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American/Canadian National boundary: Thunder Bay to Saganaga Lake: [specimens] 6751-6862. No. 5 1883-08/1883-09

Irving, Roland Duer, 1847-1888

[s.l.]: [s.n.], 1883-08/1883-09

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U. S. GEOLOGICAL SURVEY

FIELD NOTE BOOK

No. 5.

Aug + Sept. 1883

National Boundary

Thunder Bay to Saganaga Lake

6751-6862

R. D. Irving

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

INSTRUCTIONS.

1. Devote at least two pages of this note book 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. 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 smaller spaces as 100 paces, each of the spaces between the red lines as 500 paces, and four of these large spaces as one mile, or 2,000 paces. Usually the southeast corner will be placed at the first red 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 down one space, 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, after which give in order 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 exposure as possible. Very often the notes for one section will cover more than one page in which case pass to the next right hand page, *repeating the map on each left hand page* as long as the notes, with regard to one section, continue.

3. Collect a specimen from each separate ledge of rock, or whenever 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 the note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples will be allowed, but in all other cases *large sized trimmed specimens*, with chips for slicing, must be selected in accordance with § 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. All specimens are to have numbers painted on them, in white on a black background, in camp.

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, etc., etc.

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

#5

maps

Natural Boundary
Thunder Bay to Saganaga
Lake.

Aug 26
1883

Portage Bay Island Minn.

See Winchell's (H.H.) 10th Annual Report for that West. Survey of Minn. for a section of the island. This I attempted to follow in ascending order.

The notes mentioned by Winchell (p. 46) as occurring in fragments, but not in place, and supposed to be at the base of the section, we did ^{not} find.

His dikes numbered "551" (his numbers) we failed to find, nor did we find his "550" dike (Portage, however, from a misunderstanding of his labels)

6751 Brecciated rock at base of Portage Bay Island section (Winchell's "549"). It is not all brecciated, so as to make it 16 feet of breccia, as he gives it, but is partly merely a sandy quartzite.

6752 Shaly layers interstratified with 6751. Much of Winchell's "548" is slaty.

Sec.

T.

R.

(9-891.)



See also 1880 notebook
for numbers of other
specimens in this area
also full notes.

Aug 26
183

Portage Bay Island. Cal. 2

- 6753 Slaty material from winchells
"548"; about ten feet (Stratigraphically) above 6752
- 6754 a pebble(?) contained in
the quartzite 6751-2 i.e.,
near junction with overlying
eruptive rock.
- 6755 Slate from below the first
"trap" layer, and from near
to contact with the latter.
- 6756 Winchells dike "541", page
45, 10th Ann. Rep. geol. Mann.
- 6757 The same dike from near
the wall.
- 6758 the quartzite ^(6751-2 i.e.) from near to contact
with this dike.
- 6759 Winchells trap layer "547". The
junction with the underlying
slaty rock is quite irregular,
and characteristically
an eruptive one.

Aug 2.6
1883

3.

Portage Bay Island. Cont.

- 6760 from the same trap layer as
6754, near the bottom con-
tact.
- 6761 Mitchell's Sandrock "546"
- 6762 The same, showing contact
with next overlying trap.
- 6763 From one of the heavy trap
layers on south part of
the island - Keneeneaven.

Aug 26
1883

4

Partridge Falls. Region River

A great dike of gabbro forms the lower leap of the falls. The upper leap is over slates, and slaty quartzites, dipping S., 15° . See Photographic negatives nos , 1883.

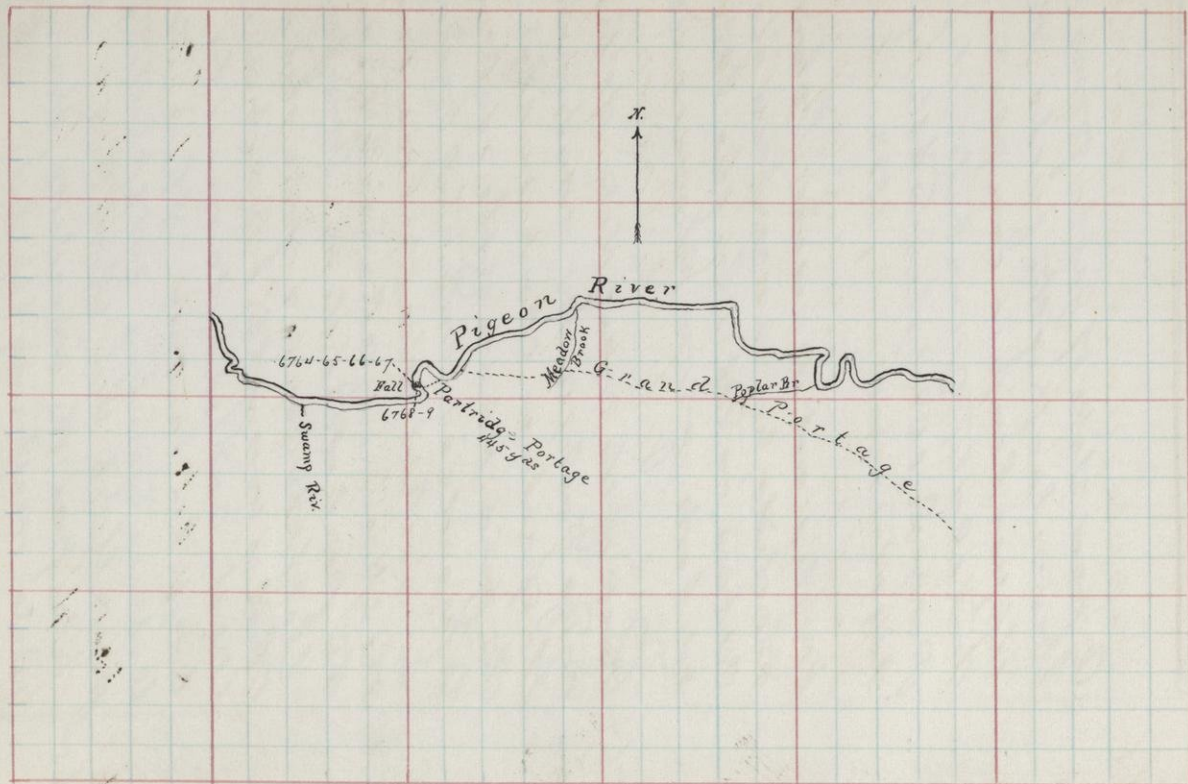
We did not examine below the dike, nor ascertain its certain width. See further notebook of Wm. Chauvenet.

- 6764 Rock of the great dike at Partridge Falls, above mentioned. The specimen shows rather the finer phase of the rock. A peculiar vertical banding somewhat may be seen on the specimen, characterizes this part of the dike. It is parallel to the course of the dike, which is roughly East and West, and is not crossed by any other banding. There is some tendency to jointing and splitting parallel to this structure.
- 6765 also from the same dike, showing nodular weathering (Sp. last).

Sec.

T.

R.



Aug 29
1883

Partridge Falls. Continued

6766

Ripple marked quartzite at head of upper leap, Partridge Falls. Does it contain mica particles?

These claty quartzites dip very regularly southward 15° . They are in part true quartzite, and in part more claty and argillaceous. Some of the layers are very ferruginous. All the layers are much broken up by cross-jointing. Where treacherous above of the hammer brings down showers of large shaped fragments.

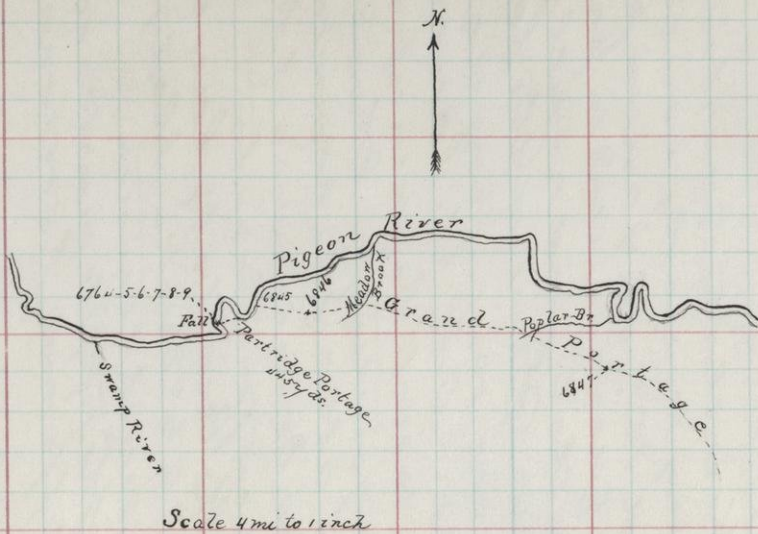
The less slaty layers are 2" to 6" thick - slaty layers much thinner.

The ripple marks occur at different horizons.

See photo. neg. no 1883.

6767

more ferruginous portions of 6766 at or alluded to.



