28326 is mainly coarse Diabase cut by ve-  
nus of a rock apparently inter-  
mediate between granite and Dia-  
base.

Mr. 28327 is from small ledge of white granite  
on same island.

Aug 1

Ran west on South line Sec 34 for  
300 paces the south E. line of sec  
10 T. 62 R. 9.

For the greater portion of this distance  
were crossing a well defined sedi-  
mentary Conglomerate? It is a gran-  
itic looking rock, schistose and bedded.  
The schistosity and the bedding both  
strike at  $N. 10 W$  in Sec 3, increasing  
to nearly  $N. 85^{\circ} W$  in the center of Sec 10.  
The shore of Sunobank is heavily drift  
covered in the S.E.  $\frac{1}{4}$  Sec 34, but from  
beneath the drift small ledges appear  
on the crest and north side of hills.

At 300 S. of  $N.$  line Sec 3, the conglomerate  
is cut by small dykes of green-schist-  
generally running about perpendicu-  
lar to the bedding of the conglomerate  
and by veins of red granite? That may  
be apophyses of the Sunobank granite?  
The conglomerate weathers with a rough  
surface. Its pebbles are rather oblong.  
They appear to consist of red quartz,  
granite? and Diabase

The matrix is distinctly granitic

28328

Wm. H.

28329

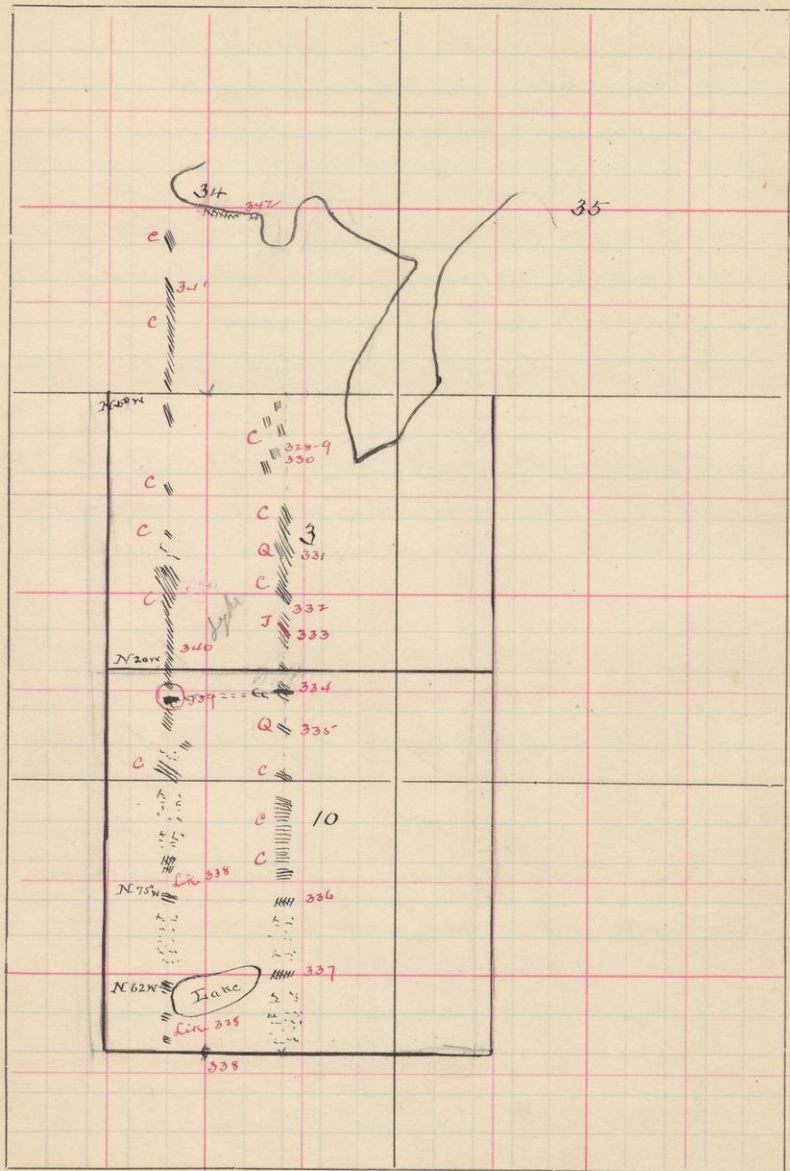
28330



S.

T. 63. 64

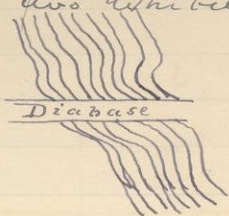
R. 9



at 8000 the Conglomerate strikes  $N. 55^{\circ} W.$  and dips about  $50^{\circ}$  to  $N.$  At this point it

is more properly a coarse quartzite than a conglomerate, though the quartzite grades into conglomerate to the west.

At 10600. The Conglomerate is very schistose, both schistosity and bedding striking  $N. 10^{\circ} W.$ , and dipping vertically. Diabase dykes intersect the sedimentary, the contact of the two exhibiting shearing effects as:



checked  
25333

at 12000 ft. found narrow seam of Jasper in the conglomerate. This varies in width between 1 and 8 in. It runs parallel to the schistosity in the conglomerate and also to what are supposed to be bedding lines. It may well be an infiltration vein.

Quartzites are interbedded with the conglomerates in this portion of the run. They are jointed and crossed by very tiny quartz veins. The rocks are exactly like the quartzites west of Black Lake.



S.

T.

R.

At this point (ledge from which pebbles  
were taken) there is a 15 ft. wide bed of  
greenstone cutting conglomerate. Dyke runs  
E-W.

At 100 S. of U. line Sec 10 the strike of the conglomerate is N. 65° W. and the dip 80° S.

<sup>C</sup>  
28334 Pebbles (grains?) from this conglomerate.

<sup>C</sup>  
28335 At 300 S. the rock is less conglomeratic. Pebbles disappear or become scarce, and a gray rock speckled with white spots, with the same strike and dip of the conglomerate takes its place. Think it quartzite.

The last, i.e. just south of conglomerate ledge is at 1100 South; beyond this is what looks like blue greenstone.

<sup>sl</sup>  
<sup>M. S.</sup>  
28336 1200 S. of U. line Sec 10. is a ledge of dark colored schistose rock that shows some evidence of being spheroidally pitted on weathered surfaces. It may possibly be a gray wacke, though have mapped it greenstone.

<sup>FW</sup>  
28337 At 1600 S. is a ledge of fine grained rock with a very light colored weathering. This too may be fragmentary.

When reached South line Sec. 10 found ourselves 110 paces west of 1/4 post.



gl.  
m. 50  
28338

Run west on south line Sec 10 for 600  
paces and then north, all the way  
over rock represented by 28338

This same rock is found in numerous  
ledges in the west side of the little lake  
in SW  $\frac{1}{4}$  Sec 10. The strike of the banding  
is N. 62 W.

Further north it again occurs with  
strike N. 75 W.

At 900 N. of line Sec 10 conglomerated  
ledges again appear and continue  
with almost no interruption north to  
Snowbank lake.

The traverse does not give as good  
a view of clean surfaces as the East-  
ern traverse, but the exposures are  
sufficiently numerous to show the  
rock to be of the same character through-  
out the run to the lake.

As we pass northward the strike turns  
more and more to the south, from  
about S.E. at 500 S. of N. line of Sec 10  
to 20° E. of N. at north line of section and  
50° E. of N. at north line Sec 3.

gl.  
28339

At 300 S. of N. line Sec 10 is a little bon  
of gneiss

The conglomerate in Sec 3 is, as a rule, finer grained than that with East. Boulders are more rare in it, and the rock approaches the character of anarkose.

F.P.

28340 is a white<sup>o</sup> weathering dyke cutting conglomerate at about 100 yd. S. of Sec. 3.

sl. (?)

