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Vermilion Lake County, Minnesota: [specimens] 10185-10190, 9734-9799, 8565-8709. No. 45 1885-07/1885-08

Irving, Roland Duer, 1847-1888

[s.l.]: [s.n.], 1885-07/1885-08

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 45.

July and August, 1885.

Vermillion Lake Country, Minnesota

R. D. Irving

10185-10190, 9734-9799, 8565-8709

Survey of the Pre-Cambrian Rocks of the N. W. States.

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 figure attached, showing the amount and inclination of the dip. Denote slaty or other very plainly bedded rocks by lines running in the direction of the strike, with figures and a dip arrow attached as before. In all cases where there is the least doubt about the true bedding directions, 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 line as 100 paces, and twenty of these spaces as 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.

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, for instance: 4025 | 250 N., 300 W., *Strike, N. 6° E., Dip, 50° E.* Then follow with as full a description of the ledge as possible.

3. The ruling of the left hand page is also arranged so that a smaller scale can be used. Each one of the black lines may represent a section line and the red lines quarter sections and "forties." The scale of the maps may thus be reduced, if desirable, to two inches to the mile (the ordinary town plat scale.)

4. Collect a specimen from each separate ledge of rock, or wherever there is a change of rock on any one ledge. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be sampled, the position and extent of the ledge being marked on the map, with a note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples, 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 $\frac{1}{2}$ 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. In all cases collect chips for slicing. All specimens are to have numbers painted on them, in white on a black background, in the field.

5. 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., etc.

6. Forward this note book, as soon as filled, as registered mail matter, to R. D. IRVING, U. S. Geologist, Madison, Wis.

Magnetic Dec. in the U. S.
Appendix No 13 Report for 1882.
U. S. Coast and Geod. Surv.

✓ peonies - others not
 Feb. 11 of 1886

9734	9780	8590 ✓	8630	8670	8710
5	1	1	1	1	11
6	2	2 ✓	2	2	12
7	3	3	3	3	13
8	4	4	4	4	14
9	5	5	5	5	15
9740	6	6 ✓	6 ✓	6	16
1	7	7 ✓	7	7	17
2	8	8	8	8	18
3	9	9	9 ✓	9	19
4	9790	8599	8640	8680	8720
5	1	1	1	1	21
6	2	2	2	2	22
7	3	3	3	3	23
8	4	4 ✓	4	4	24
9	5	5	5 ✓	5	25
9750	6	6	6	6	26
1	7	7 ✓	7	7	27
2	8	8	8	8	28
3	9	9	9	9	29
4	9799	8565 ✓	8650	8690	8730
5	1	1	1	1	1
6	2	2	2	2	2
7	3	3	3	3	3
8	4	4 ✓	4	4	4
9	5	5	5	5	5
9760	6	6 ✓	6	6	6
1	7	7 ✓	7	7	7
2	8	8	8	8	8
3	9	9 ✓	9	9	9
4	8570	8610	8650	8690	7
5	1	1	1	1	8
6	2	2	2	2	9
7	3	3	3	3	8740
8	4	4 ✓	4	4	1
9	5	5 ✓	5	5	2
9770	6	6 ✓	6	6	3
1	7	7 ✓	7	7	4
2	8	8 ✓	8	8	5
3	9	9 ✓	9	9	6
4	8579 ✓	8620 ✓	8660	8700	7
5	1	1	1	1	8
6	2 ✓	2	2	2	9
7	3 ✓	3	3	3	8750
8	4 ✓	4	4	4	1
9	5 ✓	5	5	5	2
9780	6 ✓	6	6	6	3
1	7 ✓	7	7	7	4
2	8 ✓	8	8	8	5
3	9 ✓	9	9	9	

✓ 8756
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✓ 8760
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✓ 8800
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8850
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✓ 8851
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8860
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8999

Vermillion Lake Region
Minnesota

July - August 1885
R. D. Irving.

9734 - 9799

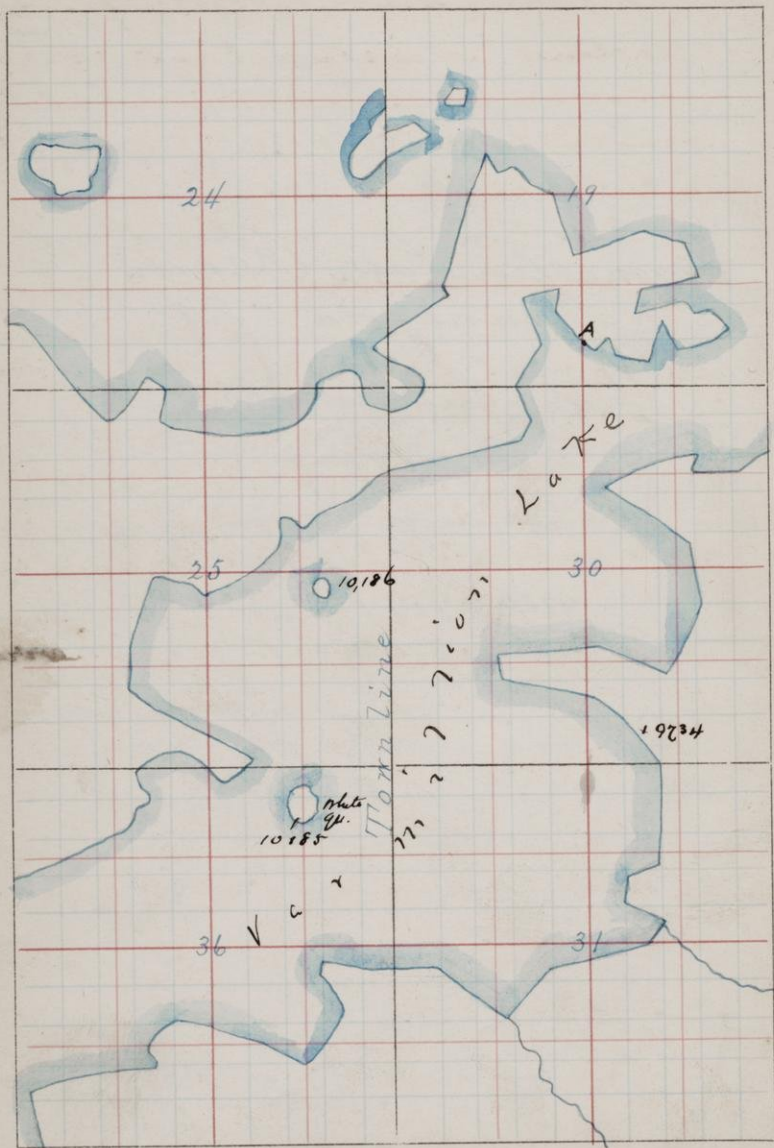
8564 - 8709

names write under spec. nos. as determined by
study of thin section - except when word "lites"
is used - when macrosc. only.

2 Vermillion Lake

T. 62

R. 16-15



July 28 1885

3

10,187

at A. white quartzite with pebbles
flattened - also slate bands irregu-
lar - abruptly terminating, but trend-
ing on the whole E-W. Dip high N.
See Merriam's notes also.

10,188

10,189

10,190

Note how immensely these
rocks are squeezed

9734

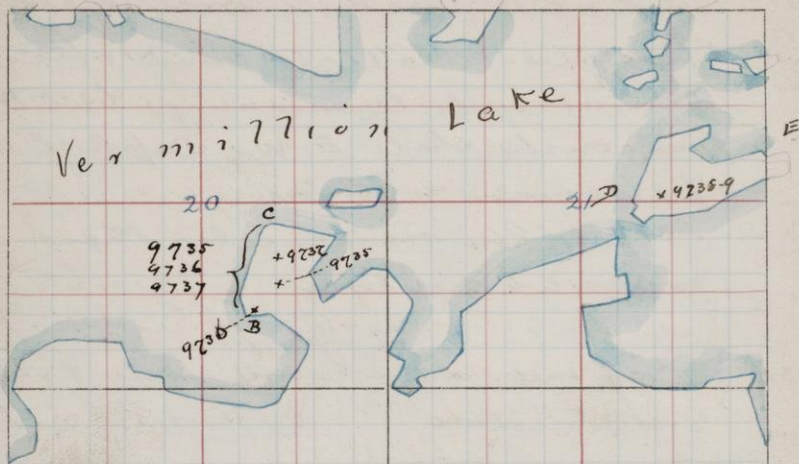
See opp. map. Dark colored slaty rock
E-W structure

10,185

white quartzite - see Merriam's notes

10,186

Speckled grey quartzite - see Merriam



fractured apart; and again in entirely detached fragments in the corner rock. Are these the result of the brecciation? or genuine pebbles? I think undoubtedly the former. Here, towards the end of the point are no less than three belts of the banded slaty iron y rocks. These masses are lens-shaped. At least we think the lens shaped terminus gone. They are irregular in the extreme; often complicatedly brecciated.

9735 - slate from this point, from a place where the bedding was horizontal. shows cleavage and bedding lenses

9736 Brecciated ^{slate and quartzite} ~~cherty beds ferruginous~~ from here

9737 Banded cherty ferruginous material from here

Note that slate and quartzite are here inter-banded just as in the Animikie series - the only difference being the folding, cleavage, brecciation. Merriam has further specimens from here

July 29/885

5

9235
9236
9237

Point B C, Sec. 20. Landing at B we found slates and quartzites strangely jumbled, and brecciated; probably all the result of squeezing. Coarser layers alternate with thin slaty ones, and slaty cleavage is beautifully shown. Indeed the whole series of this part of the lake owes its E-W structure or $E 10^{\circ} S$ to $S 10^{\circ} N$ structure to slaty cleavage. The bedding, as shown by beautifully marked laminations, is now with the cleavage, or vertical, and again slightly to the N or S of the cleavage, and again horizontal. So we have even in the short distance along the point B C of opp. map, several folds, very closely appressed. Even on a horizontal, or approximately horizontal surface, there is often an appearance like this:-

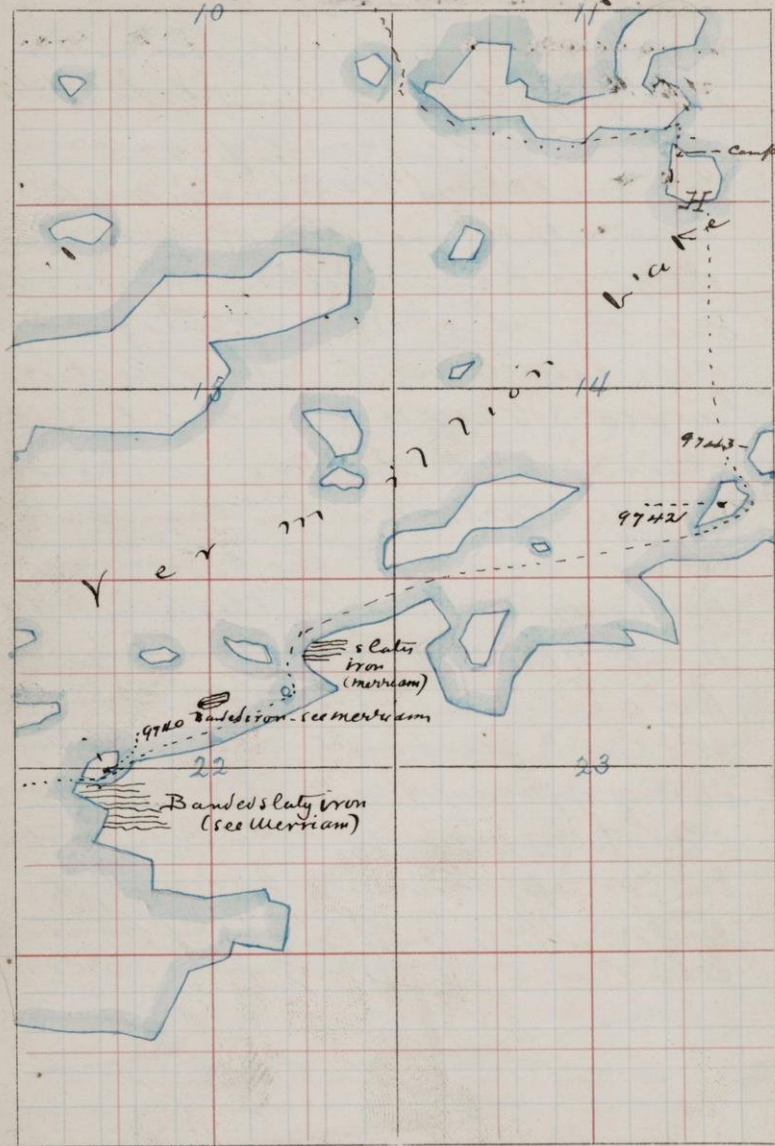


The lines show slates in sharp bends in the coarser rock, and again slaty layers

6 Vermillion Lake

T. 62

R. 15



Camp July 29
1885

slaty
iron
(Merriam)

97420 Banded iron - cemented

Banded slaty iron
(see Merriam)

97421

97423

Ver

10

11

13

14

22

23

9738 Pebbles and boulders from the coarse conglomerate of island DE map on p. 4. Are they quartz porphyry?

9739 Pieces broken from the cherty iron masses of the great conglomerate of the island DE. Note that they are largely silicified black clate

9740 Supposed massive rock from small island - see map p. 6 - Is it a quartz porphyry? and the source of the pebbles 9738?

9741 The conglomerate of the island DE (map p. 4 - Same as 9738 - Chewing matrix.

9742 See map p. 6 - Is it a massive quartzite?

9743 (Treat as a local doubtful) see map p. 6 - Full of interlacing white quartz veins, several inches wide, orange when.

T.

R.

See map p. 6.

Vermillion Lake

9

9744

Island H. map p. 6 - shows a highly schistose and brecciated slate rock. Dip of apparent sedimentary bands E 30°! But the rock is jumbled badly.

9745

Breccia from this island.

Is it possible that the apparent slate fragments indicate an unconformity with a lower green schist series? Or are they simply the result of queering and brecciation in this slate itself?

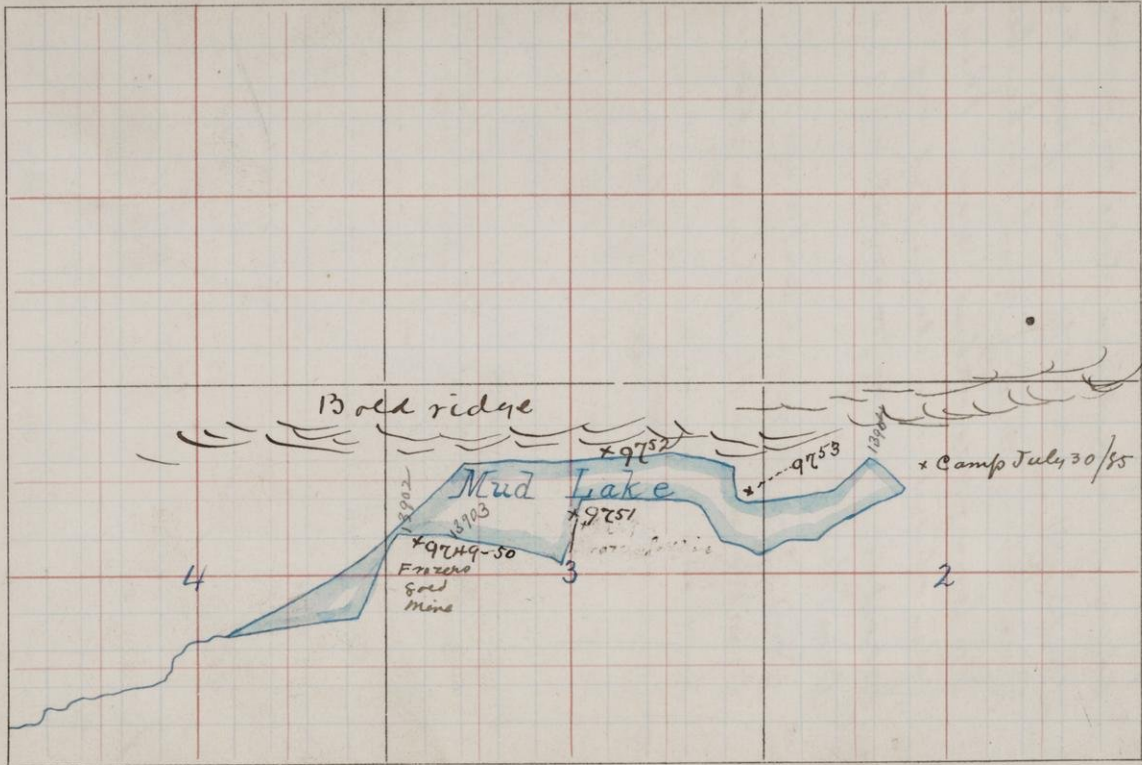


July 30 / 85

11

- 9746 Specimens from along the north shore of Vermillion Lake in sections 11, 10 & 4, 62 15W. and from E end Pine Island in Sec. 4. Do they belong to a lower "green-schist" series. They are often whitish, non-slaty, but highly schistose. Are the fragments in 9745 from these slates?
- 9747 Some large fragments contained in 9745 from the island H. They are squeezed look into this.
- 9748 Rock of island K. seems to be an acid rock. Has it furnished the pebbles 9747

See Merriam's notes and specimens for further information



Mud Lake

13

9749 South side Mud Lake SW. No. 3
62 14. A crystalline rock. Fraser
"gold mine". Is it a quartz-propylite?
The source of pebbles in the conglomerates
of Millin Lake etc?