Scale 4 mi to 1 inch

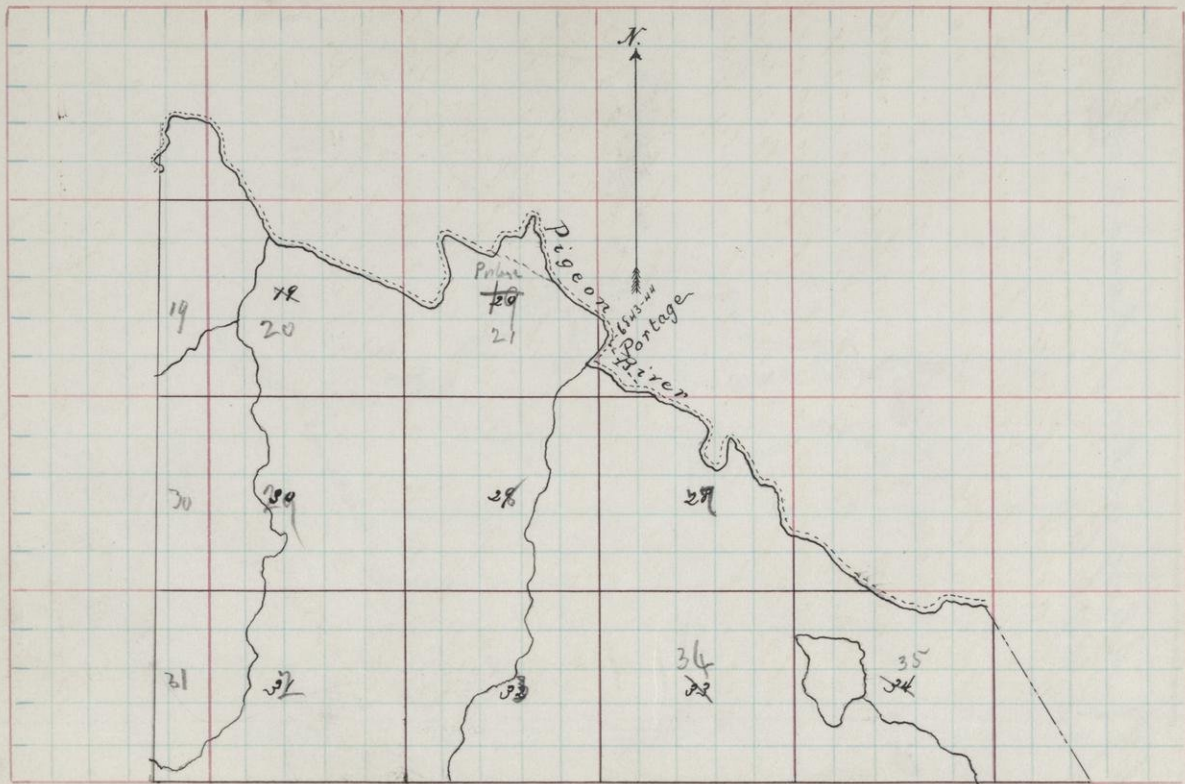
Aug 29
'83

5

Partridge Falls. Cont.

6768 } show other phases of
6769 } 6766

Sec. T. 64 R. 4 E.



Aug 29
83

Pigeon River T. 64 R. 4 E.
7.
Meann.

No important rock exposures
occur along the ^{immediate} banks of
the riv. within ^Abona-happ
above the reservation line
Under water in the rapids
in sec. 28, ²⁷ jointed angular
shaly fragments are very
numerous, and apparently,
the ledge is immediately under-
neath the usual slaty quartz-
ite

At the upper end of the
Portage trail on sec. 28 (or
rather on Canadian side, for
portage is on that side) is
again a mass of fluvial
fragments, angular, of
quartzite and gabbro. These
are evidently in place
nearby. See also infra - p.
The timber is nearly
all burnt off here on both
sides river.

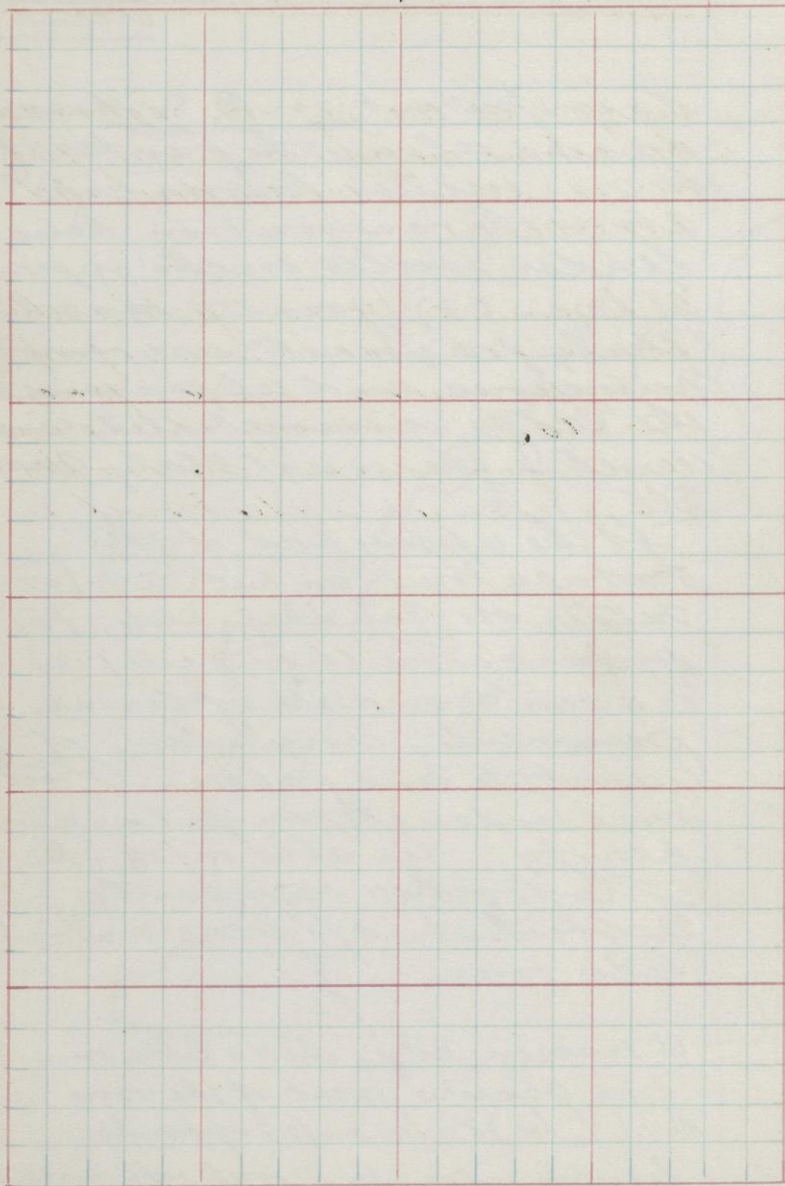
A massive ridge, like like in
form occurs west of the river
in S. 8. $\frac{1}{4}$ sec. 28 ²⁷ See map. opposite.

See also infra, p. with reference
to bed exposures on ridge at north
end of Portage opposite section 21

Sec.

T. 64

R. 4 E. Minn.



Aug 29

8.

1883

Pigion River, T. 64 R. 4 E. Allen. cont.

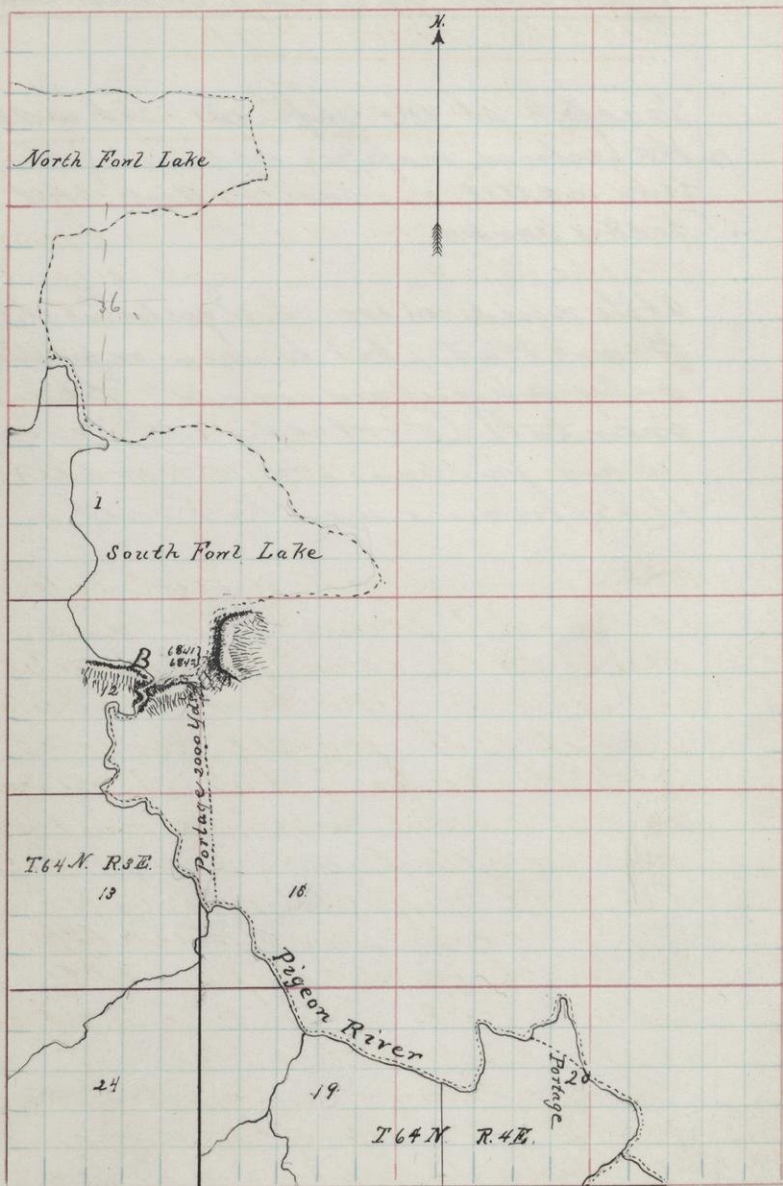
Except at the rapids section 20,
in the sections mapped opposite, the
river is still and mostly deep, with
reedy banks

At the rapids on Dec. 20 I followed the
portage trail, but the men reported
only angular rock frag-
ments. Probably the ledge
is not far beneath the water.
No exposure on the trail.

Sec.

T.

R.



Aug 30
1883

9

South Fowl Lake.

National Boundary

Along Fowl Portage saw
very exposures until almost
at the Lake. But nume-
rous angular fragments
of rocks - slate and quartzite -
occure, indicating that that
is in place - along much of the
portage. Did not follow the
river.

Along the south side of Fowl Lake
abundant facing cliff runs.

This is broken down at the outlet
and is lower for some little distance
on each side of outlet for some
little distance, but it runs
as far as one can see east and
west from the lake. is plainly
one of the cliffs characteristic
of this region, and due to
the southward dip. The

south side of the ridge is a moder-
ate slope up to the north.