28341 Typical rock from 600 ft. of S. of Sec. 34.

F.P.

28342 Porphyry, from little ledge on shore of bay in center Sec 34. It is cut by red granite. This porphyry is different from the white weathering porphyry so commonly met with in the green schist series.

This series of conglomerates and quartzites is the extension eastward of the conglomerates S. of Moose Lake. It may be Ogishke, though it differs from typical Ogishke in containing much fewer jasper globules - a fact that can only be accounted for in the supposition that it was laid down in that por.



tion of the underlying series where Jasper bands were few. It is plain that whatever the age of this conglomerate it forms a fold in the axis of which lies Snowbank Lake.

Aug 2.

### Round Lake.

Examined Round Lake after cutting passage through from Snowbank, and then cut passage into Disappointment Lake.

Round Lake lies almost wholly in Sec 6. T. 63 R. 8.

In  
28343 on its S.W. side are several ledges of red granite represented by 28343

Bob  
28344 At the SE corner of the lake high hills of gabbro may be seen overlooking the shore. At one place they come down to the water's edge, but in the main they are several hundred paces distant. No contact could be observed between the gabbro and the granite, so that relations of one to the other could not be determined.

The hills have smooth upper surfaces in which the gabbro structure can be well seen.

On the little point just south of the Uluksua comes between 6 and 7

st

28346

unimodal

are flat exposures of a crumbly brown rock resembling strongly the "muscovado" form of gabbro. When very schistose it resembles a mica schist (345),

st

28346

unimodal

and when more massive it closely resembles a fine grained gabbro. In places, more particularly on the south side of the point there are schists containing nodules that look very much like pebbles. The appearance is thus for conglomerate <sup>reminiscent of</sup> gabbro.

6

agl

28347

nodules.

The rock on the point near E. 1/4 Post Sec 6, is very much like that last described. It resembles closely a mica schist containing nodules or pebbles. Nodules or pebbles.

c

28348

A little distance from the water's edge the rock is banded in layers 5 or 6 inches and gently curving



new?  
Hyp. g. g. g.

28349 The darker bands are mica grains in  
composition and structure and the  
lighter are mica-granite?

new?  
F.P. 28350

### Portage trail between Round and Disappointment Lakes

On East side of trail, about 75 paces  
from Round lake is a banded rock  
striking generally south and dipping  
vertically. The strike is gently curved  
in places forming steep open folds  
pitching a little W. of south. The rock  
appears like a micaceous quartzite.

sl  
M. G.  
28351

A few paces north on one of a range  
of low hills dividing the two lakes  
the rock is distinctly conglomeratic.  
The strike is N. 30 W. It is cut by  
red granite dykes.

C  
28352

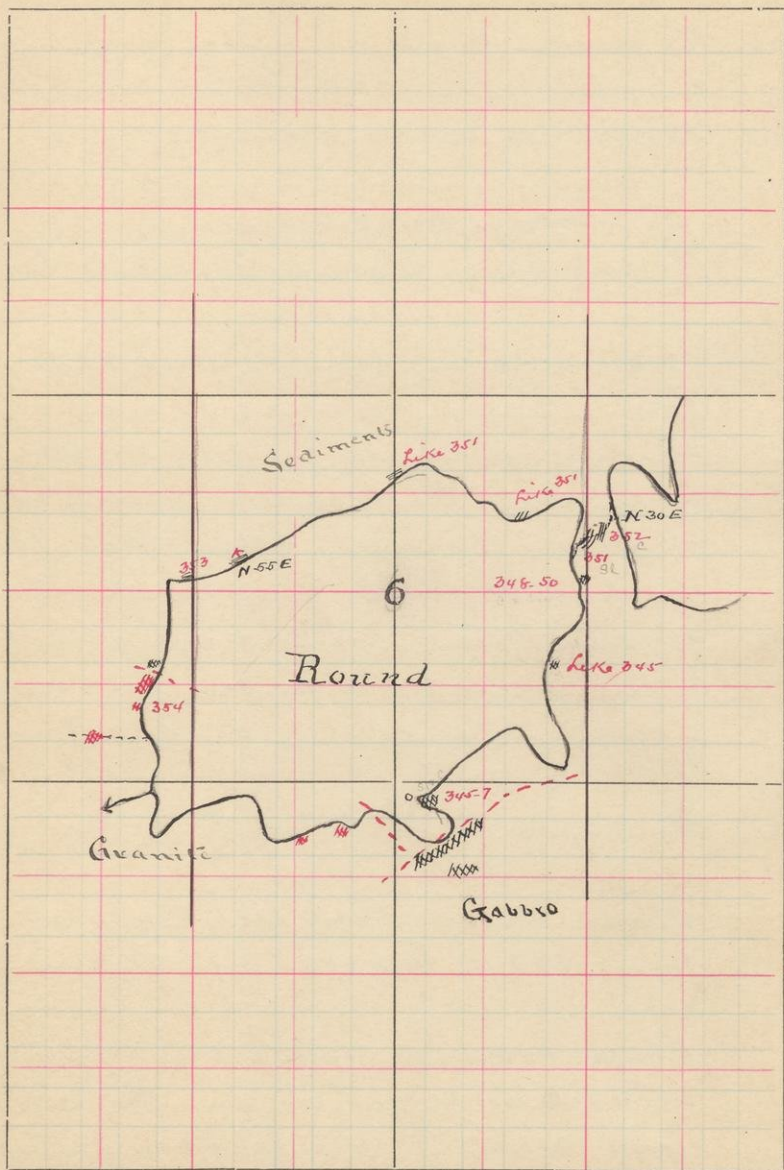
I now think that all the rocks  
from 28345 to 28352 are sedimenta-  
ries.

These sedimentaries continue in  
occasional ledges around the N and  
west sides of lake for some distance.  
Near the North meander corner of

S.

T. 63

R. 8





the line between 1 and 6 the strike  
is N. 55 E. and the dip steep to N.W.

28350 M.S. Quartzite from ledge immediately  
west of this. The under comes.

The north shore of the lake is in many  
places so thickly strewn with large  
boulders of granite that must pre-  
sume that the rock is in place near-  
ly, probably as debris in the sedimenta-  
ries.

28351 M. Red granite in shore in S.E. 1/4 Sec  
1.

The same red granite appears in  
hills in the passage between Round  
and Soap Creek lakes.

Aug 3.

Examined carefully South and East sides of Disappointment Lake while Dr. Clements studied west side.

All along this shore so far as could determine found no sedimentary rocks except at one place, viz. the S.E. corner of the lake, where the gabbro appears.

af

28355

On the East side of the little bay in the extreme S.W. corner of the lake is a small bare exposure of conglomerate. Large and small white weathering boulders in a micaceous matrix. The large pebbles look like quartzite, the smaller ones like some crystalline rock.

c

28356

c  
28357

Gray mica-schist from north end little island. Probably micaceous quartzite or arkose.