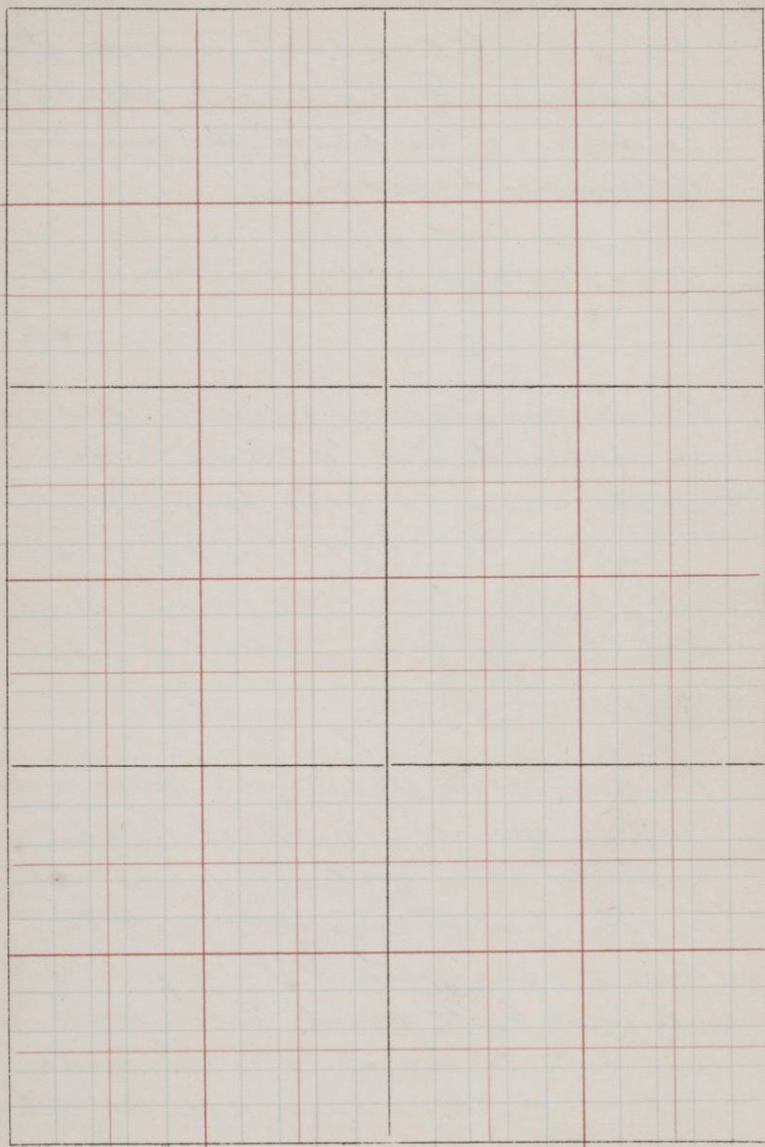
9750 Same place as 9749 and more represen-
tative
Q. propylite

9751 Forms rounded and jointed masses
on the south side of Mud Lake -
on the west side of the Horns point
on the south side of the Lake. N. side SW. 1/4
N.E. 1/4 3, 62, 14. Is it fragmental?
or cherty? or grey-cracked. Dark grey
very dense, chert like.

9752 On north side Mud Lake rises a bold
ridge of rock, 100 feet high, a
continuation of that north of
Millin Lake? and of Pine Island.
Where we sampled it it is a jointed to
schistose rock much decomposed - that
with calcite seams. The specimen
is from the lake then No. N.E. 3 62

T.

R.

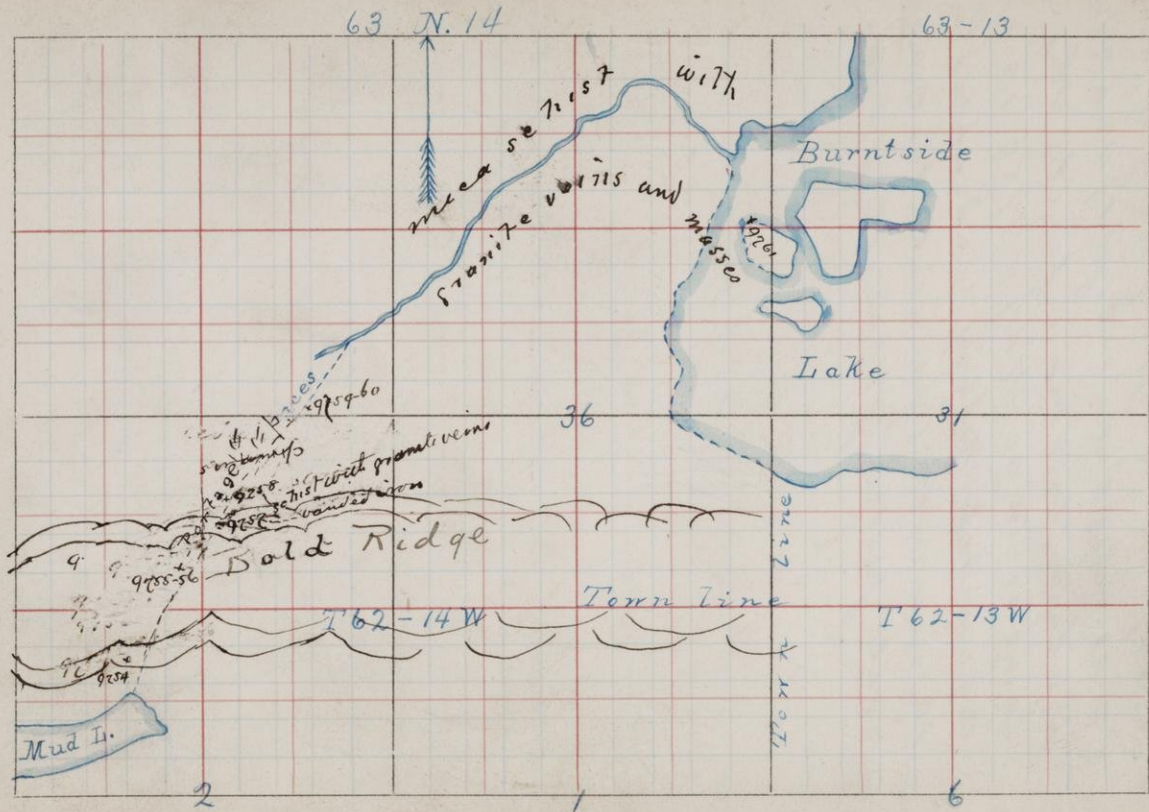


Mud Lake

15

9753

From point NW 1/4 of N.S. of 3, west
side Mud Lake - highly schistose
in places, but manifests the
same rock as 9749 & 9750 - i.e. is
a quartz porphyry, undoubtedly,
the rock which furnishes the conglom-
erate pebbles of Vermillion Lake



July 31 1885

17

9754 Portage from Mud to Burnt-side. Where first strike the bold ridge which runs along the west side of Mud Lake on this portage. Rounded masses of greenish grey mixed medium grained crystalline rock. Contains a dark greenish (hornblende?) ingredient.

9755 About 25 rods west of 9754 on winter road. A granite like rock or a granitic porphyry? Seamed with great quantities of white quartz.

*Spinel
Schist*

9756 A fine grained greenish-grey fine grained fragmental rock. Nearly in contact with 9755 on the East - junction runs S-S-N.W. Broken down to angular fragments.

9757 A few steps further north (say 25) to banded ferruginous material - no other rock in immediate vicinity.

9758 *Em. Sch.* about 10 rods beyond ^(n.s.) 9757 - at foot of ridge this at south side of ramp. 200-300 steps wide. At west side this ramp has dark-colored rock with granite

Burnside Lake 19

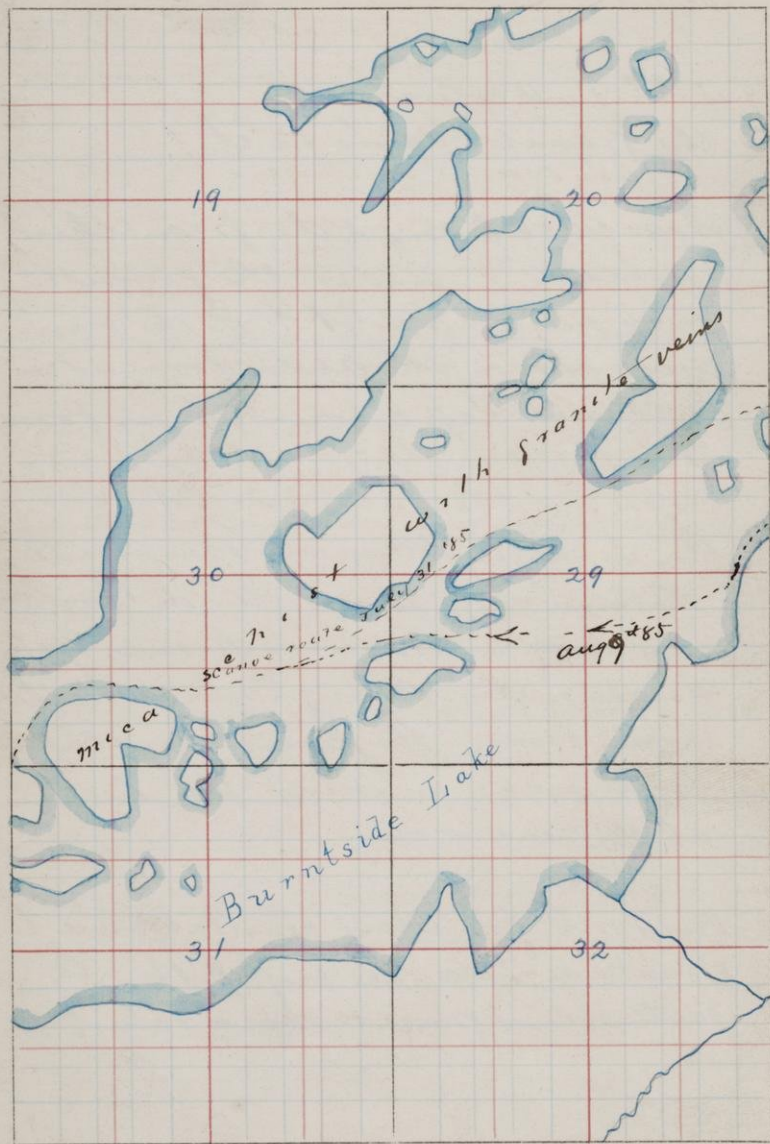
Veins

9759 is this dark colored rock
9760 the granite veins in it.

Does 9756 belong to the "green schist
formation"? and is the granite
9755 intrusions in it? Is the iron
rock here in the Alder formation?
Or does it lap around it in some
way?

From the end of the Point into Burnside
the vein rock shows often in large and
even cliffy exposures on the sides of the
marshy valley through which this little
stream runs. The granite is often in
large areas making the hills &
cliff pink or red.

9761 Veined rock from island near entrance to
Burnside Lake. See map p. 16. A
dark colored gneiss or mica schist.
Garnetif.
mica sch.



Beerside Lake 211

our course through Beerside Lake to Postage into Long Lake was all through the same coarse schist. The intersecting granite is in thin seams, wide veins, and broad irregular areas acres in extent. Also a fine-grained granite intersects the coarsest granite. Often the granite varies much in coarseness. Beyond both butts the granite according to Merriam becomes the prevailing rock, or the only rock.

22

T. 63

R. 13



Burntside Lake 23

9262 Granite from South end of island
S 84 W. 22 to 13 W. Has finer
grained granite veins. All of this
part of the island is granite - no
schist in sight.

August 12th 1885.

Followed along among islands on
west side Burntside Lake. Granite
prevails. In two or three islands
show much schist or gneiss and veins
of granite intersect it and each
other in the most intricate manner.
Veins are wide and narrow,
coarse and fine, contorted
with the schist and again
crossing the contortions. There
seem to be three intrusions as
to form: -

- 9263
1. Wide belts of a dark color-
ed granitic rock
 2. Granite veins following the
contortions but again after leaving
them.
 3. Veins wide and narrow,
irregularly branching and cur-

9264

Burntside Lake 25

ving and crossing the veins
2.

Probably the masses 1 should
come in order after 2.

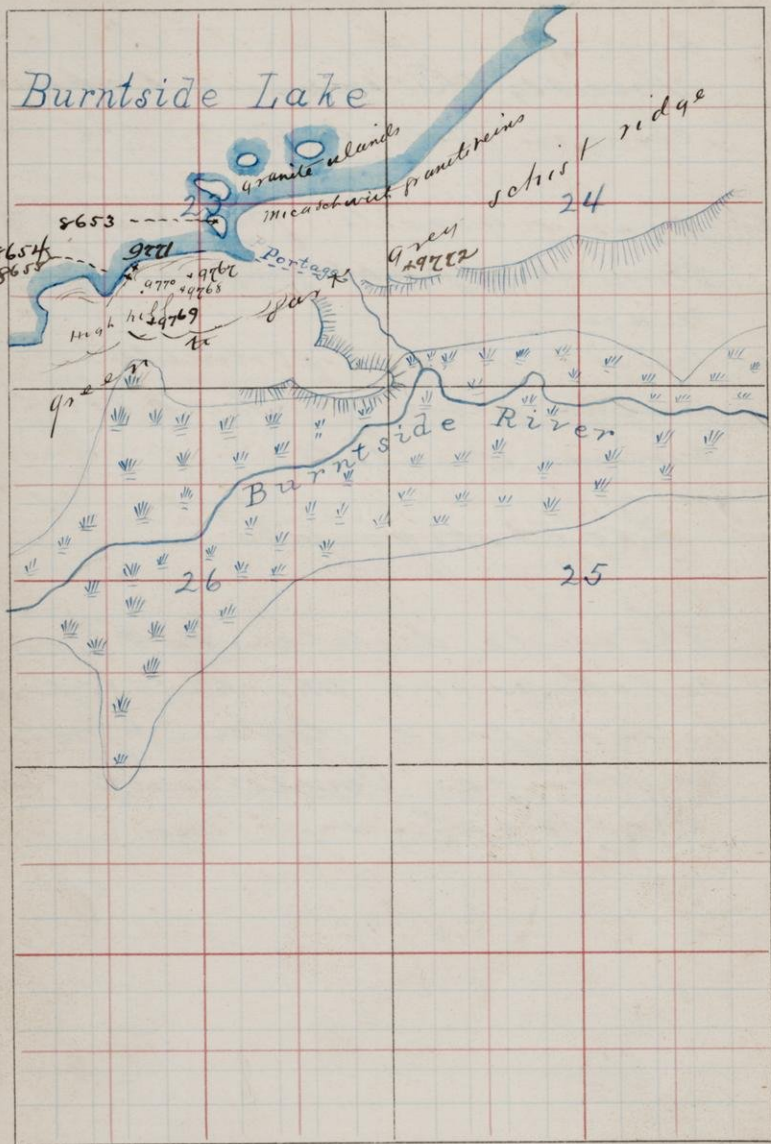
9764 coarser granite from veins 3
from area photographed by Mer-
riam.

9765 schist with vein of granite

9766 another piece of schist with
crossing veinlets.

See photographs -

The whole display on Burnt-
side Lake - i.e. the west side
is manifestly different from
anything on Vermillion Lake
The True Laurentian?



5

Burntside Lake 27

As one approaches the pass-
sage for Burntside Lake to
Burntside River, the numerous
islets are mainly granitic. But
the high knobs on the mainland are
dark colored thin, laminated
micaceous or hornblende-schist,
probably identical (save as to
greater thickness of laminae,
continuity of laminae and
less interruption with punctate seams)
with the schists on the west side
the lake?

9767 chippings from this schist
H.B. Sch.

9768 Certain seams parallel to the
thin lamination of this schist
appear to be irony weathering
brown. The interiors of the seams look
as if magnetite bearing. Are they
the same as the iron on the passage
Burntside? They seem to be
by the way at about same geol
horizon. See again same
thing at outlet of Hall's Lake
infra.

See map. p. 26.

In Brownside Riv. we run along the south side of a broad ridge, which is the Eastern continuation of that crossed on the portage from Vermilion to Brownside, or rather, Mead to Brownside.

9772. Specimens collected by Finch on south side of this ridge. See map. They are like the fusing schists with ferrug. material. but granite veins run all through to south side of this ridge. Some veins quite coarse granite.

Numerous white quartz veins
traverse this rock across and parallel
to the laminae. Often also the
white quartz appears in lenses
 $\frac{1}{2}$ " to 1" thick, one to several feet in
length. Also in irregular nests
and seams of large size.

Granite veins also occur and in
excess in size and frequency as one
goes north. They are faulted ~~and~~ often.