The ridge may run something north
west and south of east - (M. C. C. C.)
(9th annual) makes it $W 25^{\circ} N$.
but probably the correction has to be

Bruck Ford Lake Cont.

applied to this which is presumably a magnetic bearing, and which is probably accurate. My own magnetic observations, not from a very favorable point - made just at East side of the portage at the south end of the lake, where the ridge begins to break down to let the river pass through, there is a red precipice.

This cliff is 327 feet high above the lake according to Winchell. $\frac{2}{3}$ rd of which height is a columnar coarse gabbro - for specimens see subsequent page. The remaining third is composed of chert and quartzite and slate of the series -

See photographic negative No 1883.

This columnar mass at top of this ridge is plainly one of the usual interstratified layers.

Immediately above it, and at portage cliffs face in all directions, because of breaking down wall on

11

Sweet Fowl Lake. Cont.

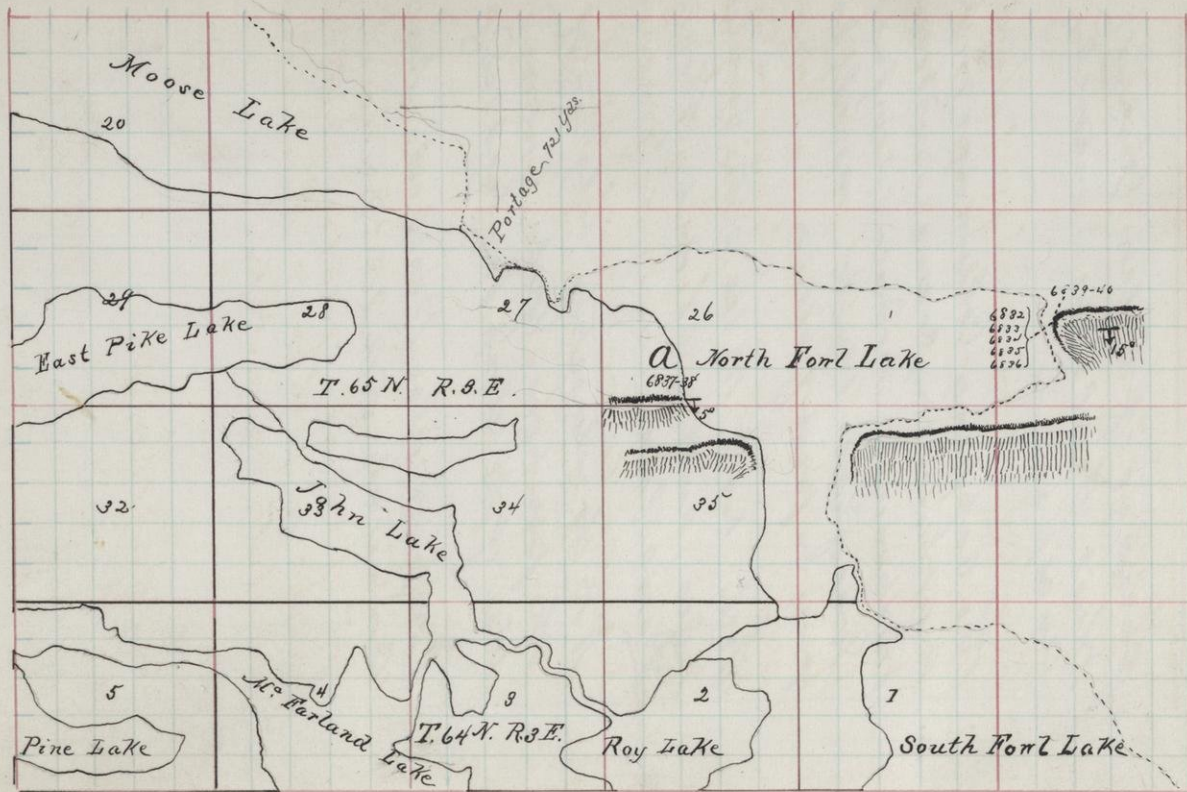
passage of Pigeon River - of
Sweet Fowl Lake is merely
an expansion.

The capping Columnar rock
is at times very coarse - and fractured
but a rough nodular surface.
Some of it is black - mostly dark
grey on fresh fracture.

To the north we see other similar
ridges, north of the end of Sweet
Fowl Lake.

Note the interesting relation of
the positions of the Lakes to
that of the steep backed ridges.

Compare also Winchell. *Reith*
Canadal. pp 74-75.



Sec.

T.

R.

(9-891.)

12

North Four Lake.

National Boundary

Between South and North Four Lakes the river is mostly very deep - with reedy banks. The passage between the lakes, and the southward extension of North Lake, cut a series of north dipping layers of gabbro etc - and the same structure is to be seen beautifully from South Four Lake - looking E.

It is particularly fine however on the Canadian side of the northern extension of North Four Lake. - see subsequent page. Also photo. neg. no. 1883

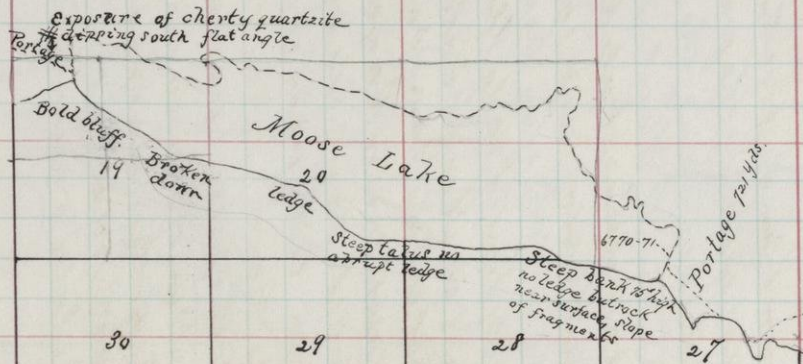
Note that we have here demonstration of the interstratification of coarse gabbro quite comparable with that of Shander, Cape, but clasts & quartzites.

See further p.

Sec.

T.

R.



Moose LakeNational Boundary

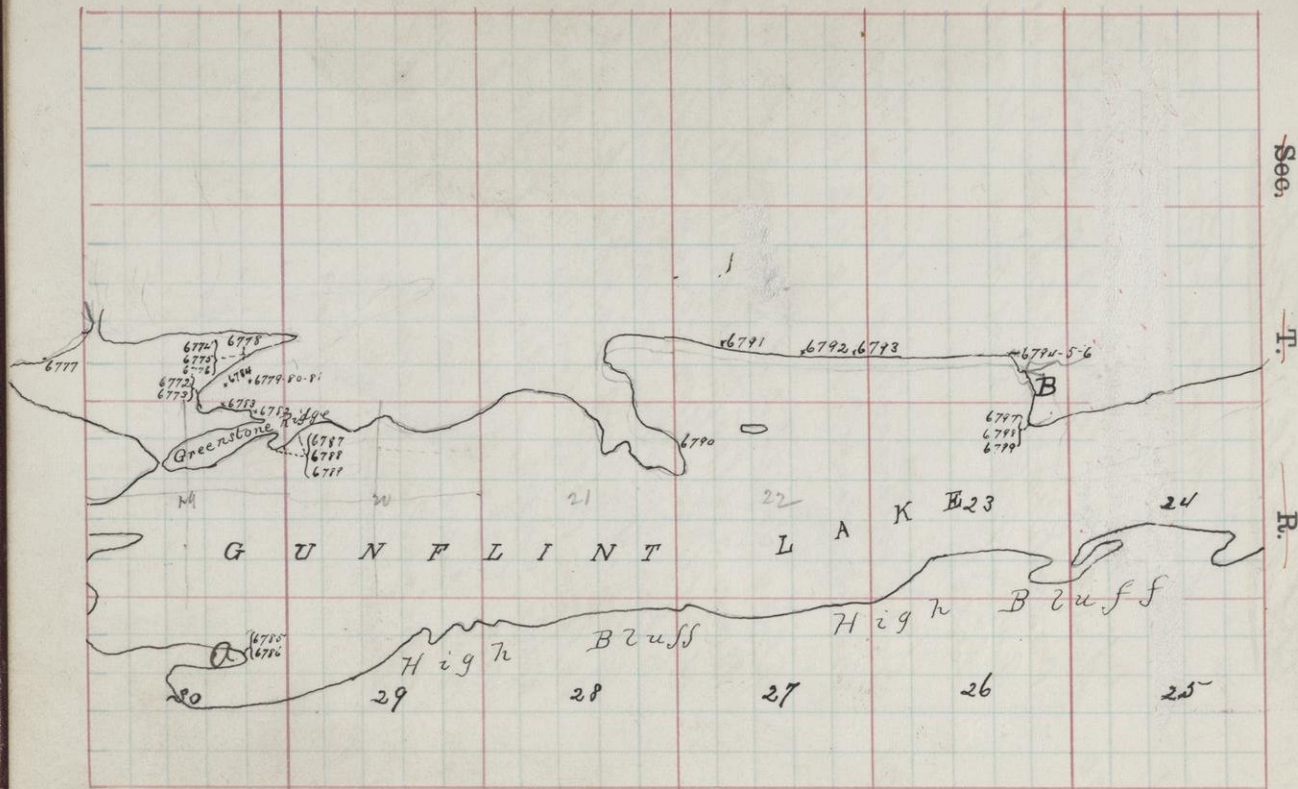
6770 Low ledge (110' high) of coarse crumbling gabbro, on Canada side of trail, east end Moose Lake.

6771 Dike intersecting 6770 - Fine-framed black dike 12" to 18" wide along South side Moose Lake. Near a steep hill-side, made up of talus from back side of a great fault layer ^{and of scoria}. Elsewhere that shows Four Lake. No cliff is seen till near the west end of the lake, where we find a bed one. But all the south side of the lake shows a bed hill up. is plainly, merely a broken down ledge.

See,

T.

R.