On the end of the point directly South of the island are Laminar features of banded quartzite in layers from 1 to 6 in wide. The strike is  $N. 22^{\circ} E$  and dip,  $75^{\circ} S. E.$



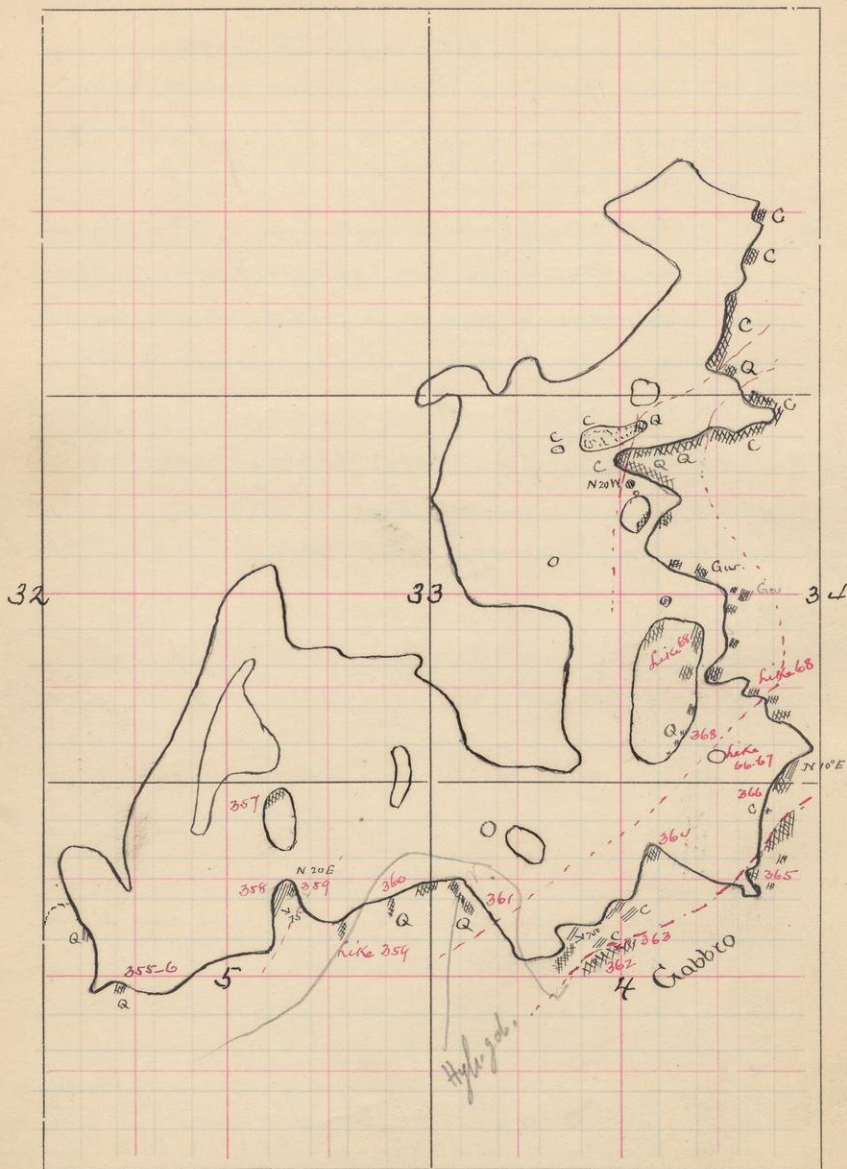
C  
Met. Arkose  
residue

Contact rocks

28358  
" 28359  
unscrubbed

is specimen of coarse band.

Fines grained, dense and more mass-  
ing quartzite from ledge on East side  
of point.the  
28360Between this point and the meander  
corner on line between Secs. 4 and 5  
is small ledge of a rock that looks  
like a micaceous granite. It is  
probably an arkose or reemphered  
granite. It apparently contains em-  
bedded in it a few pebbles and is  
cut by veins of chlorite that resemble  
dykes.Hypothetical  
the  
28361.Noted rock. of same general char-  
acter as 28360. It has an obscure N.E.  
strike.Went south from shore at about  
center Sec 4. Near the shore found  
dense massing rock like 28359, but  
as we pass south this assumes a  
conglomeratic aspect, which increas-  
es in clearness as we proceed south-  
ward.Rob.  
28362At about 200 paces from shore the  
conglomeratic gives place to a fine  
grained diabase or gabbro, which





apparently intrudes the conglomerate and encloses fragments of it. A little further south the normal course gabbro occurs.

Rob  
28363

To the East the gabbro is in a small ridge separated from the conglomerate by a little gap. The gabbro near the conglomerate is the rotted, silicified form (28363).

Near the shore and a little to the East of the point the conglomerate is band-  
ed with little seams of Jasper, just as is the conglomerate South of New Bank.

C  
28364

granitic looking conglomerate from point in N. W. of N.E. 1/4 Sec 4

Rob.?

28365

Hill. Hb.  
gabbro. where

Fine grained gabbro from East side little bay in S.E. of N.E. Sec 4

From this place northward along lake the shore is made up of quartzite, graywacke and quartzite-conglomerate. The various ledges are indicated on the map.

28366

quartzite. Strike N.E.

28367

" " N. 10° E.

In many places the quartzites, arkoses etc. are cut by seams of quartz etc. in such a complicated way as to make the ledges look like ledge of the Basement complex.

28368

Black quartzite - massive. East side large island in O. C. Sec 33.

W.?  
Hb. M. Sch.



Aug 4.

Notre from Snowbank to Ensign  
and return

Ran north on U.S. 1/2 line Dec 19 J.  
60 R. 8 to U. 1/4 post Dec 18 then East  
to U.E. Corner and S. to Black Lake.

The entire run was over conglomerate  
and interbedded slates and quartzites.  
The general strike of the beds  
when it could be determined is N.  
to W.

sl

28369

M. 9

Quartzite striking N. 70° W. About 100  
paces from shore of Snowbank.

The conglomerate near the shore and  
for some little distance inland is  
a granitic looking schist that looks  
extremely like a gneiss. It contains  
here and there an obscure pebble, but  
its general appearance is that of  
a conglomerate. It is quite schistose  
Black quartzite, about 100 paces S of  
U. 1/4 post Dec 19, on south side of a high  
hill.

rw

28370

sl

28371

A few paces further north on the north  
side of the same hill black slates in  
a very thin bed form an escarpment

SW

28372

Small ledge of porphyry in swamp, at  
 1/4 post Dec 19.

SW

28373

150 ft of 1/4 post Dec 18. Grit or fine  
 grained conglomerate? From very large  
 bare hill of this rock

SW

28374

220 ft of 1/4 post Dec 18. Dark, massive  
 gray rock, that thick must be a  
 grit or graywacke.

gl.

28375

At 360 ft of this same 1/4 post the  
 grit contains a few pebbles of a light  
 green rock, i.e. becomes conglomeratic.  
 Beyond this beautifully developed  
 conglomerates occur in great bare hills  
 in the top of which the pebbles can be  
 seen very plainly. These conglomerates  
 are, as a rule less schistose than

those found further back, but they are  
 probably identical in other respects?

SW

28376

650 ft of 1/4 post Dec 18. Coarse horn-  
 blending rock, massive. Probably a  
 horn blending graywacke.

Work of this conglomerates are beau-  
 tifully exposed in bare hills with smooth  
 surfaces.

At 1350 ft of 1/4 post Dec 18 the pebbles



(Hb) NW

are very distinct on weathered surfaces, but no strike nor dip are determinable.

28377

Beyond the conglomerate is a great series of beds of gray grit so massive that neither strike nor dip is recognizable.

At the north line of the Sec. is a series of little cliffs running approximately E and W. On the north

sl

28378

edge of the cliffs we find the rock to be slate of fine grit that is gently curved.

It strikes a little N. of E but could make no accurate observations because exposures were not suitable.

sl

28379

at about 400 E of N.W. post Sec 18 the slate becomes siliceous. Acid seams occur between the layers of the slate much as the infiltrations occur between the layers of the crinoid slate at Moose Lake.

On run S. from N.E. cor 18 crinoid quartzites, grits and conglomerates as before.

Aug 5-

Moved to Ensign Lake and in the way studied the rocks around Boot Lake.

The stream from Snowbank to Boot flows over several ledges, two of which have been specimens of Merriam. The third - at the end of the little lake between Snowbank and Boot is a grit.

G.

28380

On Boot lake at the side of the outlet over which perhaps many passes is a flat ledge of sericite schist, which resembles in cross fracture a fine grained conglomerate. The schistosity strikes  $N. 40^{\circ} E.$

F.P.

28381

The first point on N.W. shore is composed of a dense, light colored gray rock with no definite strike. It is probably a grit.