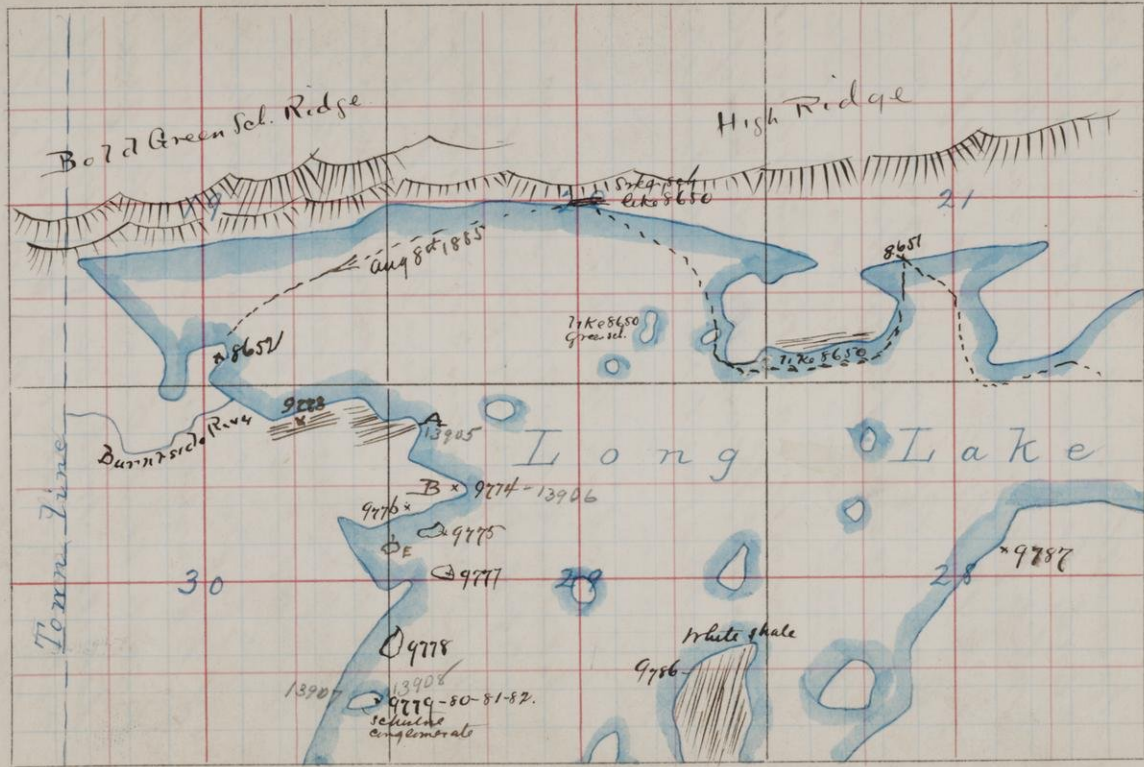
9769 Shows these granite veins - the smaller
ones.

These schists trend E-W.

9770 Interbedded iron schist - same as
9768 but from a different place

9771 Near the water edge much of the
schist is rather lighter than
the rest. It seems plainly to
be a mica sch. Are not chlorite &
mica sch. interbedded here?

The portage from Burntside
L. to Burntside River (see map p 26)
is quite short. On it rocks quite
similar to the banded iron above
its associated sch. occur. But
this iron is not like that of the iron
series itself.



31
Long Lake. Aug 1/885

9773 greenish chloritic schist dense highly schistose - laminated ~~by~~

The same green schist runs quite around to A. map. p. 30 making large exposures.

9774 At Bonaville after crossing bay the rock is entirely different - schistose - white - felsitic like.

9775 from island - greenstone? } See map. p. 30
9776 shaly.

Island E is like 9776

9777 Sand-colored rock. is it greenstone?

9778 A grey schistose quartzite from island - near West line S 60° W 29 63 12 W.

9779 From next island south - About 1/4 mile - Schistose Conglomerate with white weathering pebbles quite analogous to the Vermilion Lake Conglomerate. Schistose structure ENE

See map p. 30

9780 white pebbles from this Conglomerate
Is not 9774 the parent rock of
these pebbles?

No schistose or green schist pebbles
seen

9781 From this Conglomerate showing
structure like an x line rock!
But manifestly a part of this
Congl. Holes No. x Es?

This conglomerate forms the
west side of the island. The west
side for a little distance is a
shale or schist. Is it not like some
of those on Vermillion?

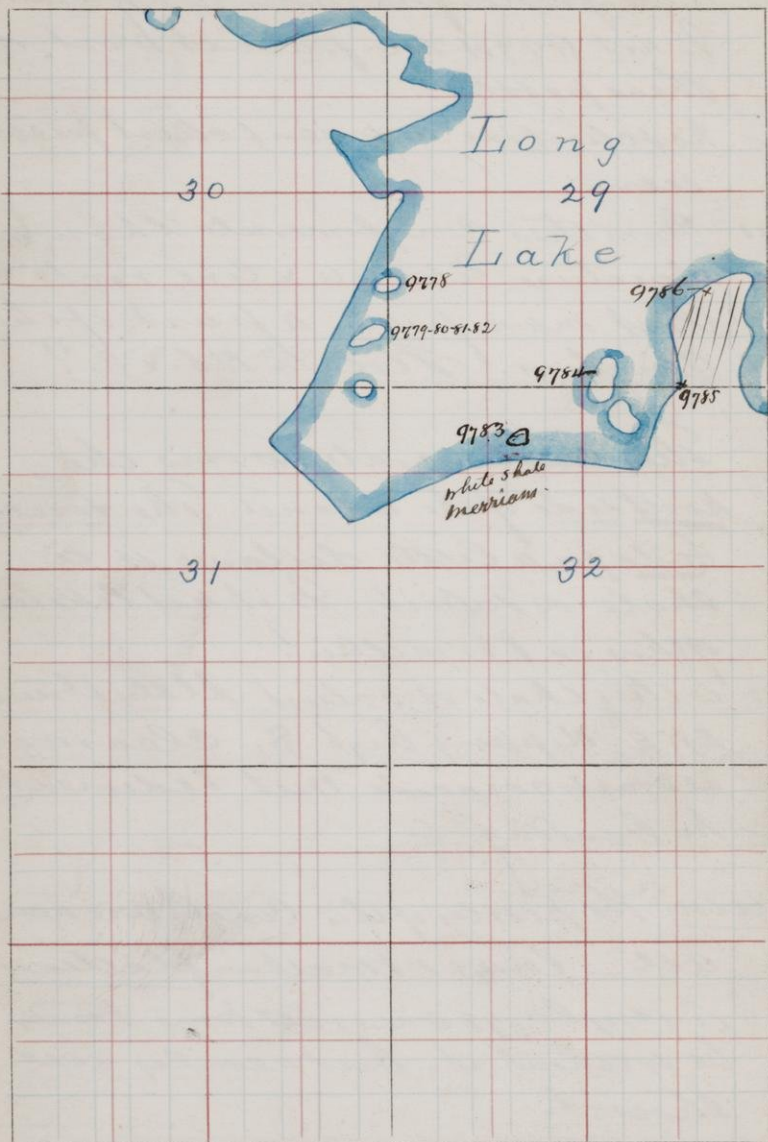
9782 is this shale or schist. Slaty structure
ENE dipping high S. Cleavage
seems to coincide with sedimenta-
tion banding

Mem. The pebbles of this Congl. are nearly
all - large + small - flattened
A very large one in some times
be without it - but nearly all
show it.

34

T. 63

R. 12



Longlake

35

9783 Greenish sch. from island N. 20° E map.
retic foliaceous structure

9784 Red shelly rock - dip with high.

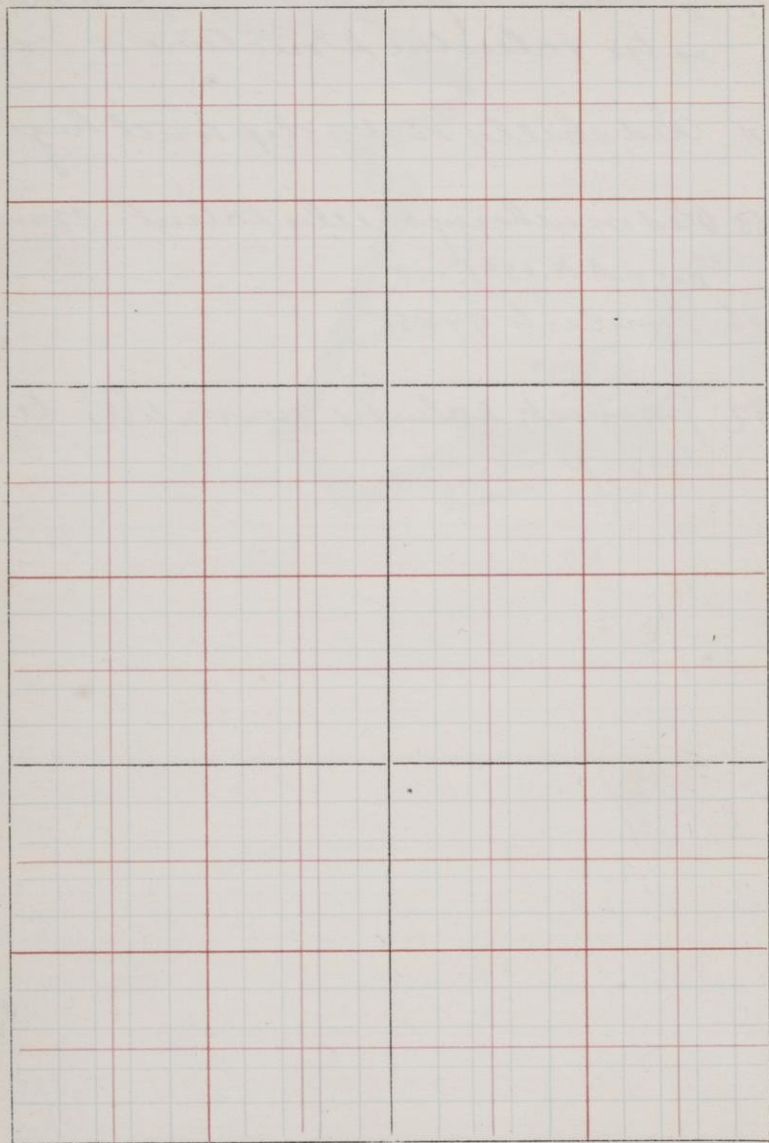
9785 Red weathering shelly schist. crumby
Trend N. 15° E

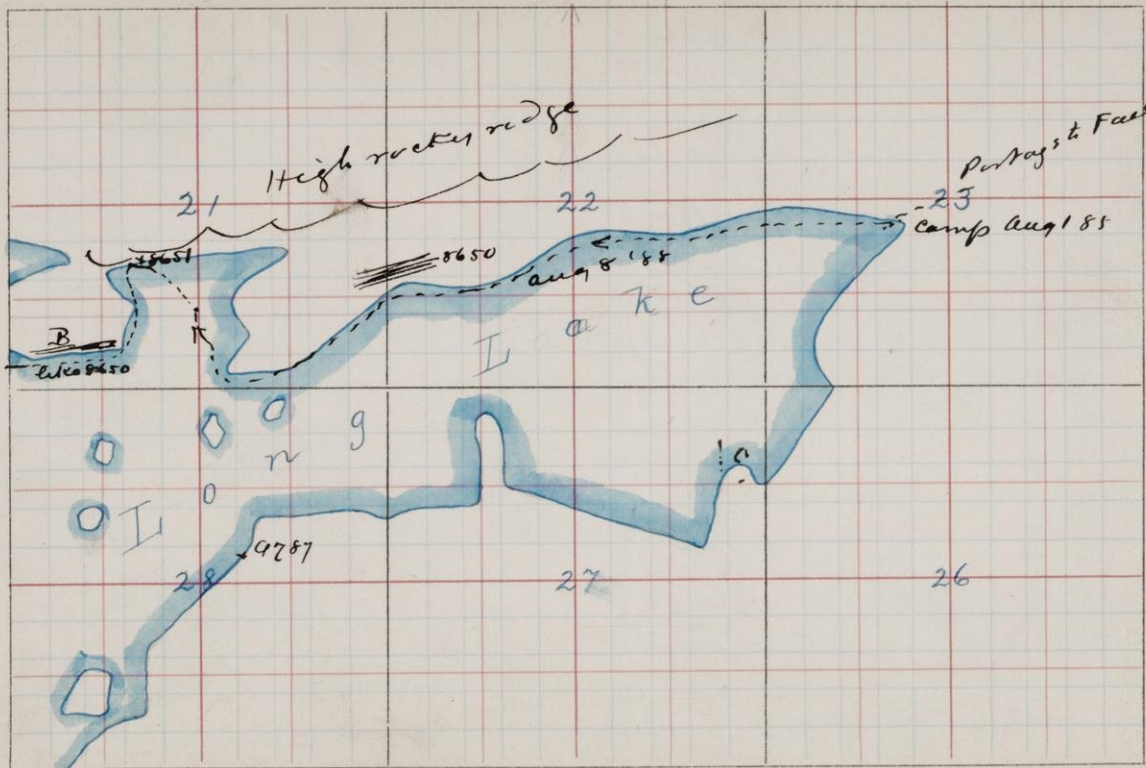
9786 Similar to 9785

9787 Greenish schist, quartzite (?) see
map. p. 38.

T.

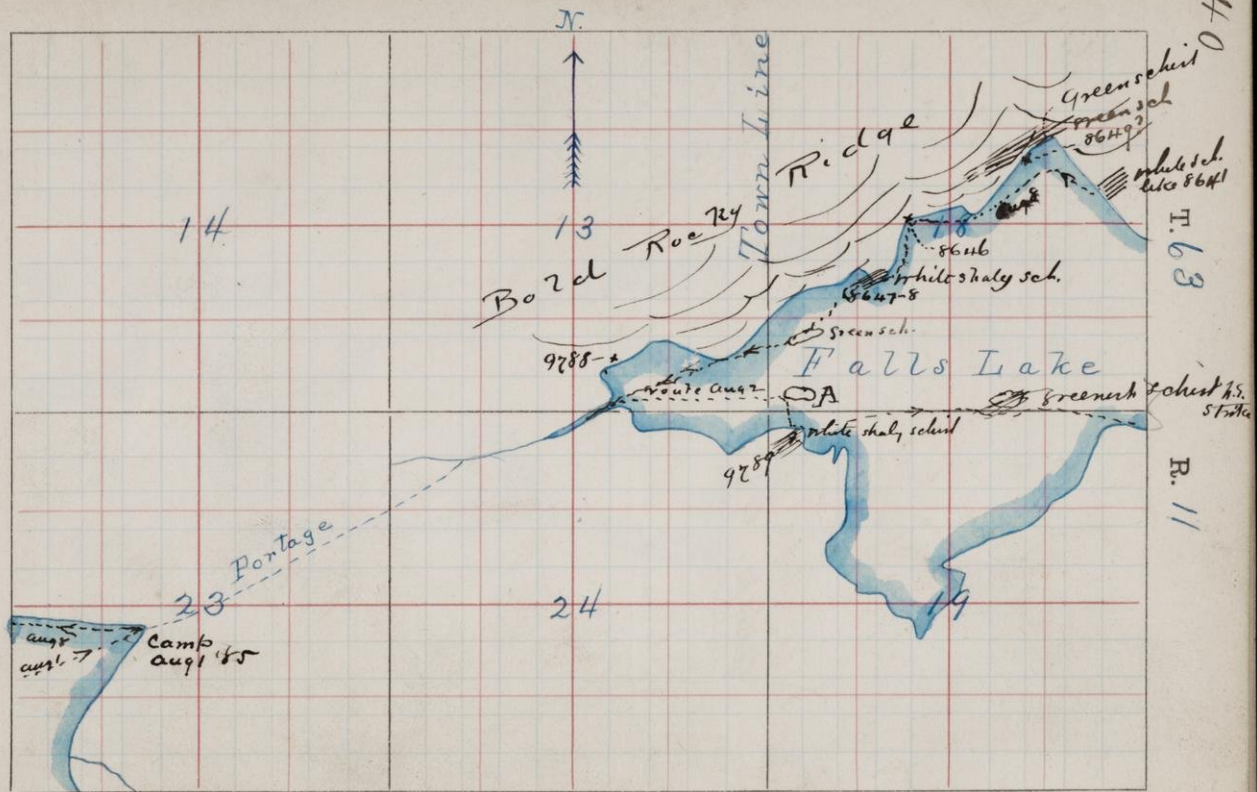
R.





38
Long Lake
 T. 63
 R. 12

See p. 95



Falls Lake

41

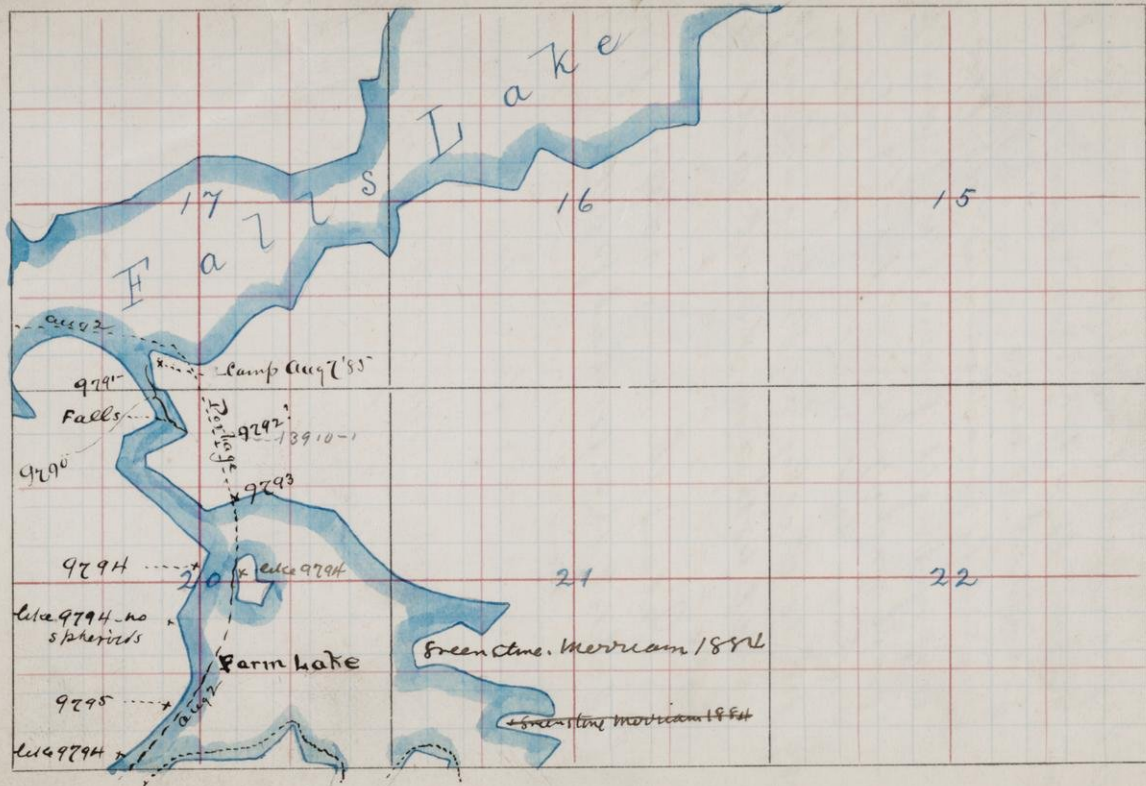
Aug 7 1885

9788 green schist schistose structure
dipping high to S. containing thin
granitic seams

The weathering is at times
a very bright green (not an epi-
dote green)

9789 white shelly hydromicaceous (?)
rock like that on South side Long
Lake.