Sept. 4
1883

14

Gunflint Lake

National Boundary

6772. Quarzite from point A. map of opp. page.
Outlet of Gunflint Lake. Irregular
thin layers. The thicker layers (2" to
6") weather down into thinner ones.
Rock is cherty, and more or less
iron stained. While layers are
irregular as a whole dipping very
regularly S. westerward.
- 6773 Peculiar sparry material (siderite?)
present in some layers of 6772 - Due
to secondary action? Has not the whole
rock undergone a secondary action
- 6774 Low ledge of Jaspery iron ore-
or jasper schist! See the char-
acteristics note book no 1, and specimens
The specimen is from the more jaspery
layers
- 6775 More arenaceous and quartzite like
layers interstratified with 6774
Some layers thin and clay

This ledge (6774-5) runs along
north face of the point some dist.
under much fueler timber.
No jasper lies exactly as at the old
Home Mine, Cascade Range, in the
S. west.

Sec.

T.

R.

See maps opp. p. 14 and ¹⁵18

Gumflint Lake - Cont.

15

6776

Strongly magnetic layers found
on same ledge as '74-'5. Compare
this very interesting ledge with
juipery schists everywhere
seen in the Marquette and
Menominee region.

Coming south one's point
found a white reacting
quartzite, stained with
black micaceous. Com-
pare with Plover
Range.

See section and map opp
p. 18- for more exact location of
these specimens.

Sec.

T.

R.

See map opp p. 14

Sept 5
1883

Gunflint Lake. Cont.

16

6777

Granite from S.E. $\frac{1}{4}$ 13, T. 65
R. 40. White reaching
masses - dome like exposures
occasionally cut wide apart,
great joints cutting the mass
into immense irregular blocks.
All the granite about the outlet
to Gunflint Lake is like this.
"The Saganaga Granite."

Sec.

T.

R.

Also see map opp. p. 14.

Sept 5
1883

17

Gunflint Lake Ont.

6772, See p. 14, dips south-fifteen degrees. Strikes E-W. and is strongly magnetic. Thin magnetite bands are included -

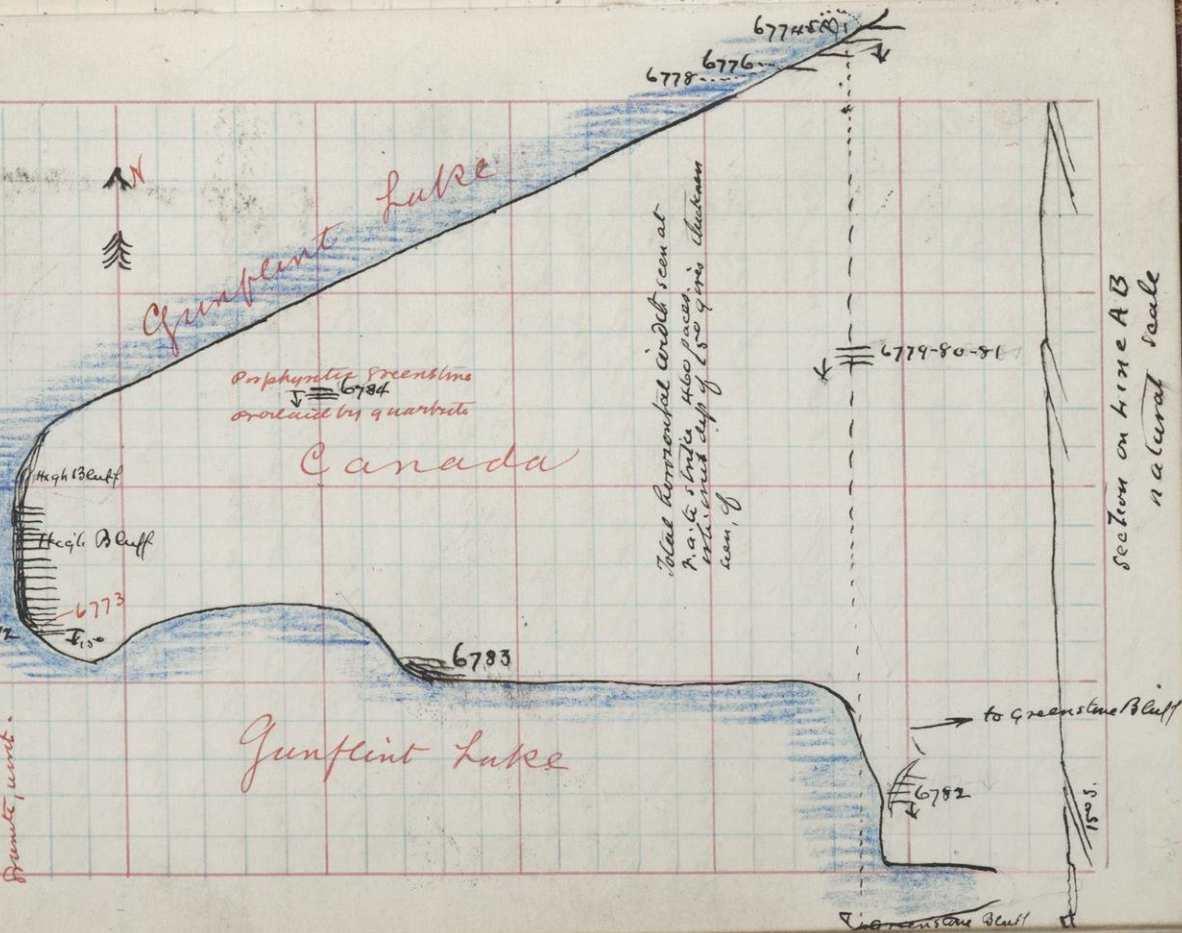
6778 from same place as 6746 - select to show mingling of specular iron and feldspar. Ledge perpendicular showing ten feet thick.

6779 See map opp. page, and section -¹⁸ This is the grey quartzite referred to on p. 15. It is seams out white quartz, the seams running usually parallel to the bedding. Ledge presents good vertical face to north. Compass needle strongly affected here.

6780 Thin magnetic seams inter-stratified with 6749 - Compare with Penokee Range and Agnew Lake. Probably also there is some magnetic dissemination through the rock. Whole exposure 10 feet thick. Brown stained holes show here and there. Does

Map of Point A Juniper Lake Map. p. 14. 1915.
 Each square 20 paces on the side. Section 8 and 9
 scale - Sec. 8 from actual measurements and comparison reading.

Designated especially to show thickness here of the
 cherty beds or "Juniper beds". Thicknesses calculated
 measured here, shown as added lengths distance to the
 granite unit.



Sept 6
1883

18

Juniper Lake Cont.

this indicate the reacting
out of pyrite?

In places the
magnetite is evidently
mingled with the quartzite,
and again is concentrated
in seams. Seams of mag-
netite over up to 2 inches in
thickness, and are often
quite rich. Still on the
whole the rock must be
much cleaner than usual
on the Penokee Range.

Some of the quartz seams
are included, when broken
open show good cleavage,
on surfaces parallel to bedding.
Also there are irregular
nests of white quartz. Jud-

ging from external appearance
this rock shows the
indurating quartz.

6781 is one of the richer magne-
tite seams of this rock,
above alluded to.

6782 See map opp. p. 18 for location - a
quartzite facing W., 4' high
cliff running west of south.
Cold Greenstone cliff lies

Junfleit Lake, Cont.

$\pm 10^{\circ}N.$ from here (magnetic) this
bluff lies high and hence the green-
stone reaches on it further south
than it would at the lake level.

6783-

chert, ferruginous layers, see map p. 18

6784

Greenstone - porphyritic - located
as shown on maps p. p. 17 and 14.
It is immediately overlaid by quar-
tite layers, it is thus evidently
a thin intercalated green-
stone.

Sec. 30 T. 65 R. 3 W - Monn.

See map app. p. 14.

Gunflint Lake Cont.

- 6785 Black slate. Point south side
Gunflint Lake. N.E. 30, 65, 30
dip. Layers vary in thickness.
Is it carbonaceous? Large con-
cretions occur here on the beach
often 1 foot diam., with a heart of
iron pyrites. Point D. - map. p. 14
- 6786 One of these concretions, or rather
a piece of it.

Altho' the point is high the slate
only shows here and there in low
exposures, being mostly weath-
ered down to fragments.

- 6787 } From the cherty "Gunflint" beds
6788 } on point E.F. of Gunflint Lake map
6789 } p. 14. This is on the Cana-
da side. These beds are
very interesting and should
be compared closely with
the cherty beds of the
Huronian of the south shore
of Lake Superior.

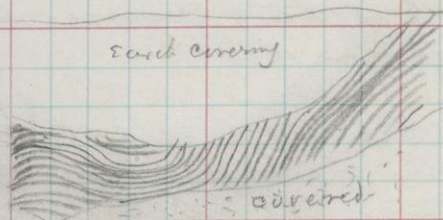
The concretions here super-
imposed upon the general southern
dip are particularly inter-
esting. They are in all probability

Sec.

T.

R.

Sketch showing contortions in
cherty layers, north side Gun-
Glint Lake.



— Each square 1 foot on a side.

— Dip being towards the observer.

Gunflint Lake Continued²¹

Due to some sort of chemical or secondary action, and are precisely the same as seen among the scult Shire iron ore. See sketch on opposite page representing a small area seen on this cliff side - the dip being towards the stream.

Where the fragments of this rock strike the lake shore they are very curiously weathered, being stained brown from hydration and peroxidation of the iron they contain, which on a fresh fracture appears as brilliantly metallic-centered particles dotting a black ground of quartzite. Then the fragments are curiously ribbed, certainly layers dis-ordering away and leaving others standing out. Why is this? There is no perceptible difference in the layers as seen on a fresh fracture. The chert, besides probably occurring continually intermixed, occurs in lenticular concretions and bands usually parallel to the bedding.

Sec.

T.

R.

See map opp. p. 14

Sept 5
1883

Quenflent Lake. Cont.

27

At Fomes the chert looks like pebbles, which are really but displaced portions of the bands, res cemented by the matrix. See also Mr Chaurenets specimens and notes.