SL

28382

Further south find a dark cherty rock that looks like a slate without definite slaty cleavage.

C. J. W.

28383

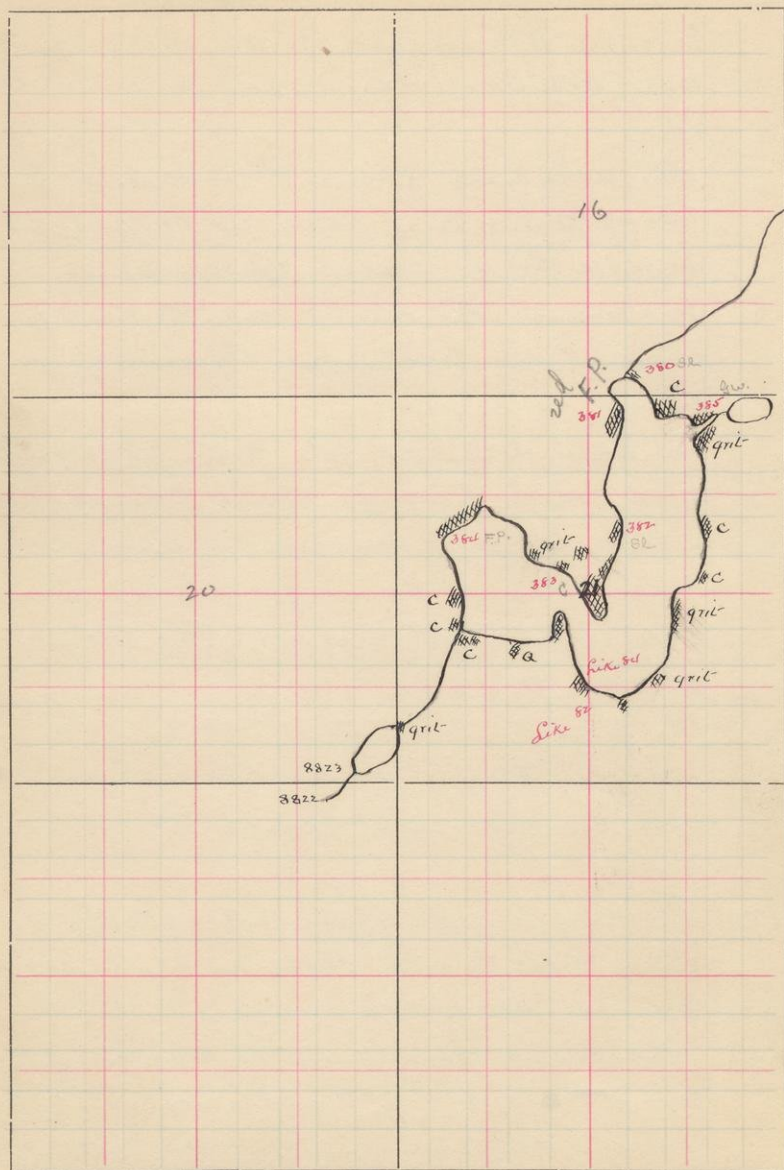
The point forming the neck of the Boot consists of conglomerate, which toward the west passes into grit.



S.

T. 64

R. 8



F.P. On the N.W. shore are continuous ledges  
 28384 which back of the shore line rise in  
 a ridge. From specimens of the  
 rock we see greenstone and the ridge to  
 be a great dyke.

On the South shore find quartzites,  
 conglomerates and grits.

W. 28385 On the N.E. shore, about 400 paces  
 S.E. of passage trail the grit is light  
 gray or white. It contains a few peb-  
 bles, hence is a fine grained conglom-  
 erate.



Aug 6.

Went around South side of Cusque Lake from E sec line Sec 17 and flared and through stream into Cap Lake. Rained in afternoon.

The rocks near East line of Sec 17 were thought blue green-schists? They strike about E-W and dip 75° N. From their relations in distribution to undoubted fragmentals to the South and others to the N. W. it may be that these schists are really fragmental. I cannot decide the question. It looks very much as though we had here the west end of a green schist area, surrounded, or nearly surrounded to the west by sedimentaries.

sl

28386

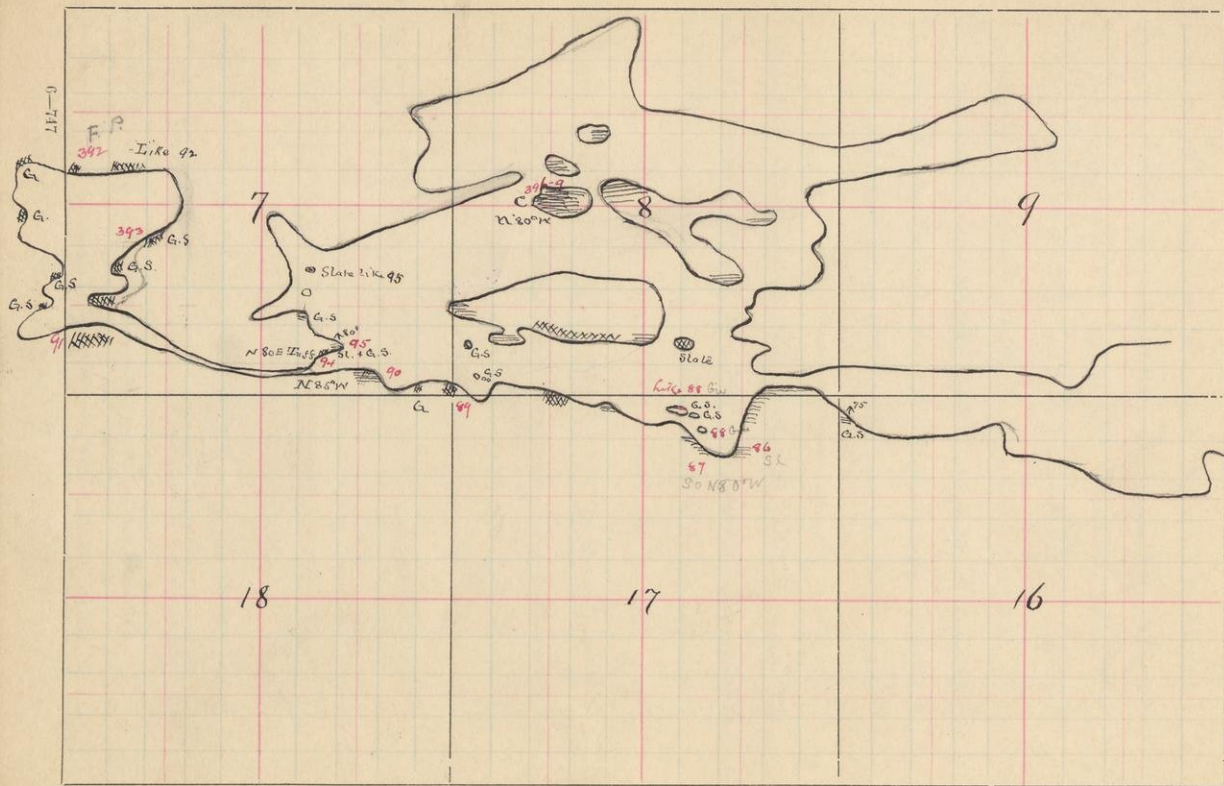
At the bottom of the first bay west of this section line the schists are very platy, sericified and slicky. Between the layers are in fistular bands of acid material. This schist reminds me strongly of the crumpled schists of Moose Lake.

sl

28387

A little further west the schists are more massive and much more like slates. Strike N. 50 W.

P. 8





28388

The little island a short distance N shore is a crystalline gneiss, with very heavy bedding. Strike and dip as before. This may be a flow in the sedimentaries, but think more likely a dyke.

The other little islands near the  $\frac{1}{4}$  line are green schists like 386. They are contorted and twisted, so that the metamorphic bands are often pinched out and broken into parts that resemble closely fragments. The rock in this case looks like a conglomerate. The north shore of the largest island is like 388.