Island the same as 9788, green
schist. (or greenish gray)



42 Falls and Farm Lakes
 T. 63
 R. 11

9790 Falls of Falls Lake. Greenish schisty
rock. Specimens taken along from mouth
of River up to Falls.

See Photos

9791 A phase of 9790 at mouth of the river -

9792 Ferruginous material picked on
portage by Daniels. In place?
See also Merriam's notes. This por-
tage over a high ridge? 150
feet above Falls Lake.

9793 In masses at south end portage
Falls to Farnes Lake note the
spheroidal weathering. This
rock is eventually in place.

9794 This spheroidal weathering, often
bright green, rock also shows at
centers Sec. 20 in large structureless
cliffs - also on Island opposite

9795 A light grey massive, crystalline rock
quite unlike 9794. "greenstone"

T.

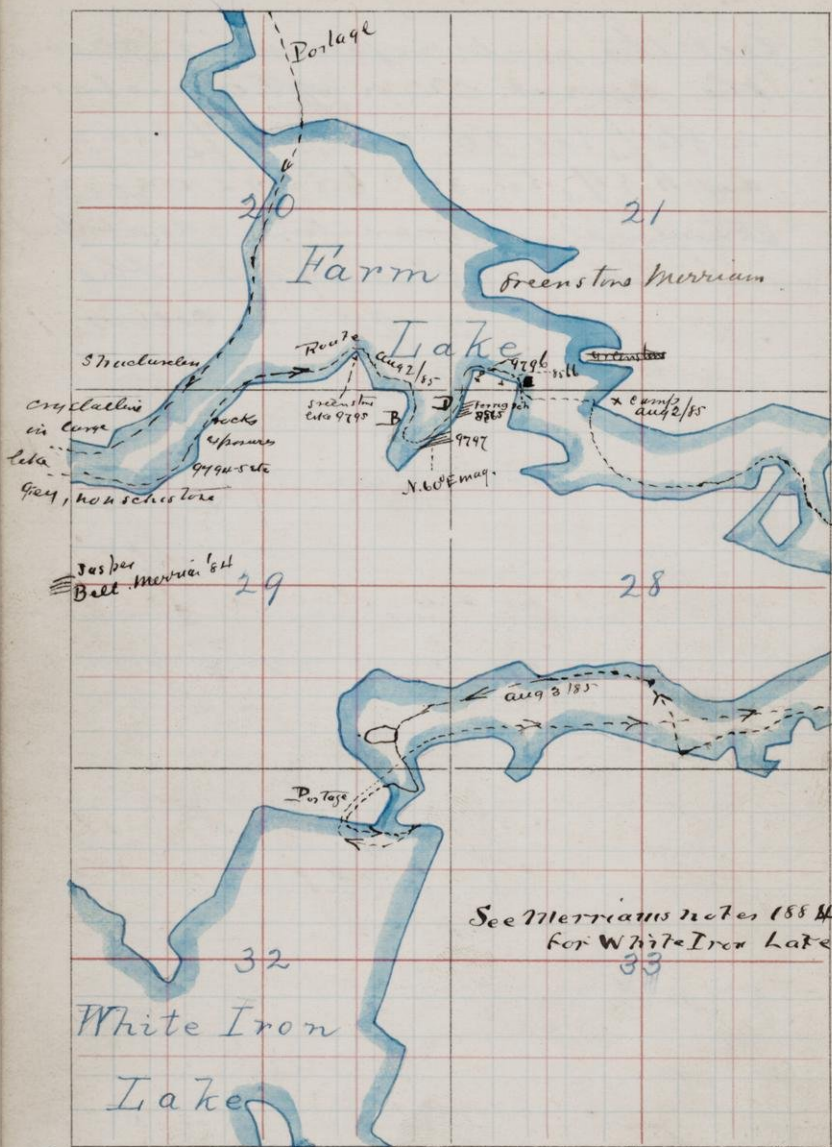
R.

See map p. 46

Harvey Lake

45

All the rock exposures around
the street area of Harvey Lake
in S.W. $\frac{1}{4}$ Sec. 20 and N.W. $\frac{1}{4}$ Sec. 29
and N.E. $\frac{1}{4}$ Sec. 30 - 63-11- are
fractureless greenstone - non-chert-
one. Like 9795 or 9794. The
exposures are large & colors
dark grey to green.



What is the relation of Greenstone and Irons on this lake?

Farwell Lake

47

9796 greenish? or Quartzite?

B the same rock occurs at B.

9797 schistous - Structure N. 60° E magnetic

Glauconitic all about here - 1.5
south side of the lake N. 10° E magnetic
Meridian.

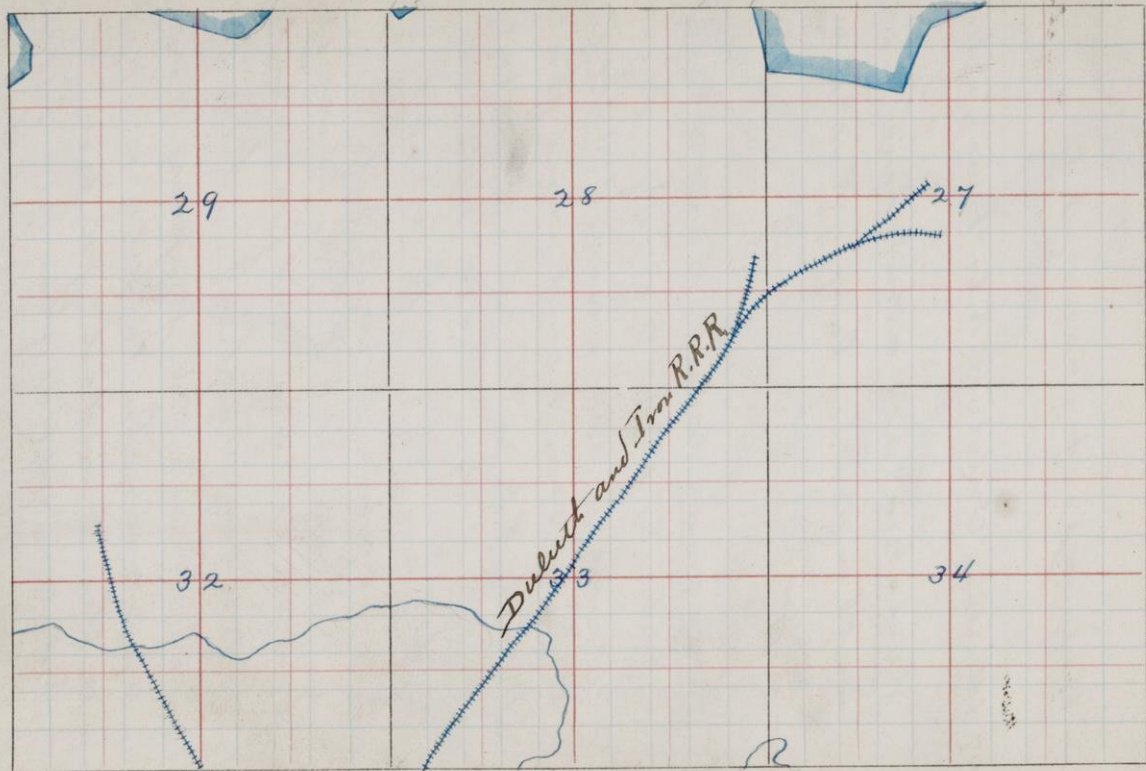
8565 Ferrous schist. Dark colored
Por. sch
schistosity parallel to 9797. This is
dolomitic or calcareous!! It is
at times very hard and finely
mass fractured. Partly
part of Dr. Beech notes
Meridian 1884 on west side
29 - same township.

8567 highly calc. hb. greenish. sh.
8568 found like 8567, part
merely fine quartz. There run
into & include? the iron transitional.

From D to E the shore shows
broken ledges and fragments of
ferrous schist. Near to E
the fragments are jaspery and
apparently in place banded.
is this banded jasper

8566
8567
8568
12674. Small
sch.

Partly from west side of bay B.D. but there
location is uncertain, except that they
were taken the evening of Aug 2 before going
into camp.



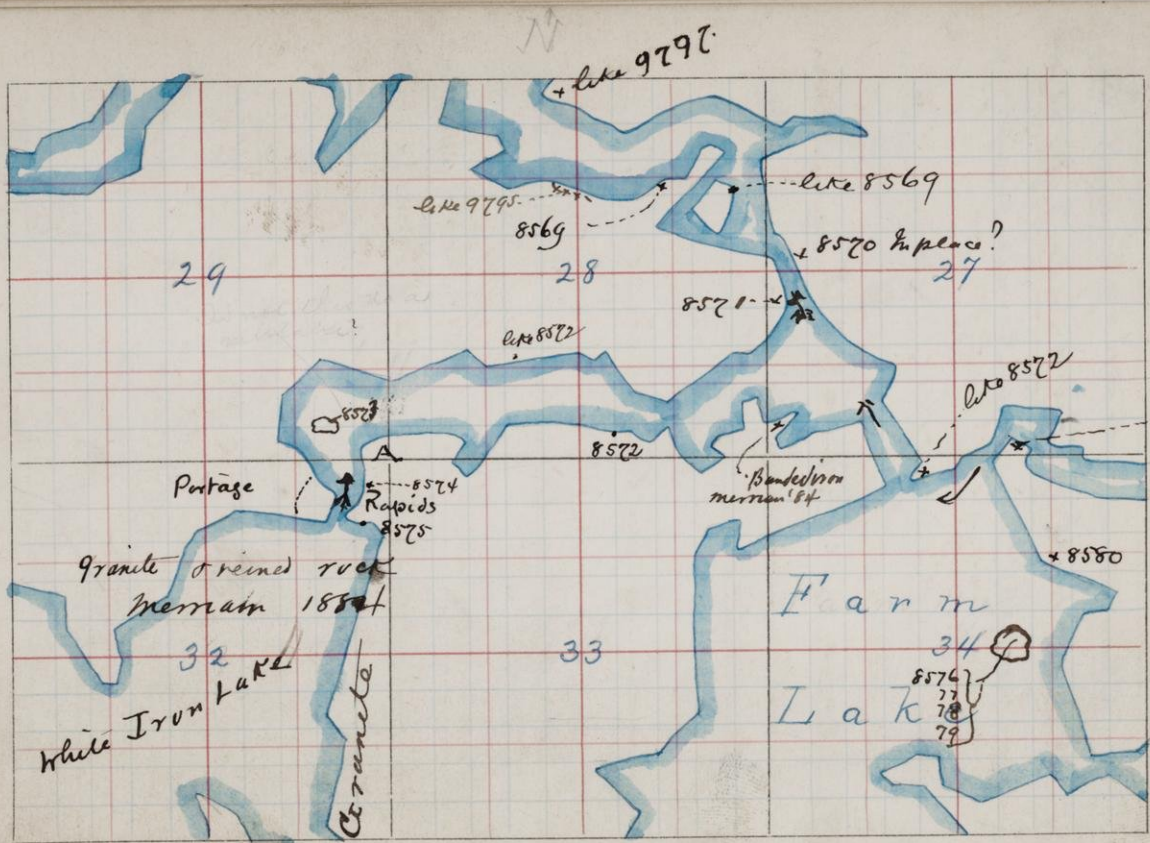
49

Duluth and Iron Range RR.

Specimens taken by Smith Aug/88

9798 1620 yds south of road crossing of railroad
near Tower Depot. Railway cutting

9799 same cutting as 9798



Farewell and White Front 51

Aug. 3rd 1885.

Farewell and White Iron Lakes

near our camp of last night the
rock is also 9797. Reluctant

8569
F. H. Sch.

8570

Dark colored massive rock - see map p. 50
Crystalline light grey - common than
anything else about here - Possibly a
large boulder?

8571

F. H. Sch.

Finely crystalline schistoid.

8572

F. H. Sch.

Low lvs of mica - schist

8573.

S. Z. H. Sch.

Micaceous Quartzite or mica-schist - Still
probably same rock as 8572 which runs
thus all along this corner of Farewell Lake
at point A. map p. 50 The micaceous
quartzite holds many quartz
seams - & there have been veins of
precious metals. Chalcopyrite & marcas-
ite are seen in considerable quantity.

8574.

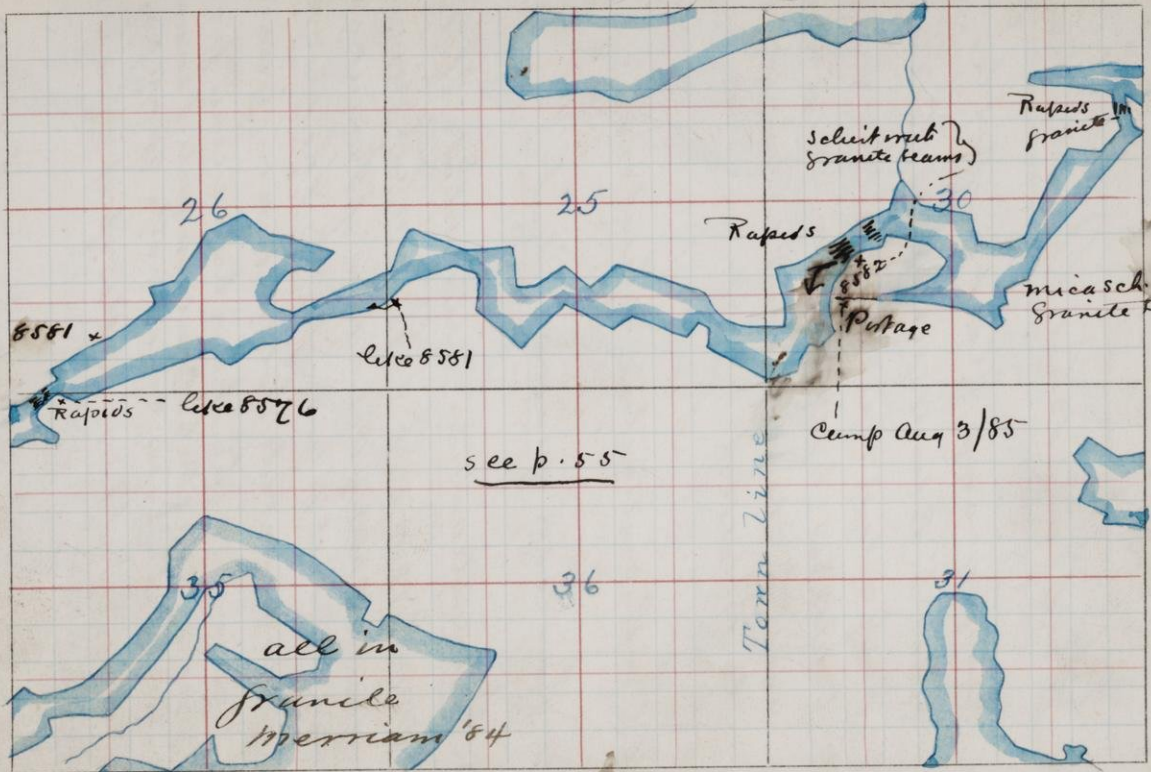
F. H. Sch.

Ferruginous bands in the schist - Are they
iron series? or lower series?

8575

F. H. Sch.

Granite - low exposure - see Men-
nam's '84 notes - granite & gneiss



T. 63

R. 11-10

Fareu Lake

53

material - i.e. schist - run along
White Iron Lake southward one
third mile from the outlet
after which the lake is all in granite
~~to head and beyond.~~

Island H. Fareu Lake. Map. p.
50, shows most singular and
confused occurrences.

8576 Mic. #6. Sch. is a rock at times quartzite like (8576)
and again gneiss-like or mica schist like (8577)

8577 Mic. #6. Sch. This rock is penetrated by

8578 Ab. Grn. coarse hornblende granite in veins and
large masses; also by

8579 Grn. por. fine grained felsitic granite veins $\frac{1}{2}$ " to 6" to 18"
wide. These cut the coarse granite
White quartz veins also intersect the schist.