At one point along here, a cliff 20 high, and showing as much thickness as this, presents through the whole thickness a peculiar wavy bedding. In one place the bedding dips 50° N., in another 20° N., and again returns around to the normal southward dip.

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1883

Gunflint Lake. Cont. ²³

6790

Lies south 60 W. from island C.
Island C is composed of porphyritic
greenstone, and the same greenstone
shows in 6790 in a bed bluff. This
is taken from the same layer as
6784. See map opp. page.

For rock from greenstone island C -
see Chaurenets' specimens.

This island is steep backed to
the north, and columnar, and is
evidently an interbedded flow.
The shape of the island indicates 20° S. dip.

6791

vertically placed slaty rock. rising
into a bed ridge on the west side
of Gunflint Lake. as per map
on opp. page striking N. 45° E. mag.

6792

a continuation of 6791

No distinct banding made out in
6791-2 parallel to the schistose
structure. Numerous quartz
veins often run parallel to the schist
structure, but as often traverse it.

Further east, this schist includes
a quartzite - see Chaurenets'
specimens, also a slaty showing
distinct banding parallel to the schistose
structure.

Sec.

T.

R.

See map opp. p. 23.

Sept 6
1883.

Gunflint Lake - Cont.

24

Schist on north side Gunflint Lake (6791-2) includes, besides the narrow ones, numerous large quartz beams or veins. According to Chaurenets the quartzite interbedded with these schists runs E-W.

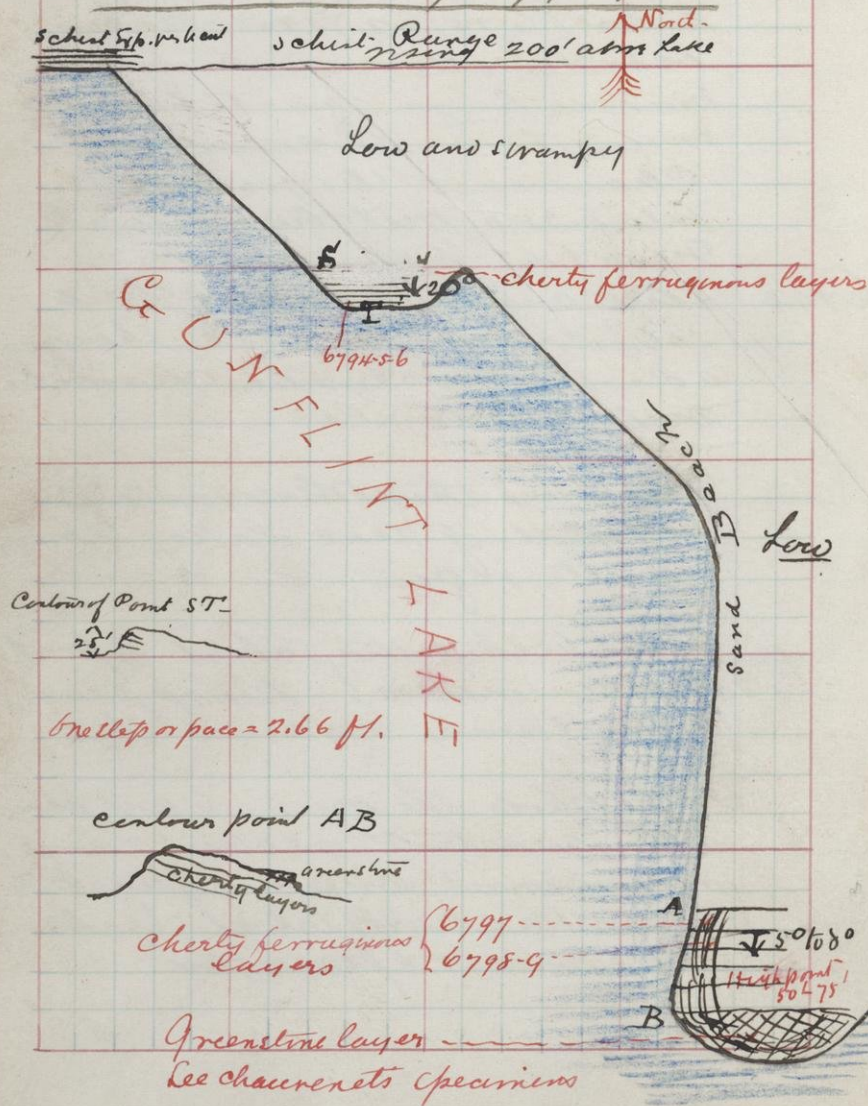
6793 Still another phase of these schists, further east, showing a more porphyritic character, with calcite xls.

Compare this whole section with that of Seal Lake, Mesquite region.

Can it be that this schist is part of the Animikie? The appearances are certainly against it.

On the whole the most usual phase in this quartzite or schist range, is a greenish schistose quartzite, or chloritic quartz schist. See Mr. Chaurenets' specimens.

Enlarged map drawn to a scale from actual measurements and compass (dial) readings, of East side of Bay H, R. Greenleaf Lake
 (9-891.)
 Sec. T. R.
 Map. p. 23 - Designed to show how the Schist and Greenleaf beds approach each other. Each square 20 steps on a side.
 See also map opp. p. 23



25

Gunflint Lake Cont.

Map on opposite page, from
pacing and compass bearings
is an enlargement of East side
of Bay H. Gunflint Lake Map, p.
23. On the west we have the
Schist, vertical, exposed at the
waters edge and running back
into a high ridge, which also runs
Eastward. 180 paces South East
have Gunflint "bed" dipping 20° S.

6794-5-6 - Gunflint bed as on opp. map.

The rock here is more quartzite like
than usual, and is much jointed.
Many rich iron seams (6795) are
included.

6796 is pyritiferous interstratified with
6794-5. On weathering it gives
cellular fragments. Consider here
again the association of chert
and pyrite.

6797 Chert from Gunflint layers as on
map of opposite page
Here the layers are very thin
and shaly, with several inter-
stratified chert layers, not more
rows of nodules, 6" to 10" thick

— See. —

T. —

R. —

See maps opp. p. 23 and p. 25-

Gunflint Lake - Cont.

also numerous nodules and thin layers of chert occur. Layers persistent in proportion (direct) to thickness. All with much iron. See also Chauronets note book and specimens

- 6797 is from a thick layer of chert
 6798 Chert nodules from same place
 6799 Thin iron layers. Same place

From point 6797-8-9 - the Greenstone caland Cr - map opp. p 23, bears N. 150° S
 This greenstone must be the same layer as on the island.

The whole appearance topography - lithology - position of rock beds, is certainly suggestive of an unconformity here.

Construct section from map on page 25.

Sec. 19
T.
65
R. 20.
20.

CANADA

Gunflint Lake

MINNESOTA

20

21

South Lake

sand beach.

International

Rapids

Barzidary

cherty ferrug. beds

16

granite

granite

granite

granite

granite

granite

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thin stone bluffs
overlying "Gunflint"
bed northern face.

Portage

Trail

6802

6802

6802

6802

6802

6802

6802

6802

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6802

6802

6802

6802

Sept 7
1883

North Lake

27

National Boundary

6800 Cherty ferruginous layers along
west side of North Lake. See
map opp. page - lies due west
of the portage to South Lake - Granite
Ridges lie due W. or S. W. from here, on shore -
See also Chaurenets notes & specimens.

6801 Greenstone, low ledge on Portage tract
west to South Lake

6802 Greenstone from low cliff at south
end same portage. Same layer
as 6801 - also same layer as that
forming the cliffs along south side of
North Lake.

The shape of North Lake, its course,
the relation of the granite & chert ledges
on the north shore, and actual road
map by Chaurenets - all show that
here the Animikie trends N. E. but
very flat S. E. dip - and very marked
ridge of a different formation behind
it.

T. 65 R. 1W

Sec.

North Lake

numerous chert ferruginous
High greenstone cliffs, facing north

Canada

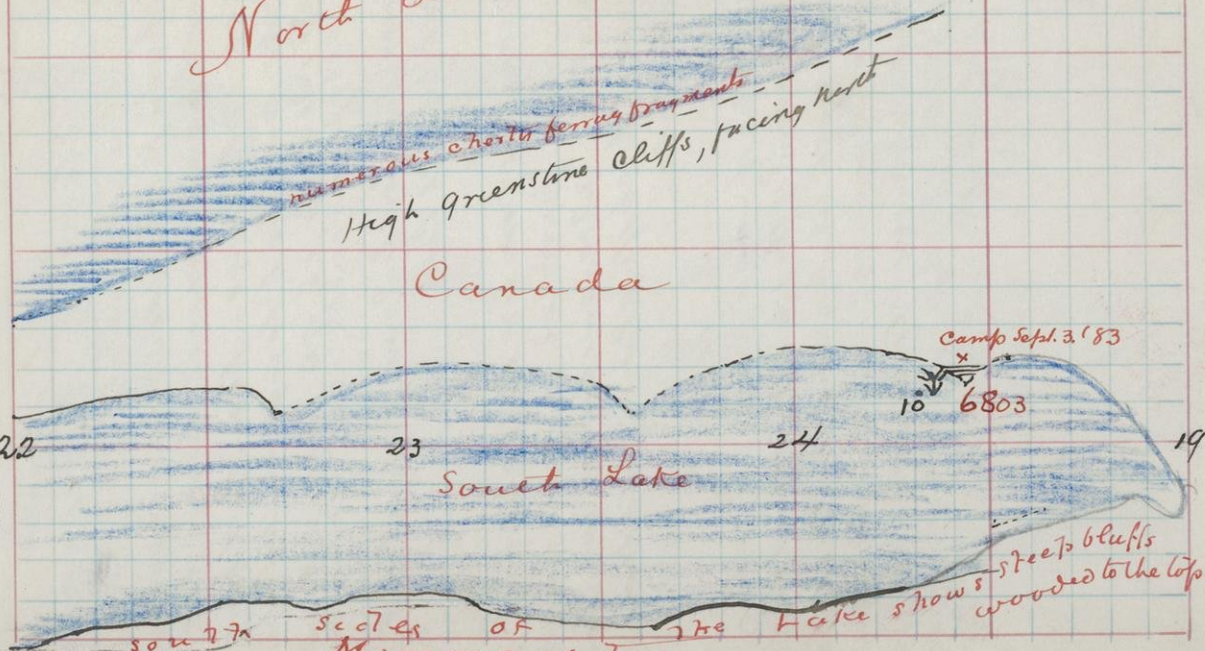
Camp Sept. 3 '83

10 6803

South Lake

steep bluffs
wooded to the top.

south side of
Munro Bay



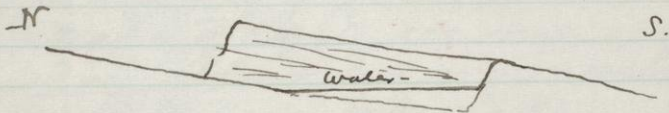
South Lake

National Boundary

6803 Granstone, shelving into lake, south dip, on north side South Lake - See map opposite page... This granstone evidently the same as that seen in the cliffs along the south side of North Lake.