28389

At the meander corner between 17 & 18 the rocks are more sericitic, resembling very much a coarse grit or a fine grained conglomerate.

28390

South shore of lake 700 W. of this meander corner. Strike N.  $85^{\circ}$  W.

28391

On south side Cap lake at meander corner bet. 18 and 13 are high ledges of what is taken blue green-schist. A short distance from shore.

ms. C

28392

Near the North Meander Corner in  
same line the green-schist is mas-  
sing,

sl

28393

and on the East side of same lake it  
is more slaty

### Hard rain

On north side of inlet from Esquimaux  
Lake, on better point the green-schists  
are beautifully banded with an E-W.

7.

sl

28394

strike and a dip of 80° to North. The  
Southern bands look like green tuff,  
but as we pass North the rock becomes  
more and more slaty until at the

sl

28395

Estimate and for the point are what  
appears to be typical slates. Green  
tuffaceous schist occur again with  
fossils, so these bands may be only  
a bed in the former. If so the bed is  
10-15 ft. thick.

Green schist is a green graywacke  
occurs along the north shore as far  
as the Meander Corner between  
bees 7 and 8. The little island East of  
this is a schistose conglomerate with

C. P.

28396



Schistosity striking  $10^{\circ}$  S of W. The matrix is a greenstone tuff or schist. It contains lenticular pebbles up to one foot in diameter of

- C  
 28397 greenstone  
 28398 fine red granite  
 28399 coarse granite

The impression made by this study is that the conglomerate is a member of the green-schist series though it appears like an unquestionable fragment. It is probable however that what have regarded as green-schists are graywackes. In this case the entire series rocks around Esquimaux Lake is younger than the true green schists to the west.

Aug 7.

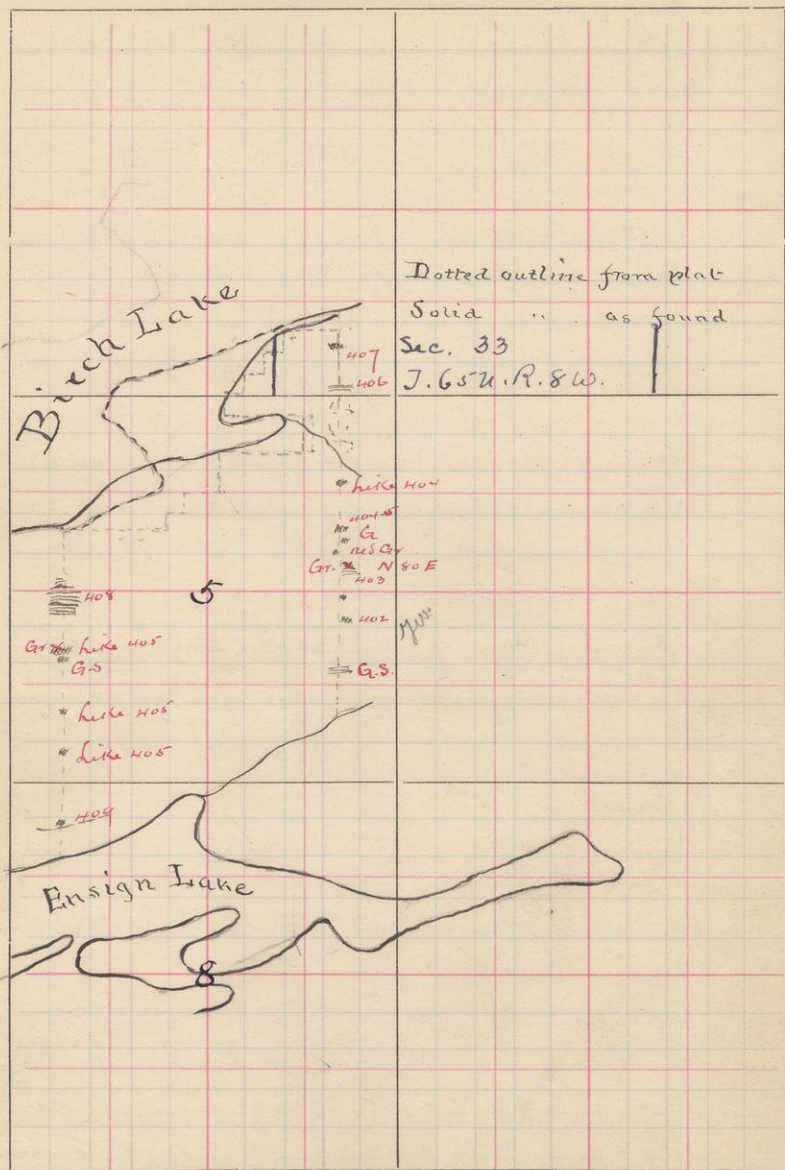
Made rapid trip through Caps, Duckers, and Birch Lakes.

Along South side Birch Lake found any greenstone schists or green rocks that took for schists? These are quite misleading for the greater part, but in places are distinctly schistose.

S.

T. 64

R. 8





28208

Slaty schist from point south of range  
lying between Town 64 and 65.

sl

28400

Aug 8.

Conglomerate from little island north  
of that in which 28396-9 were found.

sl 28401

On the S.E. corner of large island in  
center of Sec 8 is a ledge of a green  
schistose rock that looks like a soap.  
It is schistosity - strikes E-W

Went up stream flowing into N.E.  
cr. of lake in Sec 9 and started N.  
on line about 300 W of E line Sec 5, run-  
ning N to Birch Lake, then west about  
1500 paces and south to Ensign Lake.

: 8:30

At about 575 N. 300 W of E. cr Sec 5  
is what took to be a sericitic green-  
schist on the south side of a hill north  
of swamp. In the light of later expe-  
rience and now inclined the regard  
the rock as a sediment.

h.w.

28402

At 575 N. 300 W of E. cr Sec 5.  
at top of little hill is a more massive  
green schist which in fresh fracture

to

NW

looks like a graywacke.

28403

At 1075 U. is a green-schist whose schistosity strikes  $N. 80^{\circ} E.$  cut by a large, coarse, white weathering granite dyke.

NW

28404

At 1325 U. the rock is micaceous and pyritiferous and is cut by a light colored granite forming face of large, steep

NW

28405

NW

28406

Green schist striking a little  $N$  of  $E$  forms quite a large ledge at 50 U. 1600 W of SE Cor Sec 33. T. 65 N.

NW

28407

N. &amp; W.

Massive graywacke 275 U. 1600 W. Same corner.

NW

28408

Slaty green-schist 1700 W. 1000 U of S.E. Cor Sec 5. T. 64 N. R. 8 W.

SE

28409

Near the shore of Cusigne Lake is a high cliff over looking lake and running parallel to the shore line. This is composed, so far as could determine, of a sedimentary schist.