But much of 8576 and 8577 appears on
surface wonderfully like a congl.
ornate! The singular thing being that every
apparent pebble, except some of black quartz, is of a
kind identical with the veins intersecting
the same rock!! In some cases at
least the seeming pebbles are but branches of a vein
thus: - ~~black quartz~~ which is coarse granite pebble

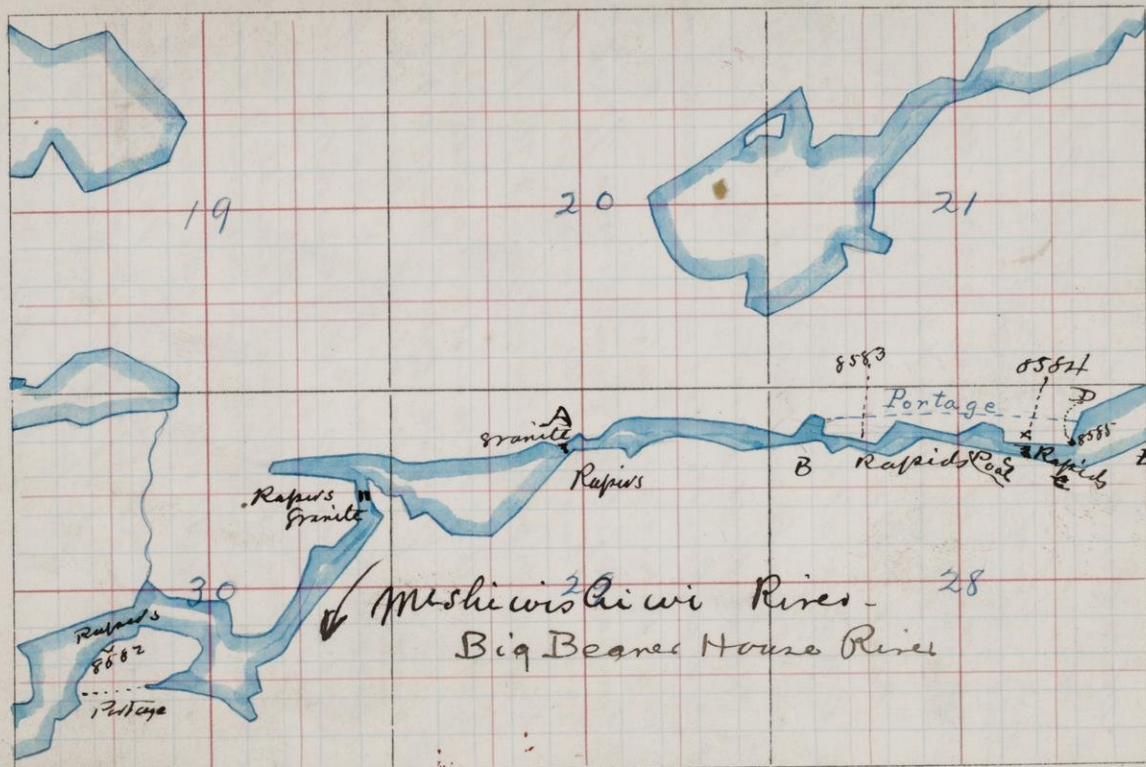
connected with all traces of the same material
We persuaded ourselves that the pebbles
were really not true fragments - some
of them are sharply angular.

See photos

8580. Mic. schist with granite veins just
as on island H.

Sch. like

8577 and Gr. veins



Meskwis River - 28
 Big Beavers House River

Mishiwishiw River 55

8581
Lil. Hb. Sch.

See map. p. 52. Greenish gray
quartz schist.

8582
Lil. Hb. Sch.

See map. p. 52 mica sch with intrusions
of blebs of granite coarse - just like 8578
Large amount of granite SW 30 6 3 100

~~See map~~
See # 185

See
map.
p. 54

Rapids A all granite. Coarse hb.
granite like 8579. A broken down
beds; large angular fragments
only, but plainly in situ

Rapids B C mica schist and granite
Quartzitic mica sch from this
place.

8583
fragmented?
grey sch

8584
fragmented?
feldspathic
quartzite or
mica sch.

Quartzite?! Is it part of the
mica schist formation? Large
structure less beds - Is it
not rather felsite? Shows feldspar
facets.

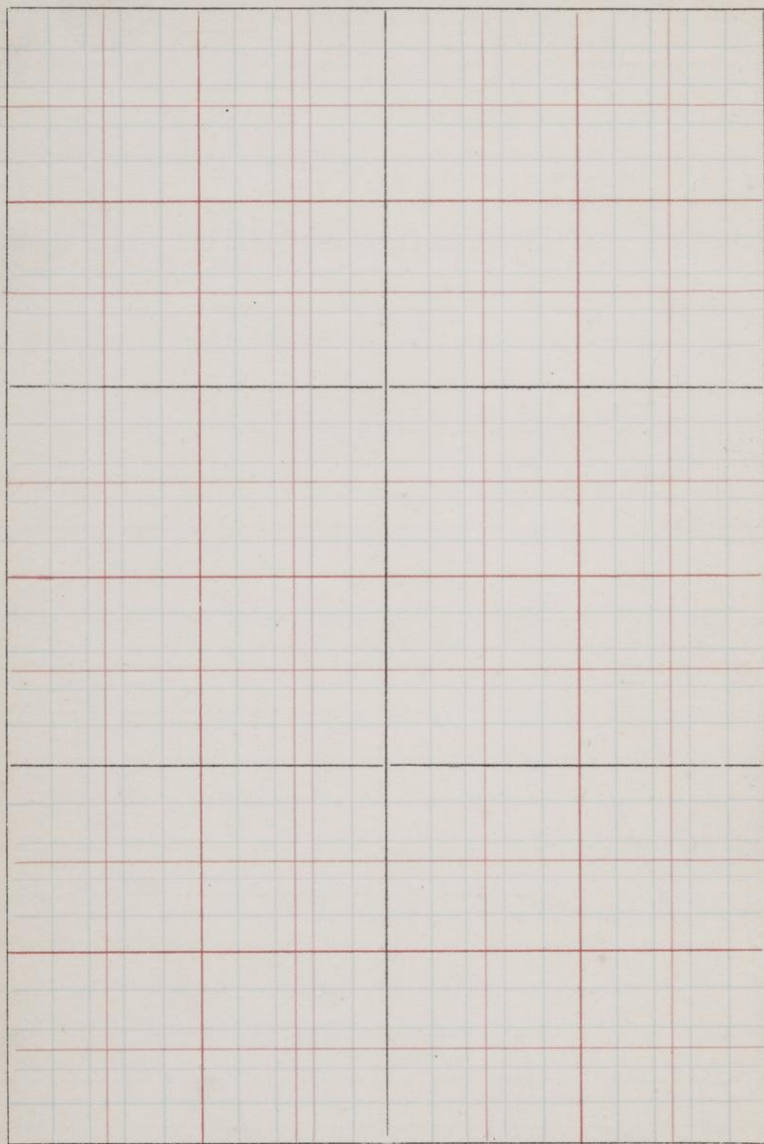
8585
Hb. Sch.

At D map p. 54 light grey rock
similar to 8584, but schistose with
some mica - plainly merely a phase
of the mica schist.

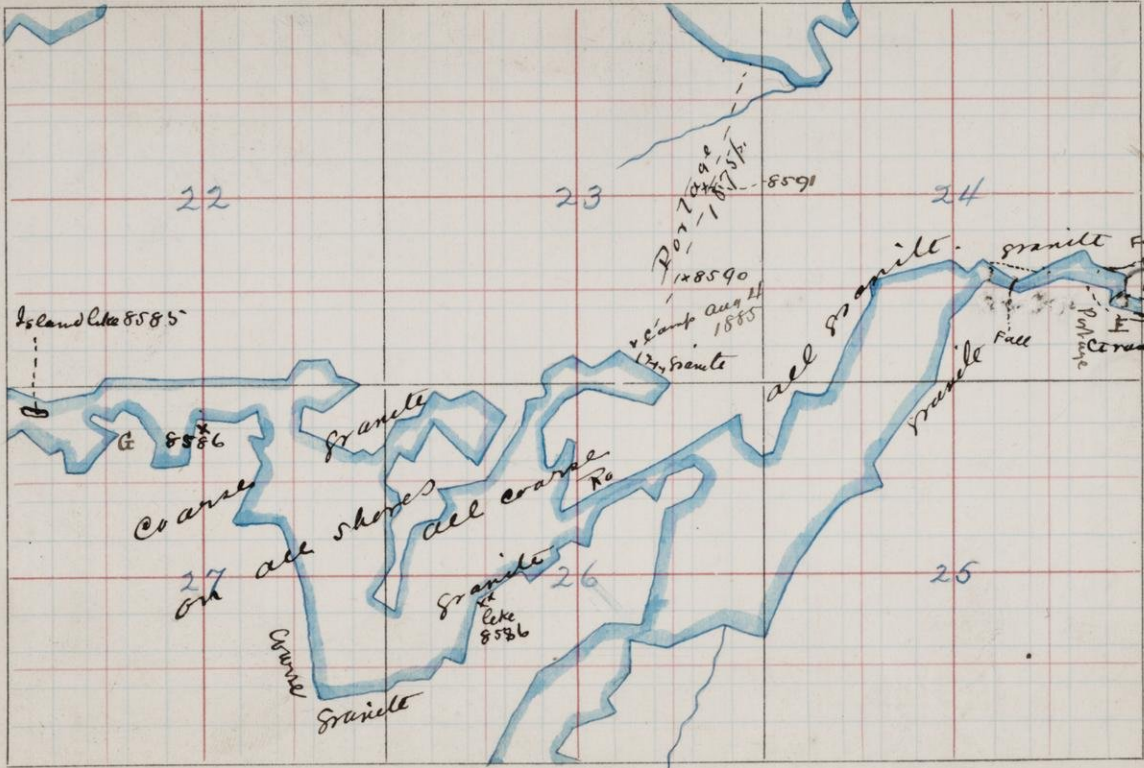
The same rock shows again
at E. map p. 54.

T.

R.



59



Miskiwispevi Res^o 61

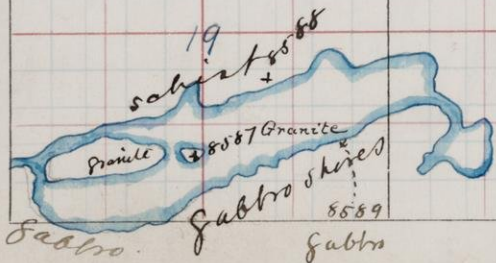
8586

Reddish hornblende granite mt

Hb. Conn.

Some stringy structure.

The Range line between 10W and
9W crosses just East of the
Quail F. It had a repeat of
9W - but found the line.



20

this map not from phot
is not right at west end.

Miskiwisipi River 63

8587 next East end of the southern
Granite. A schist or streaked
Hornblende granite

8588 schist on west side this
lake
Ho. sch.
blast

8589 Gabbro on south side lake.
O. Gabbro.

This gabbro rises into broad west
facing cliffs - flat south dip?

See map p. 60

Mishiwahwi River 65

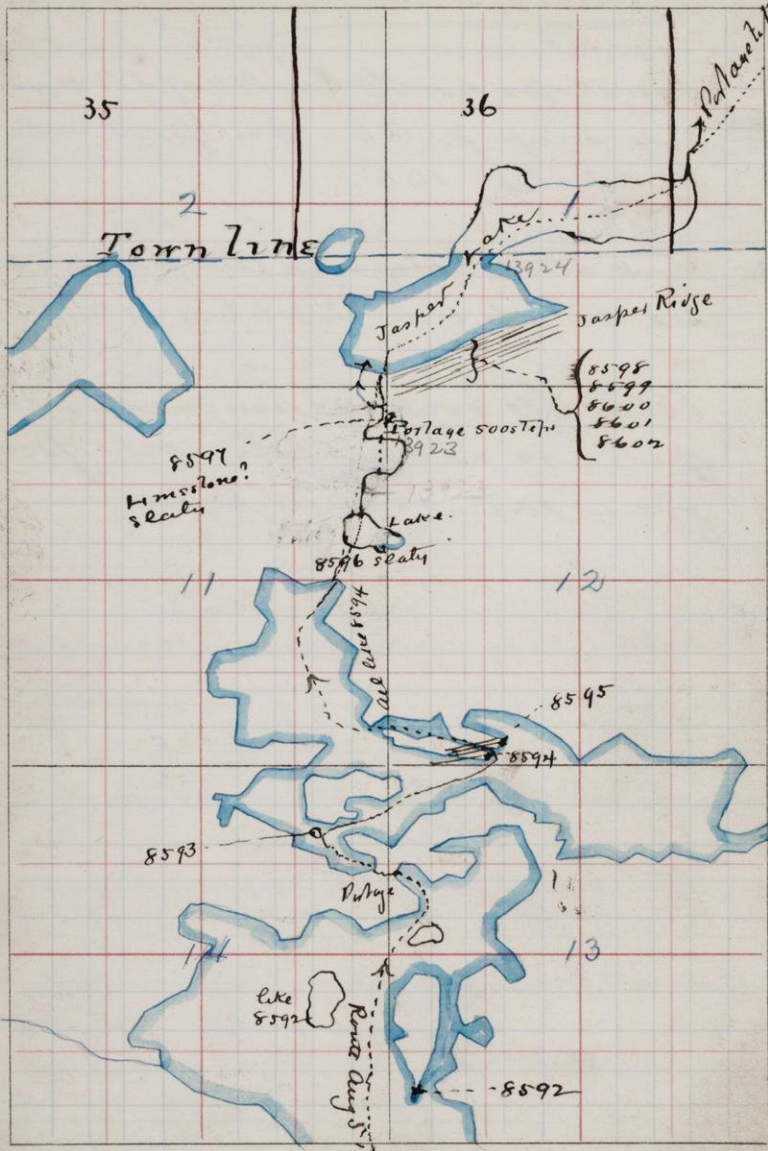
Aug 5 1885

8590 500 steps north last night's camp.
At. ~~At.~~ see map p. 60. On postage
SW 23 63 10W.

8591 Rock at 1000 steps on this postage
see map p. 60. 23 - 63 - 10W.

All the rock examined on this
postage seems to be of the peculiar
gray mica talinit type.

Palouse & Mouse
Lakes



13921-2

greenstone Jasper Lake etc 67.

- 8592 ^{Act. Ab. 2. 2. 1. 1.} Is this quartzite or greenstone?
The other islands as far as the
portage show the same rock.
66
- 8593 greenish grey fine grained rock
greenstone?
- 8594 Schistose green rock probably
same as 85-93 All the same
except as to schistosity in some places
black pit in others -
Salient structure ENE
- 8595 Fine grained dark grey-greenish?
- 8596 at north end Portage of 38 steps.
Chl. Sch. slaty - greenish pyritiferous
- 8597 Cal. Sch. Calcareous rock or siliceous clay,
Cementine with white carbonate
of some seams
- 8598 Banded Jasper - Bluff south side
Jasper Lake
- 8599 ~~On~~ Rock immediately overlying
the banded Jasper 85-98 i. e. 6 south
of it.

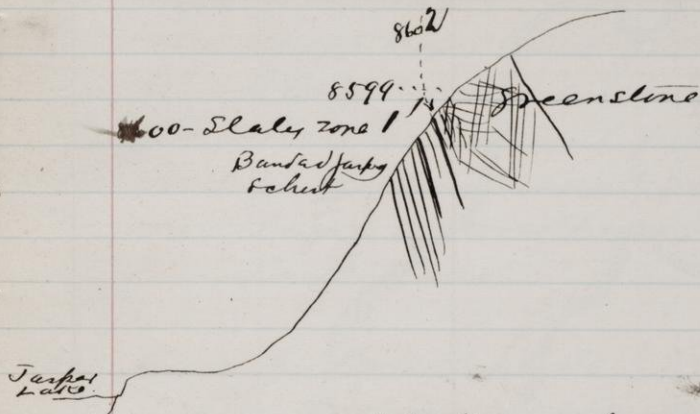
see map p. 66

in places. These thin laminated beds
dip 60° ^{SW}. See further for description
Mr Merriam's 1884 note.

Taspeo Lake

69

South



Section of bluff south side Taspeo Lake.

The greenstone grades into the slaty zone. Between the banded schist & the slaty zone a sharp transition, no gradation.

8600 Slaty portion of 8599 immediately at junction with Jasper

8602 Intermediate between 8599 & 8600

8601 Portion of the jaspery beds with white instead of red siliceous bands.

These jaspery beds recall strikingly the "quartzite beds" of the Animikie. The jasper is interbedded and again in isolated flattened lenses one or two linear inches in length. White silica is substituted for the jasper.

64-10

64-9

A
N. 50° E



25

30

29

36

31

32

Tern Line

Moose Lake

Jasper Lake

Cliff

Portage over high ridge

CLIFF

CAMP
Aug 5/85

RAILROAD

N. 65° E
8608

N. 45° E

8606

8607

8610

8600

8601

8602

8603

8604

8605

8605-6

T.

B.

Portage to Moose Lake 71

8603

alt. cont

Touch End Portage from Jasper Lake to Moose Lake. See opp. map. An argillaceous quartzite? A long exposure and bold cliff -

The portage rises abruptly from here

8604

cont.

Pebbles in the conglomerate on the portage Jasper to Moose Lake - 200 steps from Jasper Lake

8605

cont

shows the Conglomerate -

This conglomerate stands vertically as shown by bands of pebbles which stand something N. of E - say 10° to 20° . Pebbles include different kinds: - slate, cherty material greenstone and green schist seem all to be represented in the pebbles - see specimens. Also mica-schist. The conglomerate includes fines and coarser bands - in part merely a quartzite or sandstone. Again it is interbedded with black or dark colored slate

This is an important place. The interbedded slate - just mentioned - is banded vertically by sedimentation lines. Mr. Merriam reports such a band with conglomerate

See map p 70.