North side of South Lake not surveyed - but it shows the same character as the north shore of most of these lakes. i.e. is scarp-like - being low, rising slowly northward - while south side is bold, the back of a south dipping canyon.

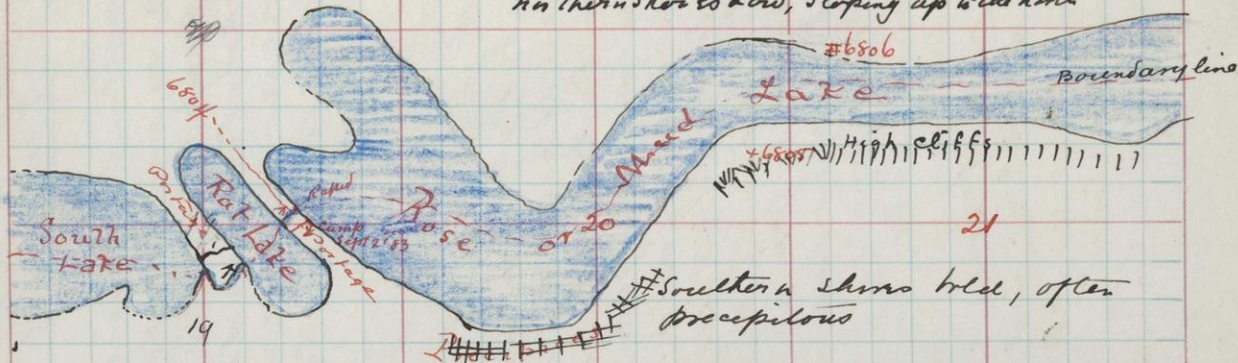
Looking E. from 6803, can see south dipping layers at E. end lake very finely - Indeed from any point in lake, looking E. thus.



65 R. 12
T. 65
Sec. 21

CANADA

nothern shore so Low, sloping up to the north



MINNESOTA

30

29

28

Sept 2
and Sept. 7
1883.

29

Rose or Mud Lake.

National Boundary

6804

Greenstone from short Portage between Rut Lake and Mud Lake. Lies flat and shelves south into Rut Lake - see map of page.

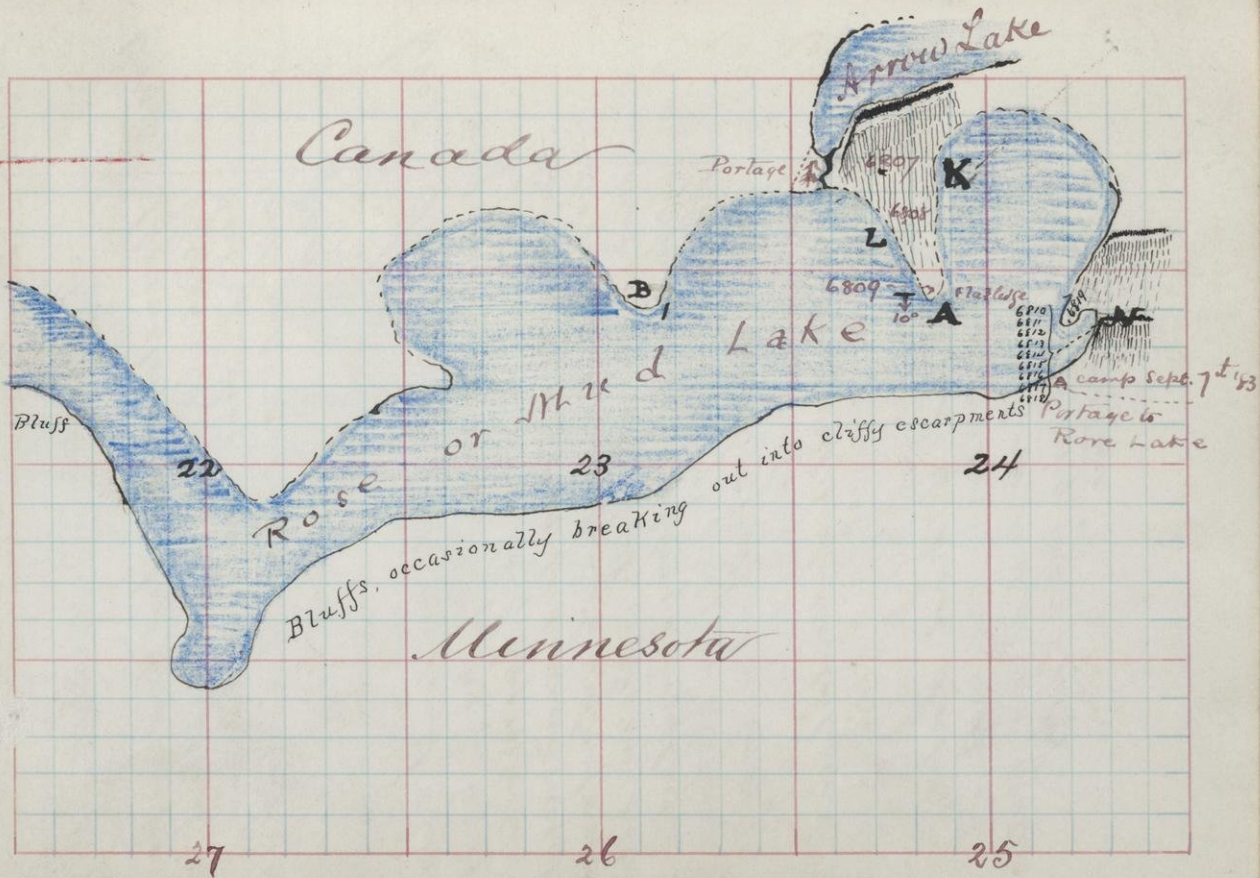
6805

From great bluff on south side of Mud Lake - S.E. $\frac{1}{4}$ N.E. $\frac{1}{4}$ Sec. 20 T. 65 R. 1 W. The bluff has a vertical face of over 150 feet - and must be fully 300 feet high - if not much more. possibly 400. A medium grained grey gabbro; through a thickness of 75 feet from the base of the vertical cliff showing no variation. Large talus at base concealing underlying slate -

6806

from north side of Mud Lake, Canada Shor. see map of page. Above ledge at water level, shelving into Lake - A "Greenstone".

Sec. T. 65 R. 1 W.



Sept. 2 and
Sept. 8th
1883.

38

Rose or Reed Lake. Cont.

6807

Greenstone from top of bluff forming point A + X. This point rises slowly from water at A, where there is a flat surfacing dipping 310° , - on the dip presenting as it rises a higher and higher cliff towards the west, and finally breaking down in abrupt cliff 200 feet (est) high, on the South shore of Arrow Lake. 6807 is from the top of the Arrow Lake face. See view taken at point B looking Eastward. Opposite to map the cliff was ascended, and very numerous angular slate fragments were found on top of the greenstone - evidently the remnant of the overlying slate layer.

6808

These slate fragments -

6809

Flat surface apparently plainly bedded, and yet a finely vane greenstone, from point A, opp. map. See photo. neg. No 1883.

Sept 10
1883.

31

Rose or Mudd Lake Cont.

6810. Slate from immediately below greenstone at top of Great Bluff at East end Mudd Lake, see Photo negs. nos and 1883. This is at N. map opp. p. 30.

6811 From the greenstone mass overlying 6810; specimen from very base of the mass, in actual contact with the slates.

6812 Slate from 20 inches below 6810. The indurated appearance shown in 6810 does not extend more than three inches down.

6813 20 inches below 6812

6814 20 inches below 6813

From the top of this bluff which presents a precipice facing west, and also another higher one to the north, can

Sept 8
1883

32

Alced Lake. Continued

be seen looking west, a most beautiful display of the structure of the country. The south side of the Lake presenting the usual bed columns, precipices facing north, while the north side is low, in scloped forms, the ledges on the shore shelving into the water, and then rising on the 100 S. dip northward, to break down again in columns faces $\frac{1}{2}$ mile to a mile or more further north.

The slate here is probably as much as 200 feet thick (est.), between the overlying porcelaneous of point N, at top of bluff, and the underlying of point O, at crater level. The slaty beds are alternately very thin and even chaly, and thicker and more quartzitic. The thicker layers running 2" ^{thick} to 4" and 6" apart. But they also reacher down into thinner layers.

Sept 8
1883

33

Med Lake Cont.

6815 One of the thicker quartite layers just mentioned.

6816 The thinner more shaly layers, which are often as thin as paper, and black (carbonaceous?)

The largest perpendicular face of slate examined was 20' high. But on the northern face of the bluff (not visited) there must be much more.

The contact of the slate and greenstone is very sharp. There is nothing like a gradation between the two, and while occasionally some little irregularity may be observed it is astonishing on the whole how regular and sharp the contact is. One would hardly expect it to be so regularly parallel to the bedding of the slate. The fine red of the overlying greenstone at its base must have misled Winchell into thinking that

Sept. 8
1883

Alced Lake Cont.