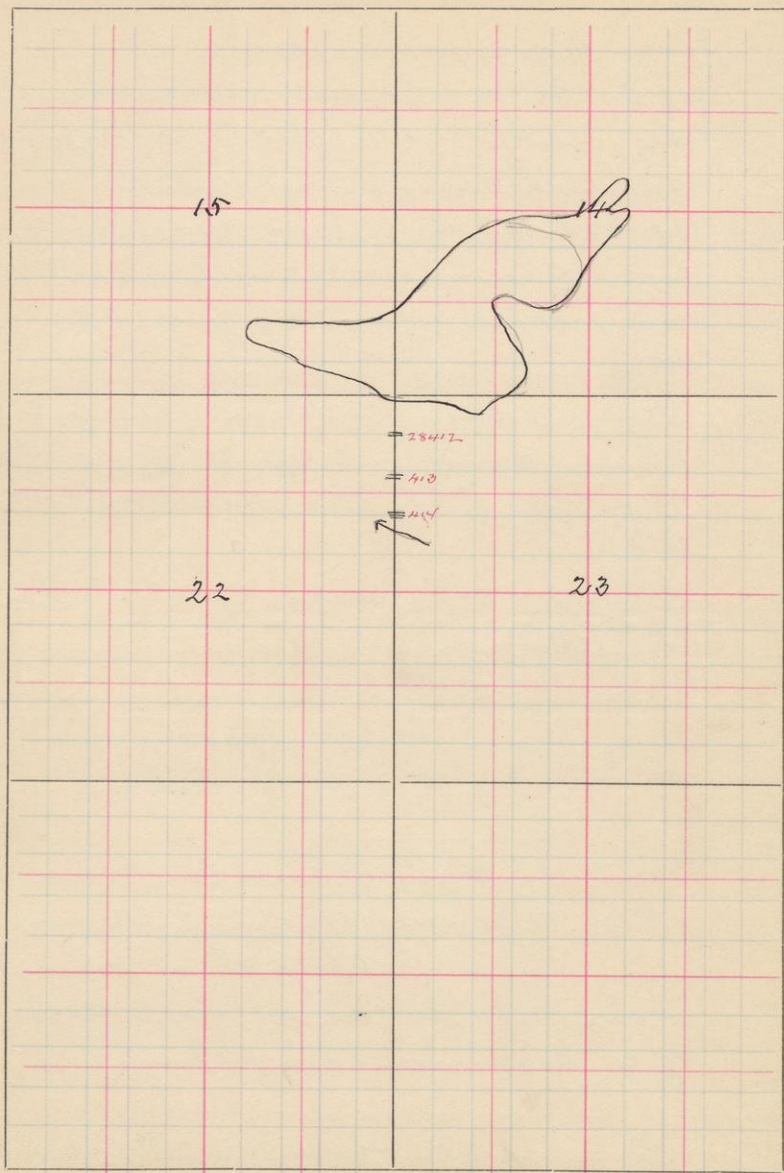
When reached shore took canoe and visited island in lake



S.

T. 64

R. 8



C  
28410

The west End of the island in the center of Sec 8 is conglomerate like that in island west. It strikes  $N. 80^{\circ} E.$  on the South side of the knob in which the conglomerate is we find grit.

56  
28411

On the South side of the same island is another ledge of the grit well exposed

Aug 9.

After a morning rain made a trip South from Little Lake in Secs 14 and 15 T. 64 R. 8

The lake is evidently wrongly located on plat. The S.E. cor of Sec 15 must be very near the lake as find the stream which is the outlet of Ina Lake 600 S. of lake shore. According to plat it is 1550 S. of lake.

The run in a succeeding day also showed the South line of Sec 14 almost touching the South shore of lake.

When reached stream found we could not cross it, so simply ran to the bank.

Took three specimens before turning back.



gl

28412

Green schist in hillock 200 S. of  
lake. This schist is cut out with  
general strike, however E-W.

gl

28413

White weathering sericite = schist  
400 S. of lake

gl

28414

The green schist at 600 South looks  
porphyritic in the weathered sur-  
face.

Aug 11

Went in on trail from O.E. corner  
Ensign Lake to Ina Lake, or a  
Lake in the S. 1/4 Sec 13. The run  
Does not agree at all with the land  
file plat although for much of  
the distance we had section lines  
or corrections in lines. It is very an-  
cient that the plats are wrong.

Grab.

28415

At 325 O.E. on trail is a high wood-  
covered ridge on whose north side at  
base are great boulders of a coarse  
gabbro-like rock in such quantity  
that I think the ridge to be composed  
of pent fit, though could not deter-  
mine the point. It is a dyke  
in the sedimentaries.

sl

28416

At 500 S.E. at little waterfall on E.  
side of trail are ledges of a very fissile  
schistose rock that looks like slate.

see  
Met. log?

28417

At 700 S.E. on trail is small ledge of  
gray grit.

see?

28418

At 100 S.E. of point 4002 of E. 1/4 post Sec 14  
the trail runs up a high hill composed  
almost exclusively of a rock that looks  
like a gray grit, finer grained than 417

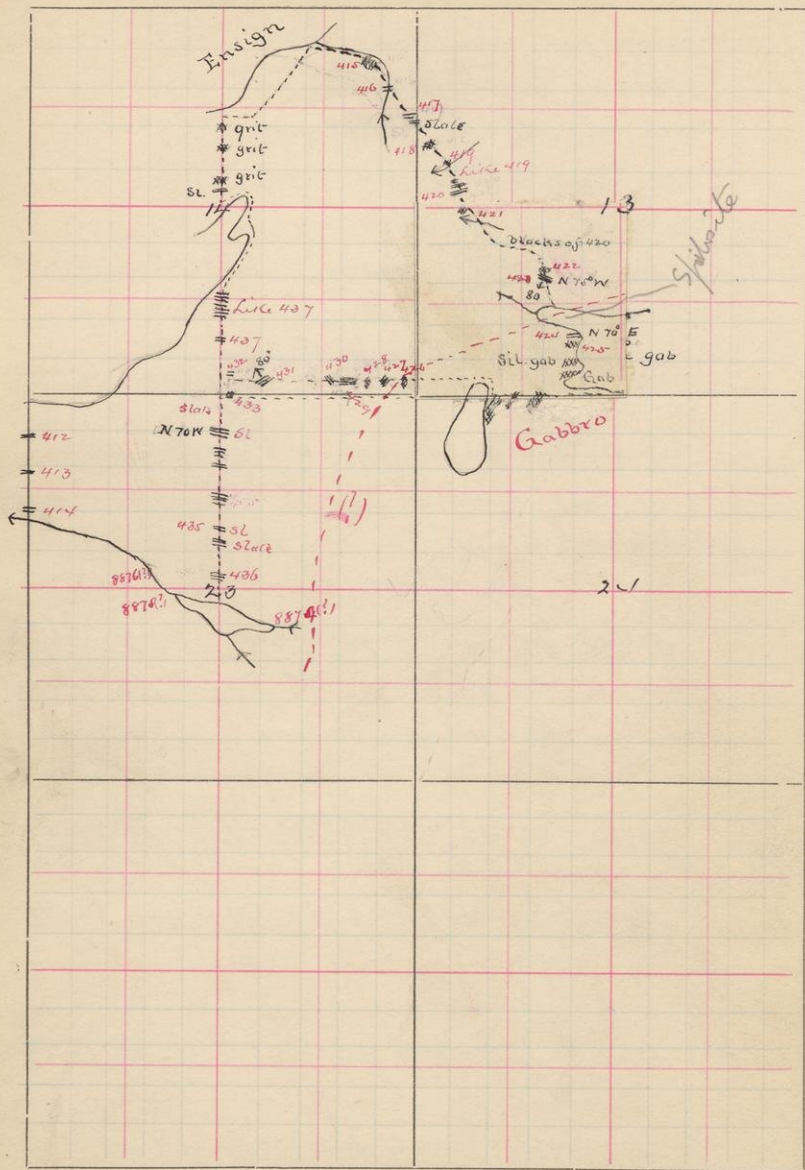
are the  
beds or granitic  
around an outcrop  
approx. in Sec 13?



S.

T. 64

R. 8



see  
28419

No schistosity is about E-W.

A little coarser grained variety of the same rock is at 100 further south in gradual, southern slope of hill.

sl  
28420

At 350 S.E. same point (viz: 400 ft. of 1st part) the rock becomes slaty with a strike of cleavage N. 75° E. dip varying,

see  
not logged  
28421

and at 150 further south is a ledge of dense black quartzite.

see  
28422

500 further S.E. is another ledge of the rock that looks like black quartzite. Here it is very dense and massive.

sl  
28423

A little further south this rock becomes banded with bands striking N. 85° W and dipping 80° S.

Struck shore of lake that suppose to be Ina lake at 1125 S.E. of the point mentioned.