Moose Lake

73

on each side of it, and grading
into the coarser material

Moose Lake See map. p. 70

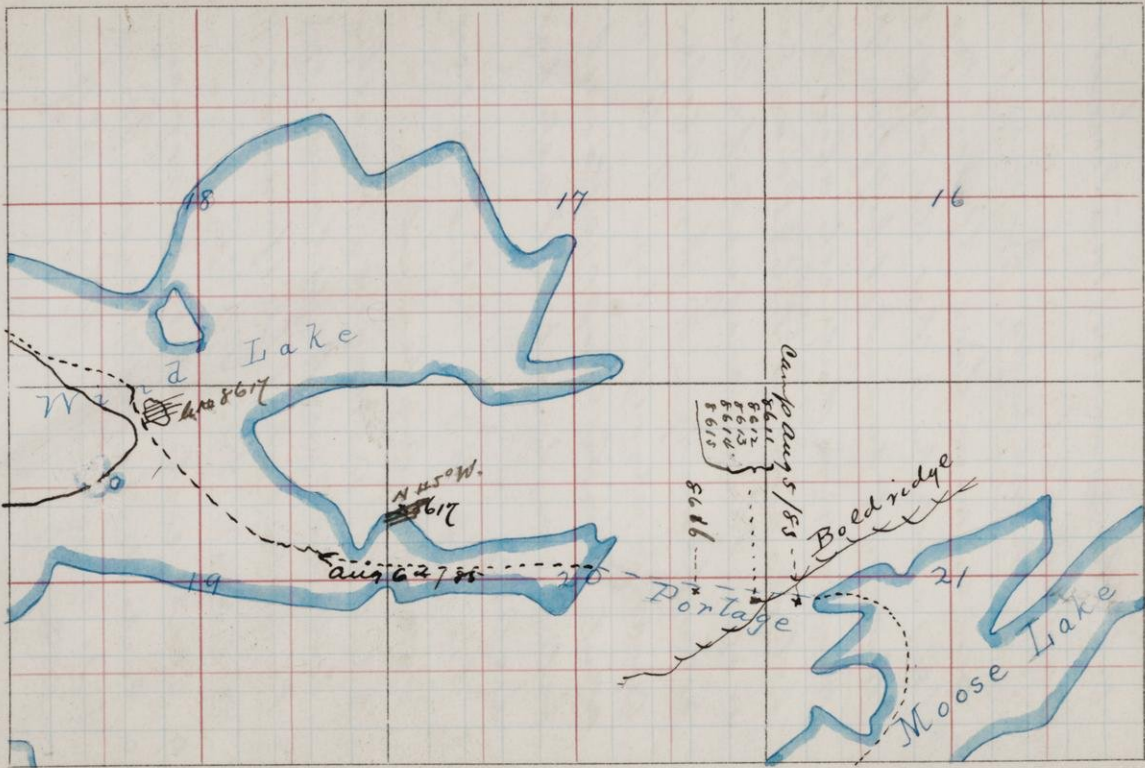
8606 West end Moose Lake - Greenstone?
All. Emmett (my recollection is that this cliff shows
also a rock somewhat different from speci-
men - a more distinctly x lined rock)

8607 Schist - trending ^{N. 70°-75° E} N. 68° E may. See
712. Sch. foot. map. This a carefully taken
Solar bearing. Is this a schist or
quartz porphyry perhaps? At all
events closely comparable with
solints on Long and Falls Lakes.
See ante.

8608 See map. p. 72 Schist - N. 68° E
Islands - Standing vertical
At A ^{p. 72} atbecca Hackett
tells that on the island on
Permillin Lake (see specimens 9744
9945, ante) - trend N. 50° E

8609 Slate collected by Mr. Merriam.

8610 Collected by Mr. Merriam South
Side Moose Lake. Above cliff.
Quartzite.



Portage to Wind Lake 75

Aug 5/85 continued

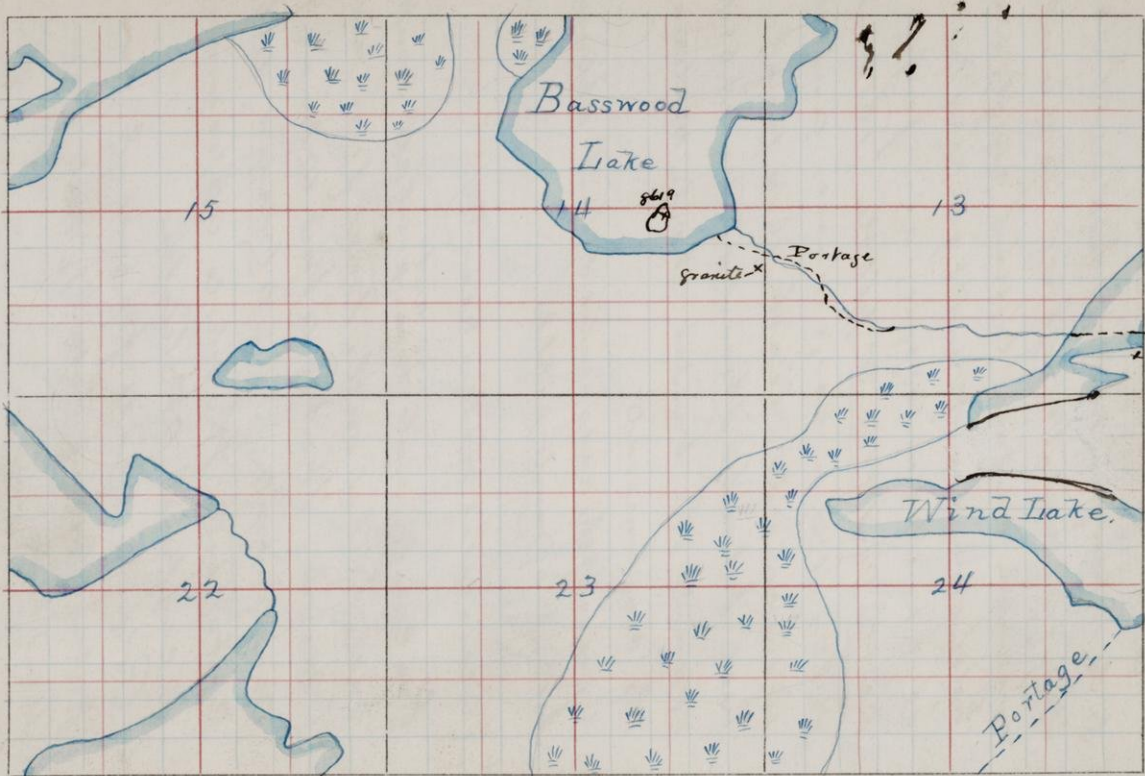
On the portage from Murrel to Wind Lake - 200-300
steps from mine, on high rocks, is a most
singularly confused looking conglomerate(?)
holding masses of banded gneiss material
as like the banded iron, also Jasper
pebbles and granite pebbles. The banded
material is in large masses and lying
in one case at least, in a single
bed, but with a strange strike S. 55- N. W.

- 8611 represents the banded Cherty material
8612 the conglomerate
8613 A piece of the associated schist apparently
holding a granite pebble.

8614 } associated rocks nearby.
8615 }

This conglomerate ~~is not~~ ^{is not} at all compa-
rable to that on the trail from Jasper
to Moore. That is a true ordinary
conglomerate; this, a breccia schist_{ite}
contorted. The whole appearance
is confused & schistose -

- 8616 Black slate fragments on
portage to Wind Lake 1/2 mile from
Wind Lake.



28618

Wind Lake

77

Aug 6 / 85

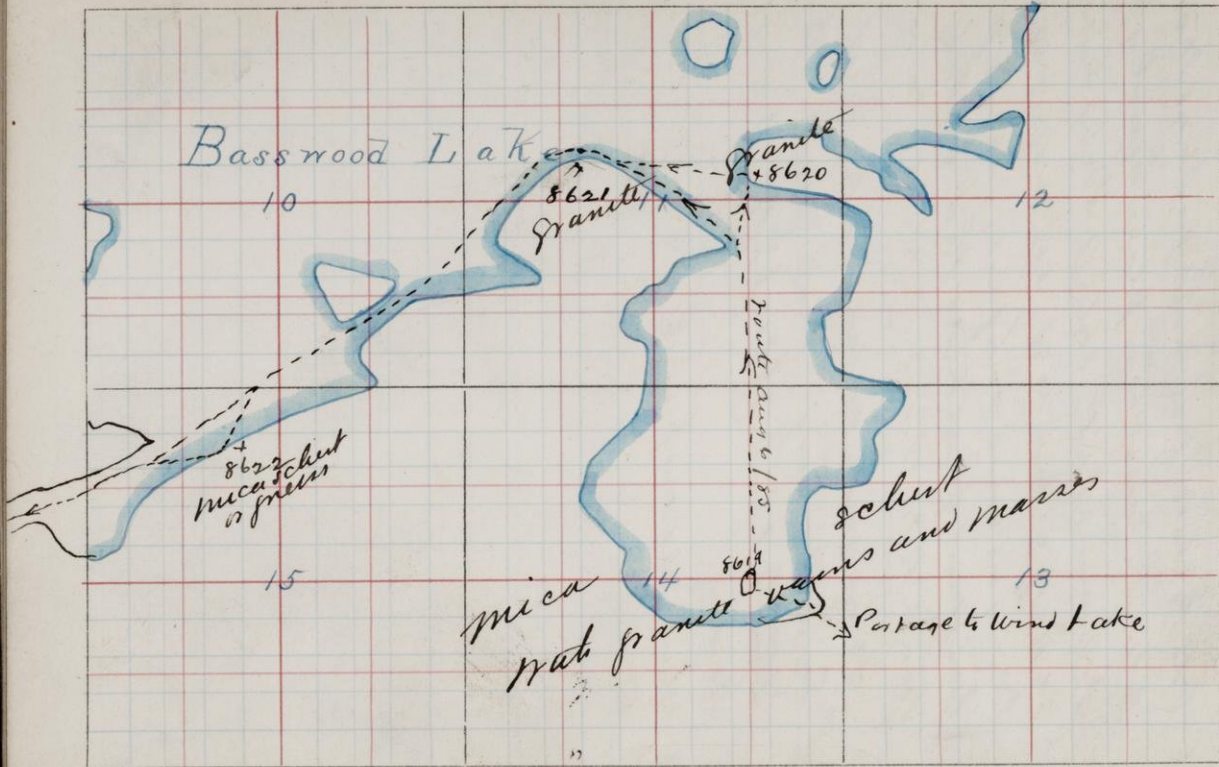
8616 Black slate fragment postage money
to wind - must be in place near by p. 74

8617 Silvery slate schist Wind Lake
Sil. Sch. S.S. N.W. 1/4 64 9 W. see map. p. 74
Silvery on some surfaces. Some per-
Finnish men quarried there other
tend N.W.

Same rock on island A. but
Same bearing. Map. p. 74. On
this island glaciation S10°-12° W
may.

8618 schist - see map. p. 76

Basswood Lake



11

Basswood Lake 79

Basswood Lake Aug 6/85

8619
Hb. Sch.

Fine-grained mica schist. Island
to south end of bay of Basswood Lake.
See map p. 78. On mainland south
more of same rock. It is gneissic
and intersected by granitic seams
veins and large areas. Dip of schist
north 45° , trend of schist planes
E-W.

8620
Hb. Sch.

Granite pink - hornblende, gneiss
coarse

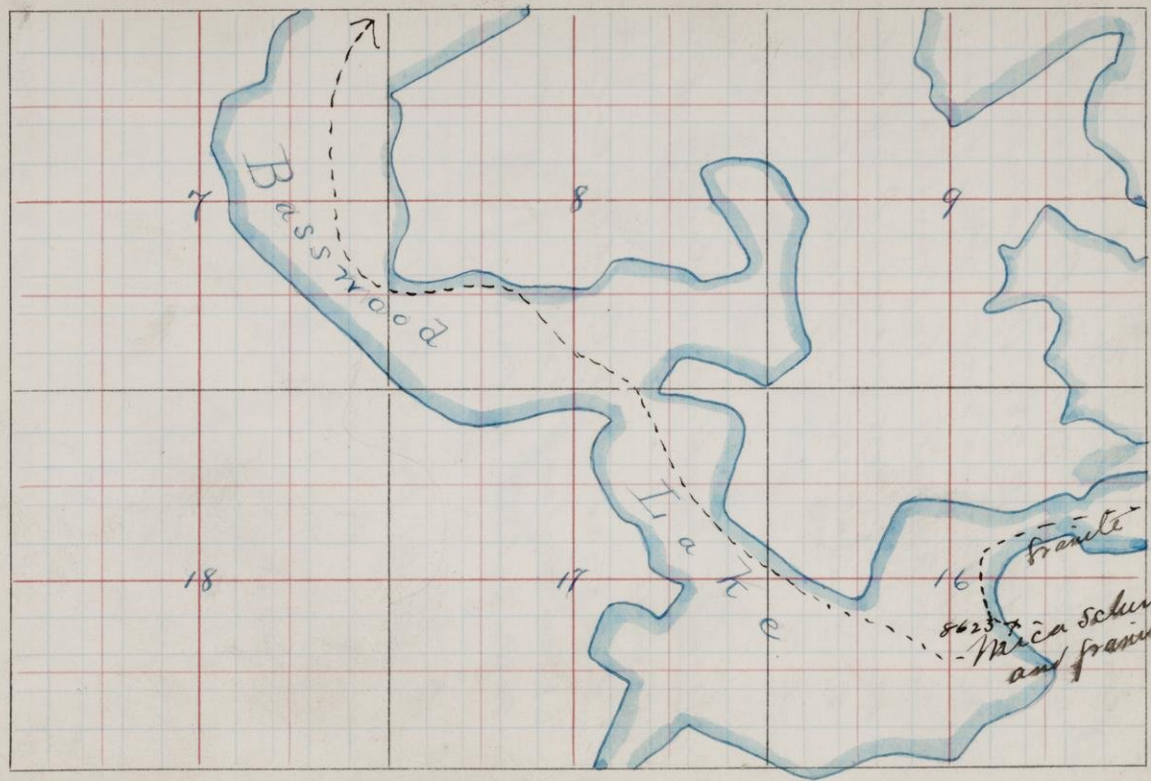
8621
Hb. Sch.

Like 8620 but lighter colored -
(grey instead of red)

8622

Mica schist or gneiss.

Photos at point 8621



18

17

16

8

9

8025
Mica Schult
and friends

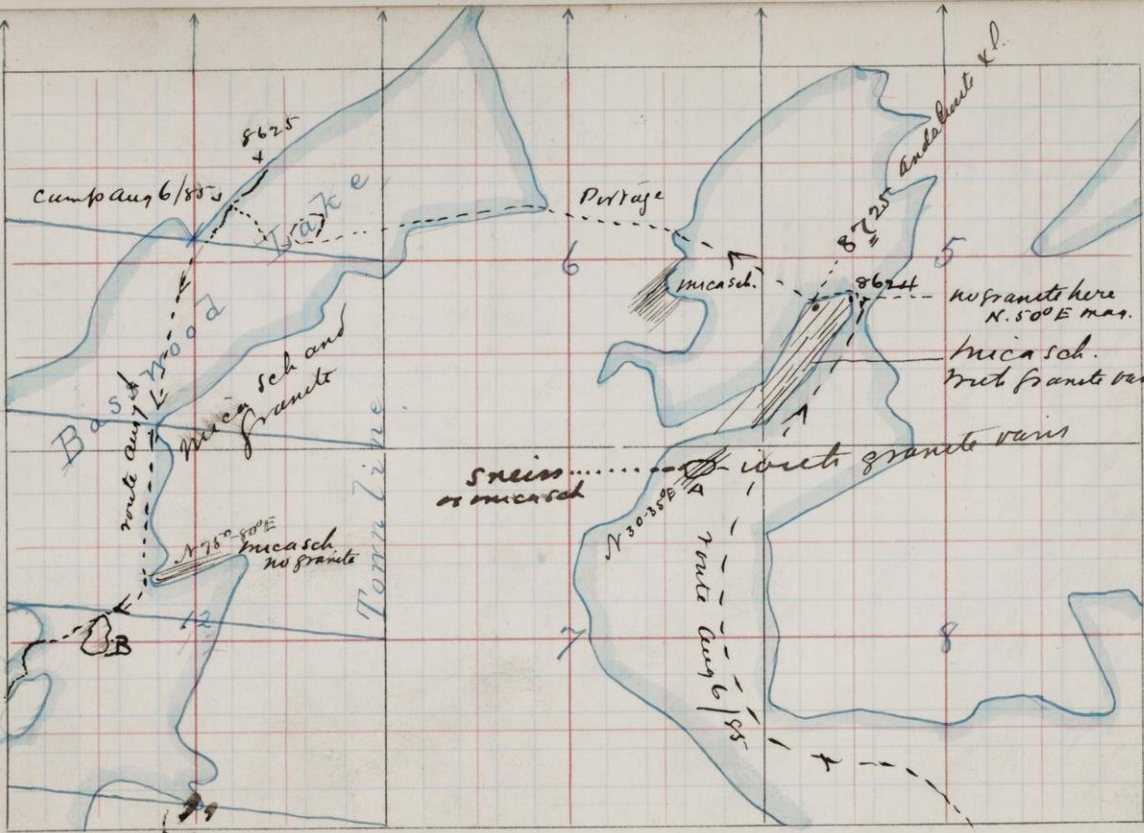
Basswood Lake 81

8623 Mica sch. light grey quartzes.
Mica sch. Penetrated by great veins or
masses of granite identical
with 86210c - There are also
smaller ramifying veins.

82

T. 64

R. 10



Basswood Lake 83

at Island A map p. 82 grey
mica sch. or gneiss with granite
veins.

Schist trends not more than
 $30^{\circ}-35^{\circ}$ E of N. magnetic

8624 Same gneiss or sch. no granite veins
sch. trends N. 50° E mag. care-
fully taken. Large Anomalous
site x c a foot in length. Mostly
composed of mica sch. - lying plane
to bedding occurs here. (8725)

Aug 7th 1885.