34

the one grades into the other

6817 Shows the average coarse-
ness of the capping green-
stone of the dissected bluff
(point N. map. p. 30)

6818 From the base of 6817 in con-
tact with the slate.

6819 From point "O" map opp p.
30. Most immediately un-
derlie slate of bluff "N."

(9-891.)

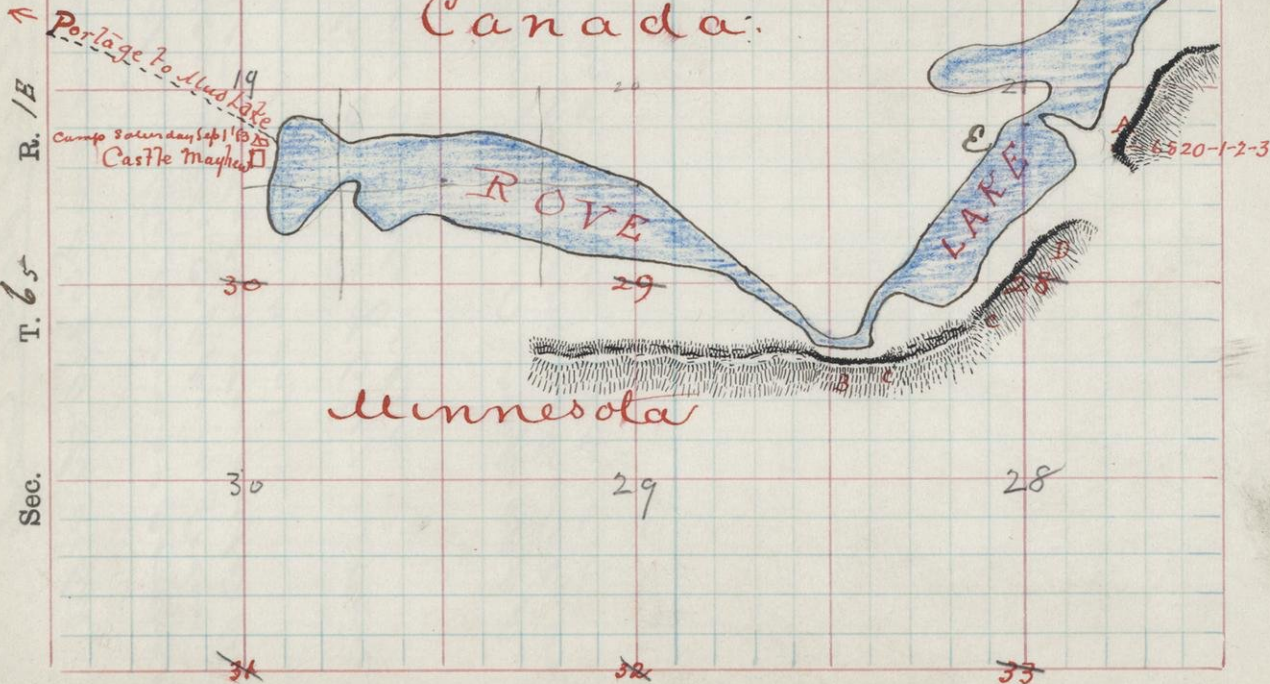
Sec.

T. 65

R. / E

Canada.

Minnesota



Sept. 8
1883.

Rove Lake

National Boundary

6820

Quartzite from bold bluff south side Rove Lake - see opp. map - see view of this bluff in register No 1883. Here above a long and steep talus has some 40 feet of slate and quartzite, capped by Greenstone. Quartzite here is at times quite clayey - but is distinct quartzite, and all seems to show the quartzitic induration. The quartzite layers are $1\frac{1}{2}$ feet down to 4 inches in thickness, separated by black slate in thin seams.

6821

The black slate interstratified with 6820

From below, pentel line of junction, which is very sharp, is perceived - the quartzite and slate from presenting a columnar appearance are not distinguished from the overlying gabbro or greenstone. The latter is a tough columnar, and the columnar jointing runs down into the underlying stratified rocks.

6822

From same place as 6822, different layer

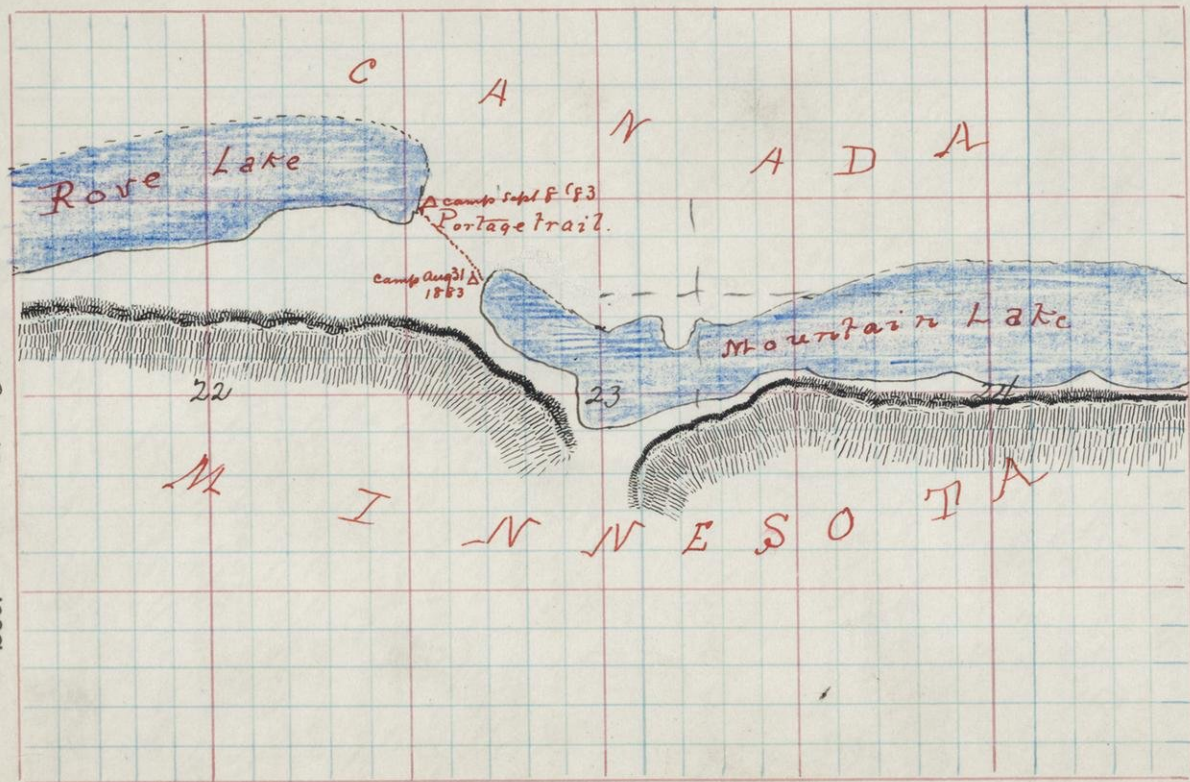
Sec.

T.

65

R.

1 E



Rove Lake Cont.

Would any of this quartite
answers for Whitstone?

Is any of it calcareous?

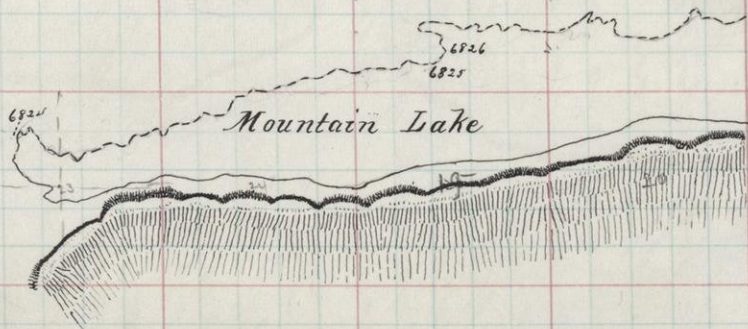
6823 The greenstone overlying 6820
oc. Specimen taken from
fallen mass on tatus, because
we could not reach the
greenstone on the face of the
cliff. The tatus is in the
main composed of huge
fragments of a pretty uniform
greenstone, like 6823.

A few rods east of 6820 the
cliff descends lower in the
slate, and fully 100 feet of
the tater is in the sight.
Probably the slate runs all the
way to the lake level.

Sec.

T.

R.



Sept 9
1883

37

Mountain Lake

National Boundary

6824

Greenstone from end of portage at west end Mountain Lake. Must underlie the slate of the Rore Lake Bluffs. It is coarser than most of the greenstone we have seen here heretofore, and decays an "orthoclase-gabbro", showing a good deal of pink feldspar and long-bladed augite. Along ledge on trail. This gr. runs all across the portage, and has a talus bank of slate just west of it at Rore Lake end of the portage. So that it is altogether probable that it immediately underlies the Rore Lake slates.

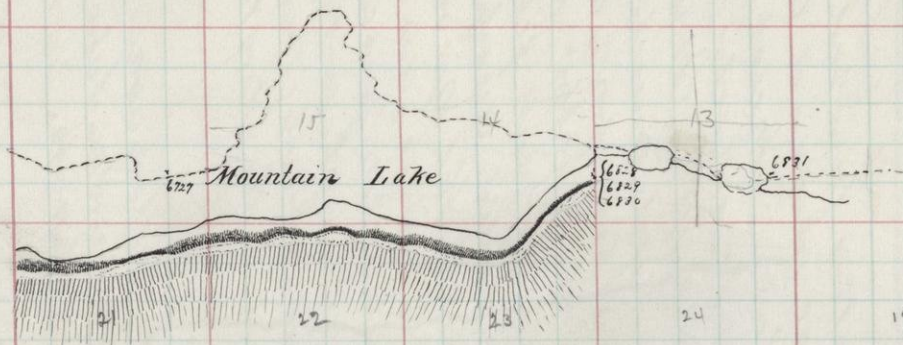
The same rock shows again on the west side Mountain Lake at point A, map opp page.