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see 28972  
see 28973  
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see 28993  
see 28994  
see 28995  
see 28996  
see 28997  
see 28998  
see 28999  
see 29000

sl  
28424

At 100 S. 125 E of end of trail, or as we afterwards discovered, at 1200 W. 400 N of S.E. cor sec 13, in point marking out into lake, found a banded rock that strikes N. 70 E. This strike was a



Sedimentary rock metamorphosed?  
gabbro. It contains small veins of  
quartz and pinched-out layers of  
the more silicious beds. On fresh  
fracture the rock is fine grained  
like the quartz gabbro, or muscovado.  
A little further south the Coars, de-  
composed gabbro occurs and beyond  
this coarse gabbro. The coarse gabbro  
extends south as far as west, i.e.  
to S. line Sec 13 getting fresher and  
more typical as proceed. Fine Expos.  
ures are found along the section line  
as far as the East side of the little  
lake at 1600 to just E of Sec 13.

From meander comes a little lake  
now north 100 paces then west to  
2 1/4 past Sec 23. Crossing small bog  
from which took following specimens  
About <sup>140 W and</sup> 100 W of NE cor Sec 23 is a  
banded rock very much like 28424  
It is fine grained and resembles  
the rocks in periphery of gabbro.  
<sup>100 W and</sup> 140 W of NE cor Sec 23. More clearly  
banded phase same rock.  
<sup>100 W and</sup> 240 W of NE cor Sec 23. Dense,

mus?  
28425  
muscovado

1/2 W  
28426  
muscovado

1/2 W  
28427

1/2 W  
28428

low 100 ft and  
gray gait.

28429 300 W. of U.E. cor Sec 23. Slate

low 100 ft and

28430 450 W of U.E. cor Sec 23. Banded  
gneiss or coarse graywacke striking  
N. 80° W. Dip 85° N.

sl 100 ft and

28431 750 W of U.E. cor Sec 23. Slate

Strike N.E. dip N. 80°.

low 75 ft and

28432 940 W of U.E. cor Sec 23. Micaceous  
graywacke.

At this point ran south 75 paces and  
found section line. Followed this  
60 paces west to 1/4 post.

sl

28433 60 E of 1/4 post. Slate. Strike E-W. Dip  
vertical.

From 1/4 post ran south expecting  
to find stream at 600 S. where Uernian  
collected No. 8876 and to the east of this  
point a little lake from which Nos.  
8874 and 8875 were taken.

Did not find stream, but at 1100 S.  
found little lake that looks like the  
one located further north. If this  
is same lake as that which Uernian



Examined, it is plain that this location need revision.

On the way I not crossed over anything but slate<sup>d</sup> striking N. 70 W. or a rock that looks very much like slate<sup>d</sup>.

sl  
28434 Slate 600 S of N 1/4 post Dec 23.

sw  
28435 700 S. of same 1/4 post. This rock resembles very closely a slate<sup>d</sup> but it appears like porphyritic.

sw  
28436 900 S of N 1/4 post Dec 23. Coarse porphyritic or granular schist. This may be a coarse gneiss.

sw  
28437 Returned to 1/4 post and ran west as indicated, crossing gneiss, represented by specimen from 300 N of 1/4 post.

The rocks traversed in this run appear to be sedimentaries, bounded on the south by the gabbro which near its contact with the former rocks takes the form of the coarse micaceous, and the banded fine grained rock that Usselman and others have called micaceous schist. The trip location





of Hermann's specimens can be determined only after topographing map is at hand.

Aug 12.

Moved from Ensign to Knife Lake. in the way visited little lake in Sec 1. T. 64 R. 8 and the larger lake in Sec 6. T. 64 R. 7. The S.W. portion of lake in Sec 6 existing in part. There may be another lake south of this one, but did not visit it.

On the passage into lake in S.E. 1/4 Sec 1 found good exposures of grit in top of high hill. Strike N. 67 E.

Went around this lake carefully examining shores.

sl  
25443 On N.W. shore of lake found series of schistose gray scales striking N. 60 E and dipping vertically.

sl  
25448 On the East shore is a series of the same scales interbedded with coarse grit, all striking N. 70-75 E. The schistosity and bedding are approximately parallel. A little further south, around point from 438 are several beautiful ex-

pieces of conglomerate resembling  
very closely the Kekaobag conglomerate.  
It differs from much of the conglomerate  
west in being less schistose, in contain-  
ing more chert pebbles and an occas-  
ional pebble of a rock that looks like  
slate.

<sup>C</sup>  
28439 Specimen of conglomerate

This conglomerate grades into slates to  
the north and into grits to the south.  
The matrix of the conglomerate is clay-  
rather than quartzite.

<sup>SW</sup>  
28440 Grit from S.W. island.

<sup>C</sup>  
28441 Conglomerate from island to N.E. of 440.

The lake to the east is bordered by slates  
on the north and north-east sides,  
and by slates and recrystallized gran-  
ite, i.e. grit on S. and S.E. sides. A  
few islands in S.W. corner are conglom-  
erates.

The slates strike N. 70° E and dip vertig-  
ally.

<sup>SL</sup>  
28442 Slates

<sup>SL</sup>  
28443 See above

<sup>SW</sup>  
28444 recrystallized granite?



Aug 13.

Coasted along Arm of Thrift Lake in  
Secs. 22, 23, 24, 25, 26 and 27 T.

Following South Shore Eastward and  
North Shore Westward.

At the Meander Corner in the west  
line of Sec 27 is a series of cherty slates  
studied more carefully by Leith. They  
are finely bedded in some cases, when  
the strike is  $N. 65^{\circ} W.$  It is also slaty  
with slaty cleavage striking  $N. 70^{\circ} E.$  The  
dip of both bedding and schistosity is  
 $80^{\circ} S.$

5L  
28445  
Dusty SL

Slate from shore about 200 ft of  $\frac{1}{4}$  line  
Sec 27. This slate is contorted in a very  
complicated manner, being crumpled  
in very fine crinkles and ruffles, with  
a general strike of  $N. 65^{\circ} E.$

On the point at the Meander Corner  
between Secs. 23 and 26. The rocks are  
beautifully exposed. The general strike  
bedding strikes  $N. 60^{\circ} E.$  at the Meander  
corner and  $N. 75^{\circ} E.$  at East side  
point. On the top of the little ridge con-  
stituting the point the rock is contorted  
into many small folds pitching very  
steeply to the S.E.





B. M.

28446

Coarse grit from little island in Dec 23.

On the shore opposite the island the rock is a fine grained black grit or a slate, the two often interbanded.

5L

28447

Specimen gneiss from end of point.

As coast along to the East we see in the distance a high hill that stands apart from the remaining hills as an almost linear ridge high above the surrounding country. Its North and South sides are almost precipitous, the north being washed by the waters of the lake and the South overlooking our hills of slate. The aspect is that of an immense dyke.

Climbed up the hill and examined its bare top very critically. The whole hill consists of Diabase, reddened on top by fires. The rock seems to be a great dyke. It is separated from the slates to South by a topographic break.

B. M.

28448

Diabase from big hill

Around the point East of the hill are excellent exposures of the slates and

B.W.  
28449  
NW 28450

with them grits? striking S.E. and dipping  $45^{\circ}$  S.W. The rocks are evenly banded fine grained grits or slates and coarse grained ones, the beds being from a few <sup>inches</sup> feet to many feet in width. Some of the softer beds are contorted within themselves but there is no contortion or bowing of the beds. The coarser beds are practically fine grained conglomerates.

Continued to range line, then north along west side of island to north shore of the bay.

B.W.?  
28451

On point just north of little bay in island is a rock that looks for a fine grained Diabase. It may be a grit as are all the other rocks in the neighborhood, but Greenman has greenstene worked at about this place.