All along in vicinity of camp of last
night great areas of granite occurs
not here and there mica schist
or gneiss, plainly intersected by the
granite, which, in common with the
sch. is itself intersected by fine-
grained felsitic veins.

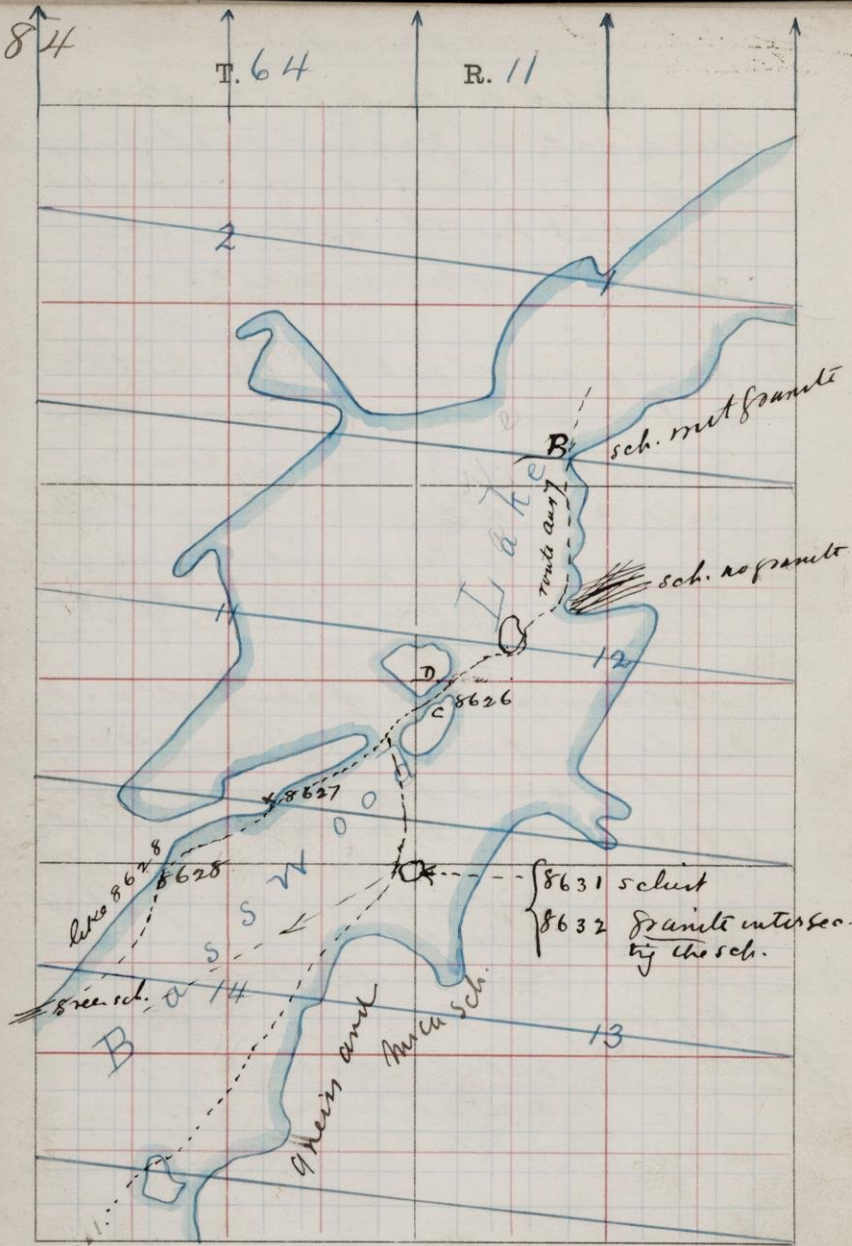
8625 - Shows this granite with inter-
secting seam. (Specimen destroyed)

Glacial scratches, on island B. map
p. 82. mica sch. surface sloping 25°
N.N.E. Scratches S. $8^{\circ}-10^{\circ}$ W. mag.

84

T. 64

R. 11



Basswood
Lake

3 feet below mer. granite

85

At point B, map p. 84 on leaves
the granite

8626 At C & D the schist changes
somewhat in character

8627 Again a schist like 8626

8628 is a lighter colored mer. gneiss like
rock. runs along for some
distance

8631

8632

See map p. 84. Here we have
granite veins again - but small

8633

8634

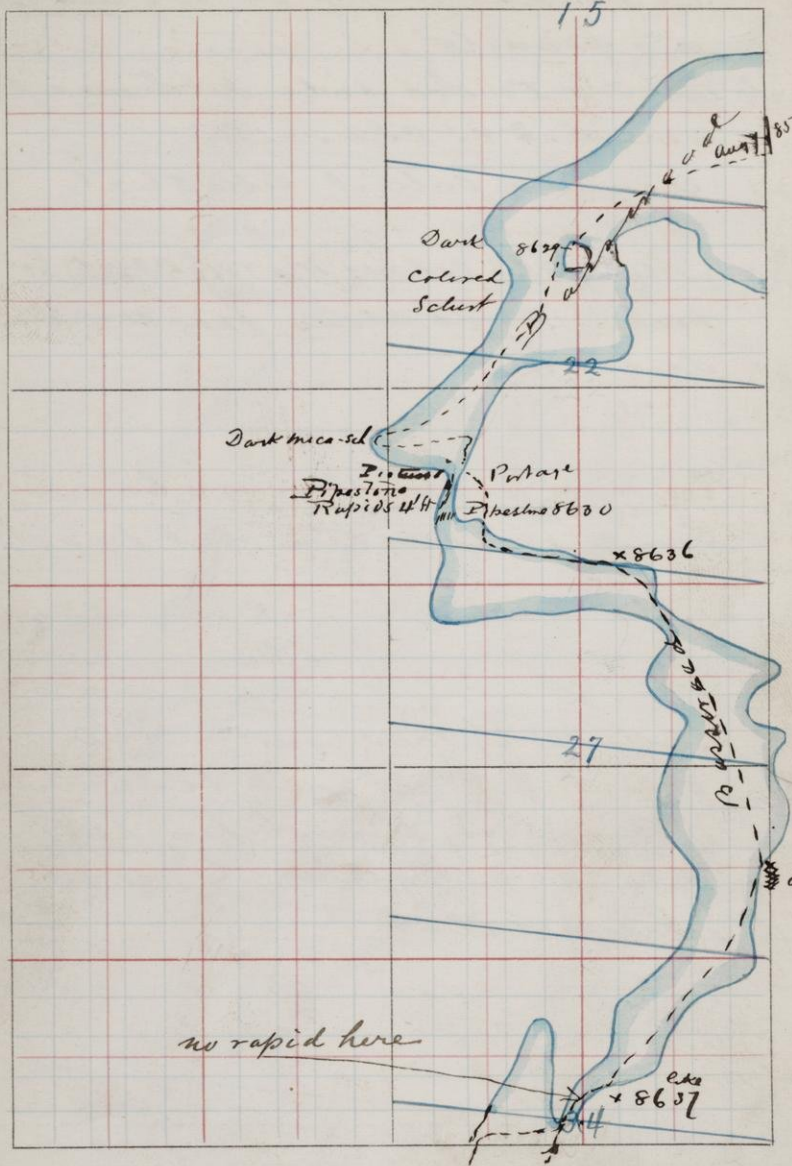
8635

collected by Merriam in order
from N. to S. on East side area
of Basswood, through sec. 14. From
Islands altogether Gneiss
is mica-schist.

86

T. 64

R. 11



Baseword Lake

87

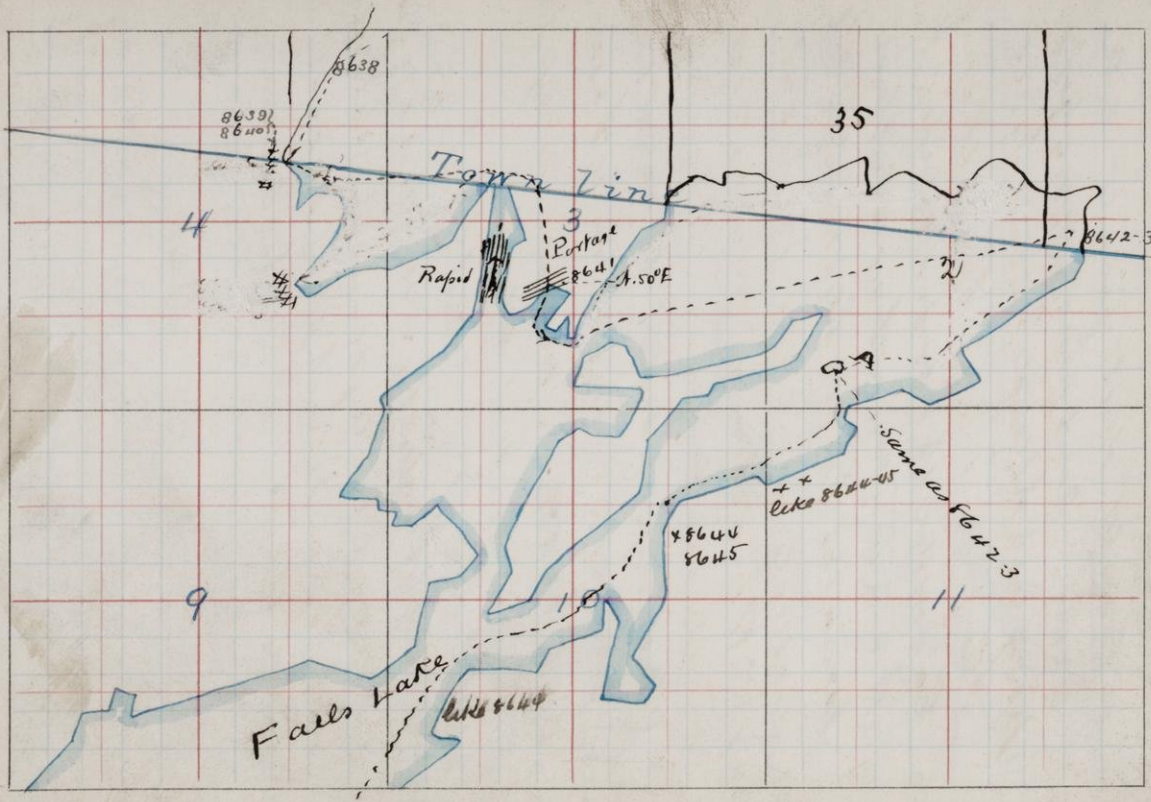
8629
Hb. Cmc
Island - Dec. 22 - 64 71 a gneiss
or granite with felsite like
veins - Contains much
greenish blende?

8630 The "pipostino" at Pipostino rapids. Is
it anything more than a rocted
mica schist. or hydromica sch.

8631 }
8632 } See pp. 84-85

8633 }
8634 } Collected in order by Merriam
8635 } from Mt 5 - Dec. 14 64 11 - See
pp. 84-85

8636 Chloritic greenish schist } see
Chloritic sch } map
8637 Pale greenish schist } p. 86



and Falls Lakes

8638 green sch.

8639 green sch. N.E. trend
Ch. Green sch.

8640 Banded ferruginous porphy material embedded in the green sch. in lens-shaped layers 2' or so wide. There is no question that this material is both interbedded ^{with} and graduating into the green sch.

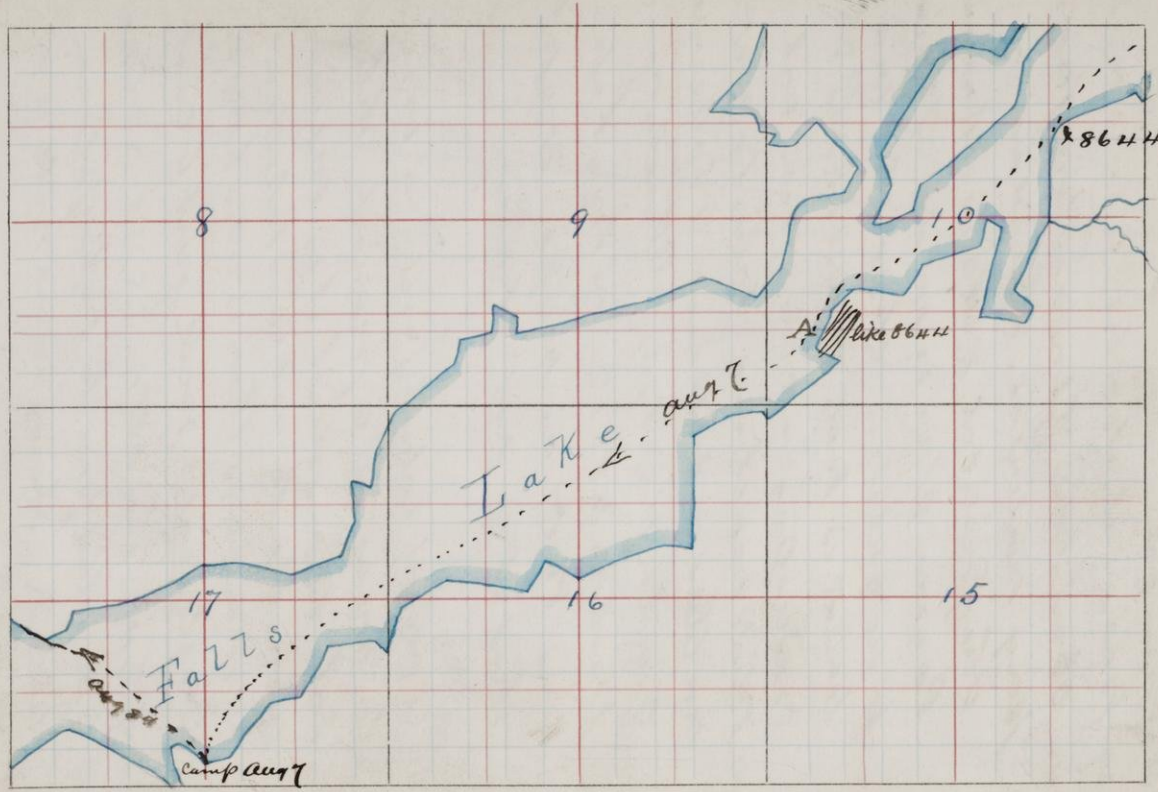
8641
H. sch. Co.

White weathering schistose rock mottled on surface. A squarred quartz porphyry? Closely comparable to 8552 on Long Lake and 8607 on moose. Except that it is not shaly.

8642 A greenish schistose rock, in irregular areas in a greenish schistose bed. than which it is much more dense. and less schistose. Verrier says there is also here a Conglomeratic rock just west of 8642. This all is S.E. 55 3564-11

8643 is the schist from the same place. Plot A shows same rock as 8642-3,

Glacial Markings S 10° W. May



Falls Lake

8644?
8645 }
Cherty grey
slates

Light grey greywacke-like and
cherty rock trending to schistose
structure - from N.E. point of
bay $2\frac{1}{2}$ 10 63 11 W. Merriam
says more of same - with shet-
stone, in bay to N.E. see p. 88

At A. map. p. 90, SW. SW. 10,
63, 11 rock is again like 8644
but that it is slightly more
schistose. Trends N. 40° E mag.

92

T.

R.

See map p. 40

Falls Lake

93

August 8th 1885

At 2 on map p. 40 has a
whitish iron stained mottled
schist highly contorted, striking
N. 45° E mag. closely like
864100.

8646 Lee map p. 40 - Green schist.
Can we call this sch the older
formation, and the white schist
or shale just added above the new-
er?

8647 White or sea crumbling shaly rock
N. 45° E mag. See map. p. 40

8648 more shaly portion of 8647
If there are newer series the old series is put
in front on ridge

8649 Lee map. p. 40. Collected by
Merriam.

See map p. 38.

95

Long Lake - North shore of
see map. p. 38

8650 Ridge on N. side Long Lake
Sto 22-63-12. A green schist
much veined with quartz. Trend
E to NE estimated - Eighty rods
further north across an inter-
vening depression is seen a
bold ridge estimated at 200ft above
the lake - Upon this Mr Merriam
last year found a greenstone.

8651 Near the greenstone ridge making
bold cliff to south, comes to
the Lakeshore
at B p. 38 - is green sch. like
8650

8652 see map. p 30; west end Long Lake
near mouth Burntside River. Dark
grey - slaty - trend N. 55° E. magnetic -
this quite an iron series appearance -

See map p. 26

Burntside Lake 97

8653 See map p. 26 Granite island in mouth of Little Bay of Burntside Lake from which portage starts to Burntside Riv. Granite intrusions in the associated mica schist.