B.W.  
28452

The little island east of mouth of narrows is composed of coarse Diabase,

N.W.?  
28453

and the north shore of the lake opposite the island is a fine grained gray rock that may also be a Diabase,



but which I think were probably  
a grit

The shore west as far as the west  
end of the Narrows is bordered by  
a greenstone, which in places ap-  
pears varicolored. Where burned it  
is colored red and looks like gran-  
ite?

Sp. 5/1  
28454 } are specimens of this rock from  
Sp. 28455 } near water line.

Sp.  
28456

At the meander corner between Secs  
23 and 24 is a small knob of a fine  
grained Diabase or grit. It is massive  
and is separated from Great Bear  
of greenstone to the north of it by a  
little depression.

Climbed the cliffs back in the interior  
and found them composed of coarse  
Diabase on the slopes. On top the  
rock seems in some places to be  
filled with fragments of chert. In  
other places it is spheroidal with  
the spaces between the spheroids  
occupied by silicious material.  
This observation would indicate

Sp.  
28457

that the greenstone is a flow, as w<sup>th</sup> the g<sup>rits</sup>; but no evidence could be detected that this was the case except the spheroidal weathering noted above. All the indications point to the greenstone being a huge dyke.

see  
28458

West of the passage trail into a more northerly arm of the lake the g<sup>rits</sup> are again found near the water's edge, with greenstone on the heights back of them.

G. S.  
28459

All the rest of the rock to the end of the point is, as indicated in the map, either slate or greenstone. Except the ledge East of Meander Corner between Sec 22 and 23. At this place the rock is practically a mass of rounded and angular fragments like specimen cemented together by weathering of practically the same composition. This I take to be an agglomerate.

c  
28460

This proves to  
be older than  
sed. & not  
intrusive.

The line forming the long arm between the two bays is composed of uniform greenstone.



Aug 14

Sunday. Rested in morning. In afternoon Examined bluff of Diabase determining whether or not it is flow. Concluded it to be dyke.

Aug 15.

Drew Knife Lake went south through Pickle Lake into Kakakabig, Examining carefully the three lakes en route.

All the rocks seen belong with the Knife Lake series.

Around the lake in Sec 27 the Exposures are not as good as they are on the lakes to the south. We find slates and graywackes that are so massive that strike and dip could be obtained in one ledge only. Here we find the strike to be  $N. 45^{\circ} E$  and the dip very high to the south.

The island opposite end of Portage on Pickle Lake is rocky on all sides. The rock at the west end is more like green-schist than like the gneiss or graywackes. It is slightly schistose, is gashed with cross fractures and

H. 2  
25461

contains here and there little nests  
of quartz.

28462

The next island East is also composed of a massing green rock but it looks more like a graywacke than does

28461

Along the East end of North Shore of Lake are high bluffs of massing graywacke a little more quartzose than 28462. Climbed bluff to get strike and dip but rock so massing that could not see either. The cliffs are beautifully jointed. They are cut by a series of joint cracks striking N. 75° W. and at right angles with direction. Weathering is directed by the joints so that cliffs are usually perpendicular.

28463

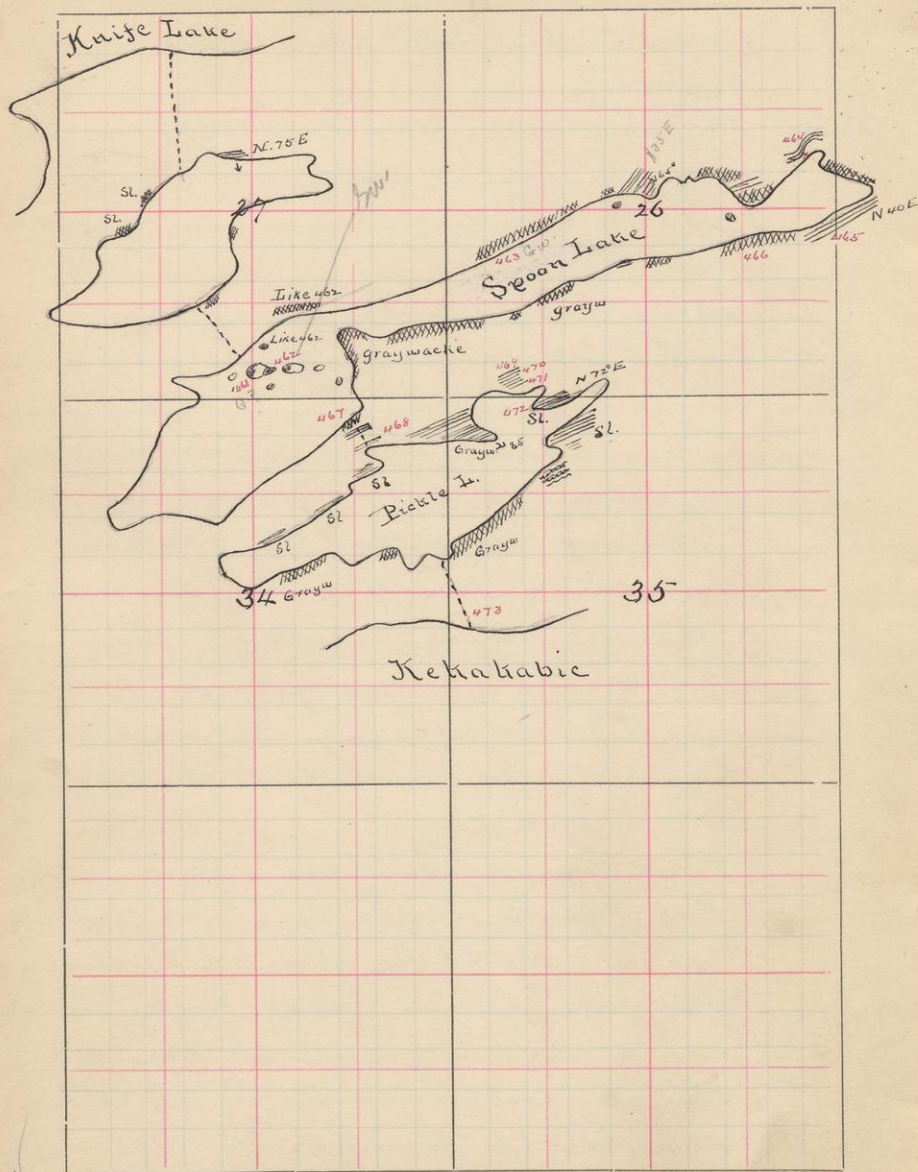
The same rocks extend eastward to end of lake, occurring here and there at the shore line and forming hills back of it. In these hills places are occasionally found where the rock is less massing than elsewhere. Here the strike is N. 35° E. and the dip 65 S.E. Graywackes are inter-



S.

T. 65

R. 7



banded with thin beds of slate and are cut by quartz veins near which shearing has occurred.

Further East the general strike is  $N. 60^{\circ} E.$ , but in the extreme N.E. corner of lake we find the strike passing from  $N. 60^{\circ} E.$  to  $N. 20^{\circ} E.$  and to  $N. 40^{\circ} E.$  indicating gentle folding.

S. di  
28466

From small ledges at East End of ridge. The East End of the lake is surrounded by massive graywacke but on the S.E. side are plainly bedded slates and purple chert-like bands. The strike of these is  $N. 40^{\circ} E.$  and dips  $60^{\circ}$  to  $S.E.$

sl + l.c  
28465

The country is very rough and so covered with windfall that could not trace the cherts S.W.

S. di  
dol.  
28466

The shore to the S.W. of these beds is occupied by a massive rock that was thought to be diabase.

F.P.  
28467

The rest of the South Shore is made of grit or graywacke, except that on the west side of the trail into 3<sup>rd</sup> lake there are ledges of a slightly schistose green rock containing porphyritic red phenocrysts. This may be a volcanic.



is diff., like that. much of Kekakabig.