8654 Burntside Lake p. 26. Shows contact of mica sch and granite

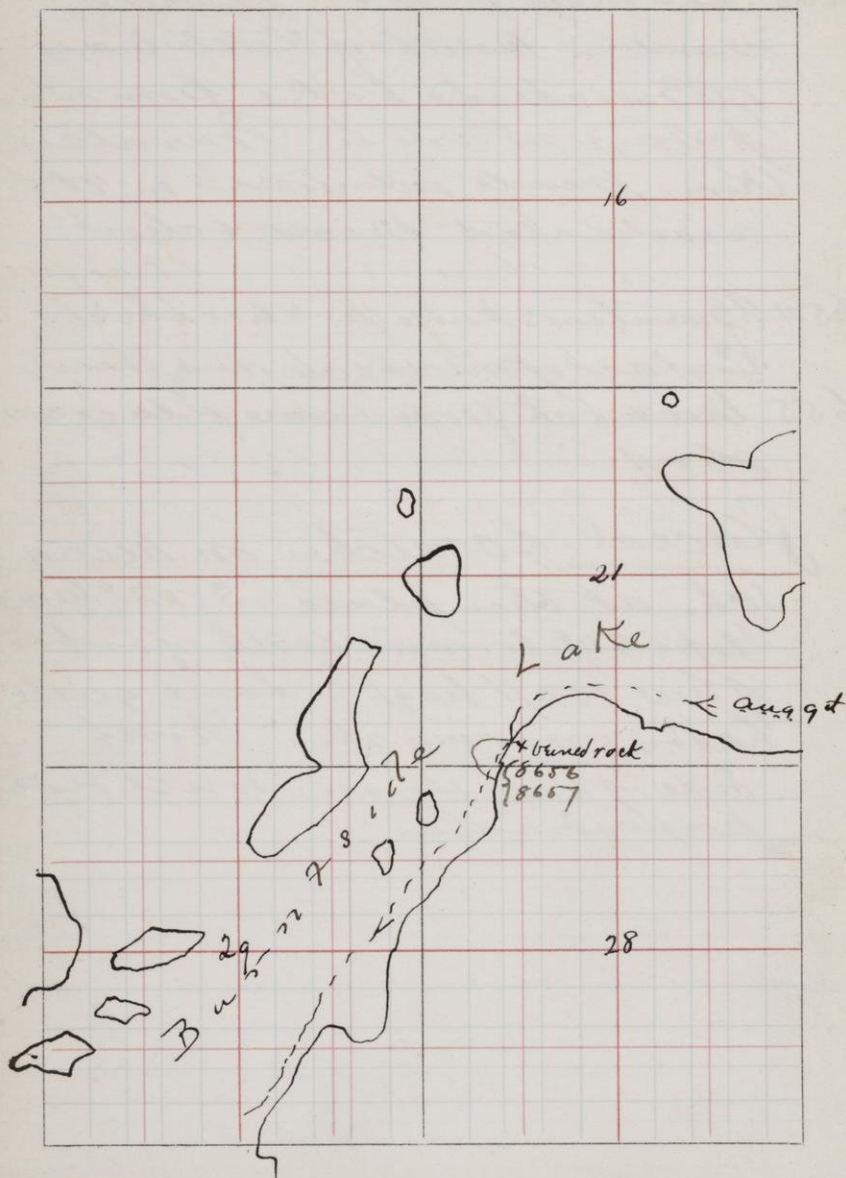
8655 Mica sch from same place as 8654.

Glacial scratches on mica-sch. at this place S 13° W may. Slope 30° towards north foot of hill 150 ft high - some quite heavy grooving also north side of bluff striated - south face perpendicular.

98

T. 63

R. 13 W.

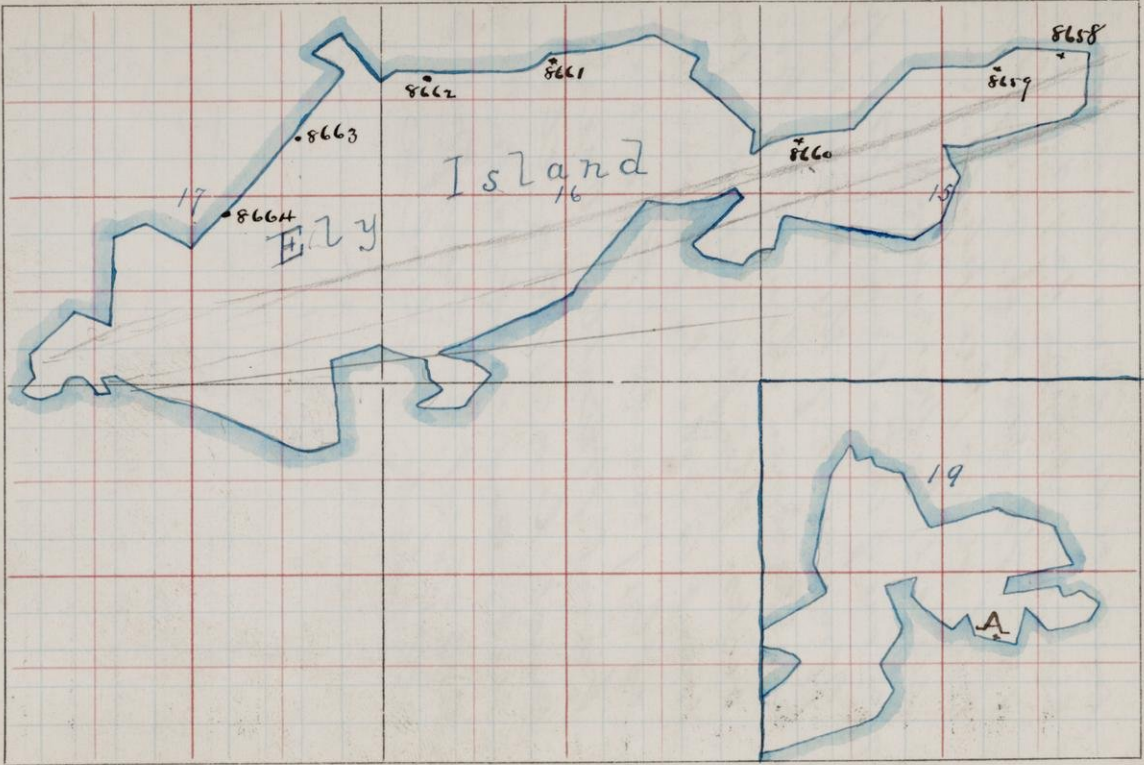


Burntside Lake

99.

8656 Mica sch. with granite veins
south side Burntside Lake
near south line sec. 21 63
13. The rock is reddled
with veins - see photos - and
sketch by Merriam.

8657 is one of these veins. It is full
of fragments of the mica-sch.
and specimen shows the two
rocks. This particular frag-
ment is wholly surround-
ed by granite. The veins
branch prettily. One is
much larger than the
rest, and makes a not-
able object as seen from the
other side of the lake.



Vermillion Lake

101

8658

8659

8660

8661

8662

8663

8664

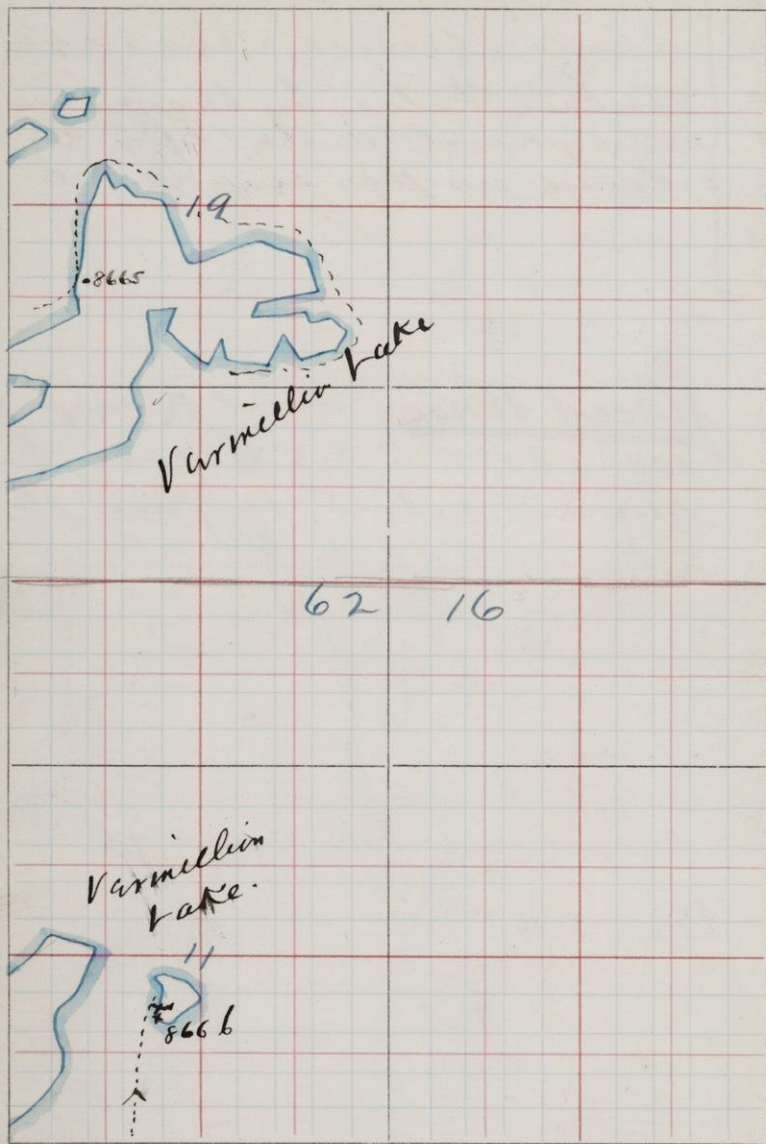
Specimens taken by Merriman
along west side Ely Is-
land as per map. p. 100

Glacial Striae Point A - map. p.
100. $S 2^{\circ} E$ to $S 3^{\circ} E$ mag. On
quartzite & slate. Surface slopes
 $5^{\circ} E$.

102

T. 62

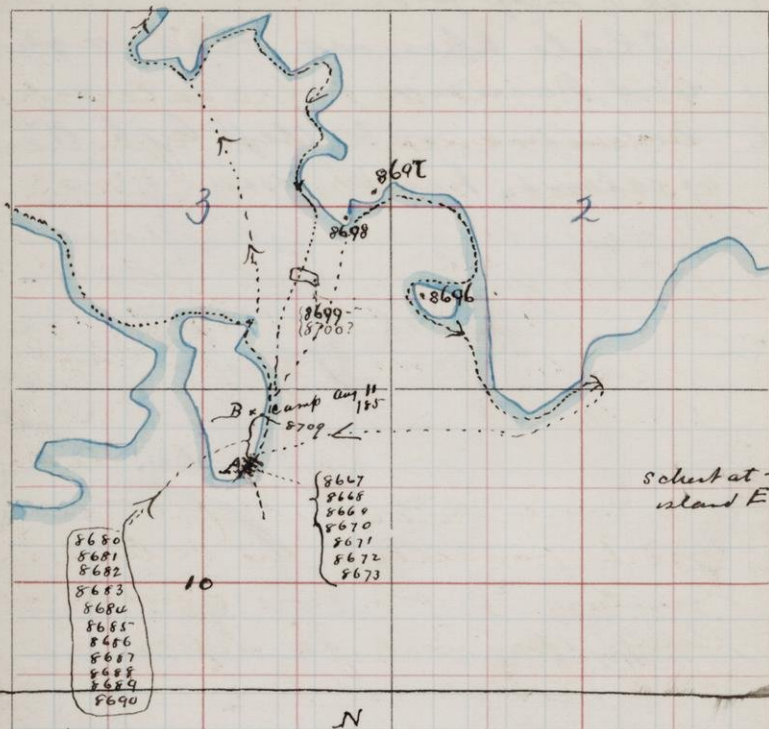
R. 15



Kermellon Lake

103

- 8665 See map p. 102
Slate showing cleavage
and banding.
- 8666 Schistose rock dip high N.
on island. See p. 100



Schist at Bon island E-W.



Staty schist

Blue squares 1 ft on side

Glacial Striae at B. atrov. N. 7° E mag
 chloritic schist - slope East 5°

Vermillion Lake. North Side

Point A. shows some interesting occurrences. An exposure of schisty to slaty rock - E 100 S Mag. about 20 steps across the strike. ⁸⁶⁶⁷ represents this slaty rock at south end of ledge or rather some 5 steps from south end.

8667

At the north end of this ledge is a zone about 4 feet in width parallel to the schistosity structure, in wh. are apparently large fragments of different rock - see sketch by me near from there tend toward a lense shape, but are not wholly so. They are sharply defined.

As they actually foreign fragments?

8668

shows the nature of most of the fragments. They contain many cubes of quartz

8669

other fragments

8670

The matrix of this zone, from close to a fragment.

See map. p. 104

The following are further specimens from
this conglomerate locality near Heron Lake
by Mr. Smith -

8680 - From 30 feet west of congl. bed (8670-68-69)

8681 " 60 " " " " "

8682 " 90 " " " " "

8683 " 120 " " " " "

8684 " 150 " " " " "

8685 " 180 " " " " "

8686 " 225 " " " " "

8687 " 75 west of 8686

8688 " 75 " " 8687

8689 } Estimated 30-40 ft west of 8688

8690 }

all along shore of Long's island in
S.S. 3, and ~~15-10~~ 62-16. Vermillion
Lake

Vermilion Lake

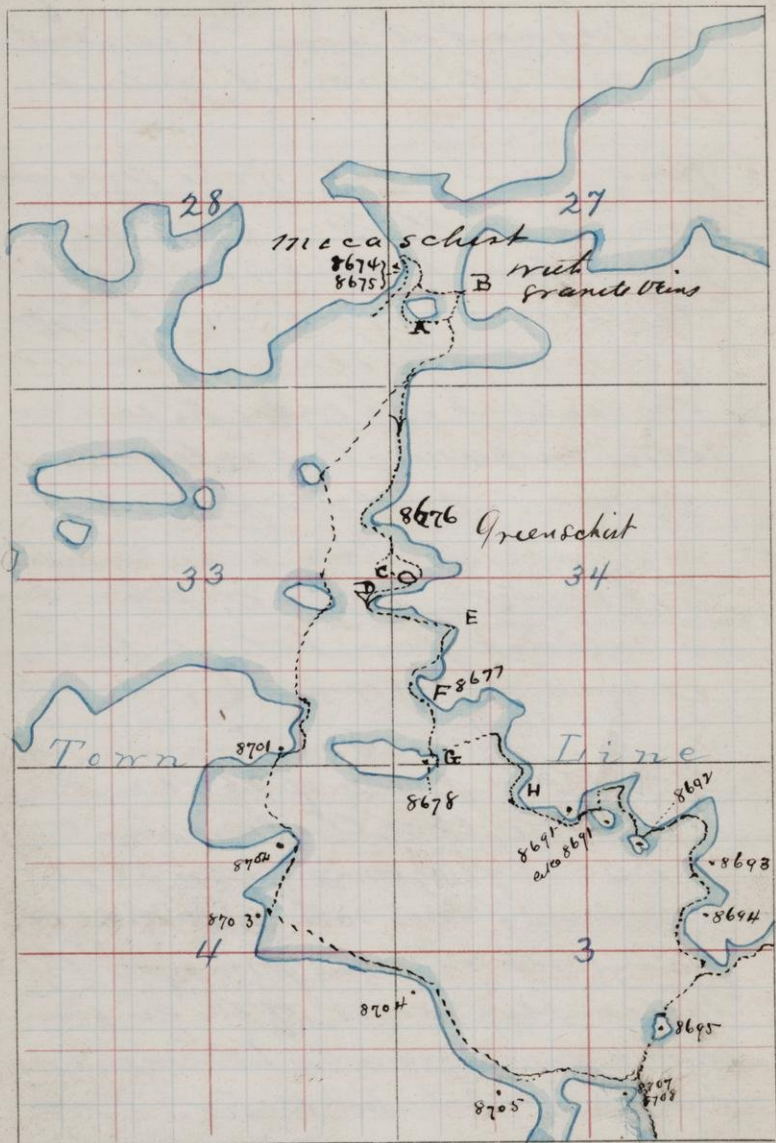
107

8671 Rock immediately north of
the fragmental zone - see sketch
p 104. - A greenish schist

8672 from 10 feet south of the fragment
zone - in the slate - Shows a
sedimentary fx banding oblique to
the cleavage. Specimen shows parts
of thin bands. This slate is banded
throughout - as may be seen on
close inspection, but intensely
squeezed into slaty structure.

Is it possible that we have here
a contact ~~from~~ between two
dissimilar formations?

8673 More slaty portion of 8671. Is
it possible that the fragments
8668-69 came from 8671?
Remaining less schistose than the
parent rock on same principle, ^{as} that
on ^{the} Q. porphyry pebbles of the conglomerate
on south side of Vermilion L. remain ^{not}
schistose in a schistose matrix?



Island A. map. p. 108. Fine grained, 109
occasionally gneissic mica sch.
The same rock shows out large exposure
on mainland = 8675

8674 is granite intersecting 8675
8675 as on map. mica sch.

at B the granite veins are 10-15^{ft} wide
and dense on the edges. The schist at junction
with the veins is greenish and chloritic

8676 greenish schist trending slightly
50° E. What is the relation of these
greenish sch. to the mica sch?
Is it possible that they are merely
a phase of the mica sch?
My friend the two schists no closer
lyrics than this.

8677. At F map. p. 108 - hard quartzite
site.

8678. At G - on island

8679. piece of the greenish sch. from
C, D, E, and H.

8680-8690 - see p. 106

Aug 12 1885

8691 Contacted green schist - Trend N. 50° E
mag.

8692 - Green schist - less schistosity than 8691

8693 Light gray clastic schist - N. 50° E seems
to show sedimentation trending oblique to the
clearage.

8694 - see plat.

8695. island - Green sch. E-W.

8696 slate N. 70° E, strike = sedimentation
bearing nearly parallel to clearage. Note that
this is the first rock as far south looking reaches,
like the tm. series. see map p. 104

Vermillion Lake

8697 see map. p 104. located by means of corner

8698 shaly rock. E-W. mag. trend
has nests and seams of white qtz

8699 schist E-W. mag } map p.
8700 phase of 8699 } 104.

8701-8708. see map p. 108 - specimens
taken by merriam on east side of
channel.

8705-6 are conglomeratic green
schist. Here seems again a
break between the two formations
green sch. & slates - and a more
satisfactory one than the other just
described (p. 104-106) (Partly in the green sch.)
This congl. sch. strikes E-W. carries
qtz nests. Also not very plentiful small
angular qtz pebbles, and perhaps some
of schisty & slaty material. But
there are also large chunks of a
granitoid rock. see specimens.

8709 schist from B - Long island - map
p. 104.