On getting a good sunlight view of the precipice on the bluff C.B.D. map of opp. page, along horizontal junction becomes visible

Sec.

T.

R.



Mountain Lake. Cont.

This is probably a junction between slate and overlying greenstone. The bluff was not ascended. The same junction was seen at the East end of Mountain Lake. It lies near the top of the bluff. High bluffs run along the South side of Mountain Lake, here and there breaking out into cliffs, but for the most part without cliffs and composed of long talus slopes. Apparently the cliffs come in only where there is some greenstone left capping them. This range of bluffs is a continuation of the Rove Lake Range.

6825 - Low ledge greenstone north side of Mountain Lake. See Pitt Lake Map. opp. p. 36.

Similar low ledges top all of the points of the N. shore of the lake, which presents the usual series of collapsed forms. These

39

Mountain Lake Cont.

ledges rise northward and
shelve into the lake southward
in the usual manner.

Note by the way, that
there very fine-grained green-
stones tend to make these flat
surfaces, almost like the
crystalline or some bedded rocks.
They are as smooth and regu-
lar as the surfaces of any
slate layer. Compare for
instance photo neg- 1883, which
shows a similar flat surface at
the east end of Milled Lake.

6826 Mountain Lake Leap. opp. p. 37
Immediately underneath
a flat surfaced rock exact-
ly like 6825, and without
doubt belonging to same layer.
6826 is close to 6824, possibly the
same layer. It is apparently
an "orthotax gabbro", of tolerably
coarse grain.

6827 North Side Mountain Lake
2 miles from East End. See
Leap op. p. 38.

40

Mountain Lake Cont.

The north side of the lake shows low greenstone ledges often broken into fragments sheltering flat calcareous along most of its length.

6828 Quartzite from the great cliff on south side E. end Mountain Lake. Very near E. line SW. SW. 13 65 22. This quartzite makes up most of the cliff in layers a few inches to several feet in thickness. There is also more or less of a slaty quartzite, but not much black slate such as seen on the Rore Lake bluff. There is a long talus before reaching the foot of the cliff, wh. must be some 150' high - est. - the whole height some 300-350 feet.

6829 Slaty quartzite interstratified with 6828, and running up to 6828 through intermediate varieties

41

Mountain Lake. Cont.

6830

Greenstone overlying
6828 - taken from the tatus,
as the cliff was inaccessible
Apparently the overlying Qs
is uniform. Probably not more
than 25-50 yd remaining
at top of cliff.

The section of this bluff
shows that all the Mt. Lake
Bluffs must be more or less
completely of slate and quartz
ite.

North

L

Long
fracture
dip.

greenstone

1 1/2 miles.

Stream
trail

75°

flat tatus

100
100

Dip. 10° S
columns Qs
Slaty ls. and Qs
steep tatus

South

Here is section of this bluff the green
stone just N. of trail must be layer rep/
underneath the slate rc. No sp.
taken

Greater Cherry Creek
Portage

National Boundary

6831 greenslate west end of
Cherry ck. Portage - see
map op. p. 38. low ledge.

Sec.

T.

R.

See map opp. p. 12

Sept 10
1883

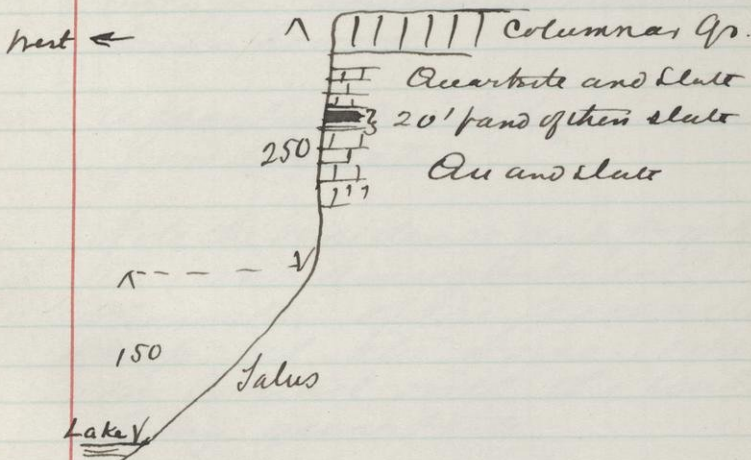
43

North Hour Lake

See also page 12, this book

6832

Greenstone immediately over-
lying quartzite and slate
at top of high bluff on east side
(Canada) side of North
Hour Lake. Specimen from
exact contact with the quartz-
ite.



6833

Greenstone from Great Layer
at top of same bluff. Represents
general run of rock. Note that
this Gr. is peculiar among
Anemikie Gr. It represents
a marked porphyritic app.

Sec.

T.

R.

See map opp. p. 12.

44

North Shore Lake. Cont

white at the same time
being quite coarse-
grained. Porph. with
much whitish feldspar

6834

From the 20 feet band of plate above
bluff

The quartzite layers are about
like those on the Shore Lake
Bluff - Sometimes running
thicker however.

6835

A peculiar quartzite fragment
from the talus.

Note the very dense and porphyri-
tic (and amygdaloidal?)
character of the greenstone
cap at its base, where
in contact with the under-
lying quartzite.

The quartzite runs thicker
and makes up more of
the mass than on Shore
Lake Bluff.

6836

is the greenstone of above

Sec.

T.

R.

See map of p. 12.

45

North Horn Lake Cont.

cliff at some 4 feet
above its base

6838 Greenstone west side
North Horn Lake. See
wrap op. p. 12

6837 Slate from west side North
Horn Lake. See wrap
op. p. 12 underlies 6838

Bluff B.C. opp. p. 12. appears
wholly Columnar greenstone.

Looking south from south end of
North Horn Lake the greenstone
escarpment at foot of South
Horn Lake can be traced from
East and west of the Lake.

6839 comes from the same cliff and from
the same slate layer as 6834

6840 is the upper half of specimen 6832
as originally gathered.

Sec.

T.

R.

See map opp. p. 9

46

South Horn Lake

See map opp. p. 9

6841

Greenstone from talus at
foot of cliff south end
Horn Lake. at west
end of the portage - Canada
side.

6842

From face of the Great
Cliff at south end of S.
the Horn Lake.

47

Pigeon River - J. G. H. R. H. E.

See map opp. p. 7

At A of map opposite page 7, this book, where the portage trail crosses a ridge, there are quite large & regular white exposures of gabbro on the face of the ridge. An interbedded gabbro or a dike?

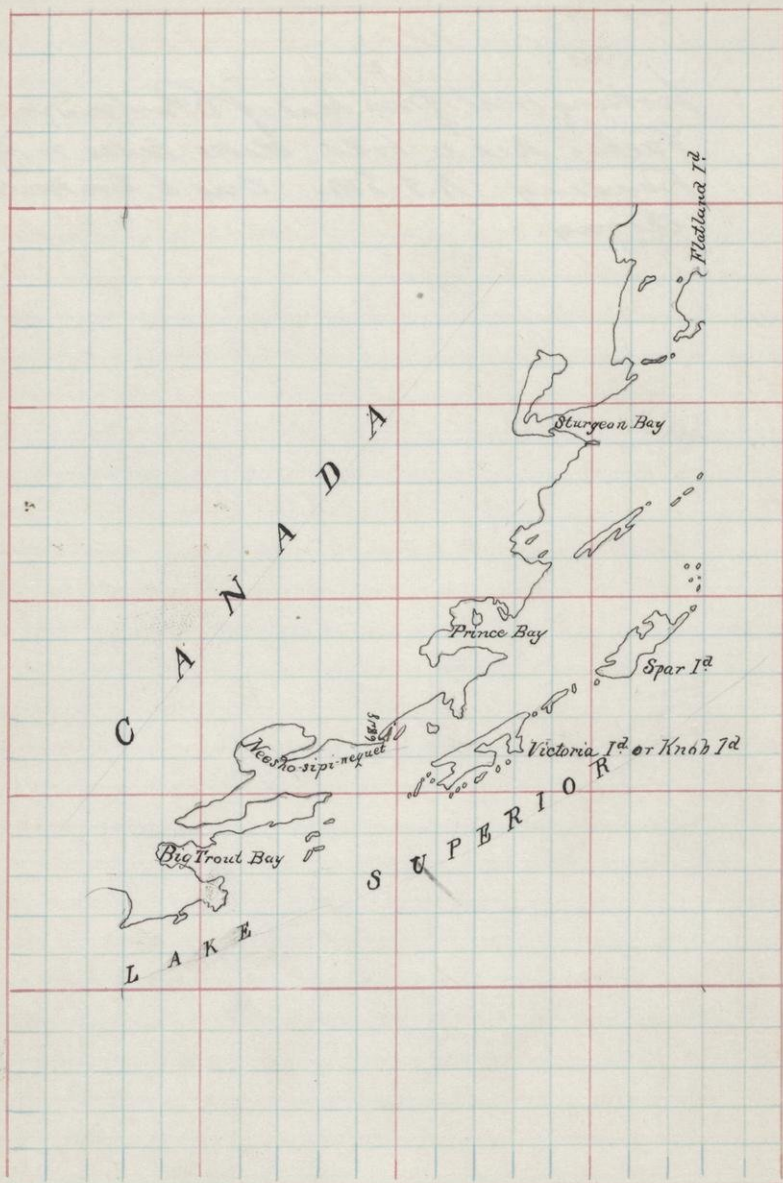
68434 Gabbro fragments }
68435 Slate fragments } From the rapids
at B of map opp. p. 7.

The portage trail shows numerous
Slate fragments.

Pigeon River - Reservation

Looking west from head of Partridge
Falls. See a bold like like ridge
trending N. 5-50. One to two miles
away.

R.



49

Grand Portage Trail

Minnesota

See map opp. p. 2.

6845 First rapid below rent
End of Grand Portage.
A somewhat more arenaceous
quartzite than usual - dipping
South. 60° - 80° . Layers 2" to 8"

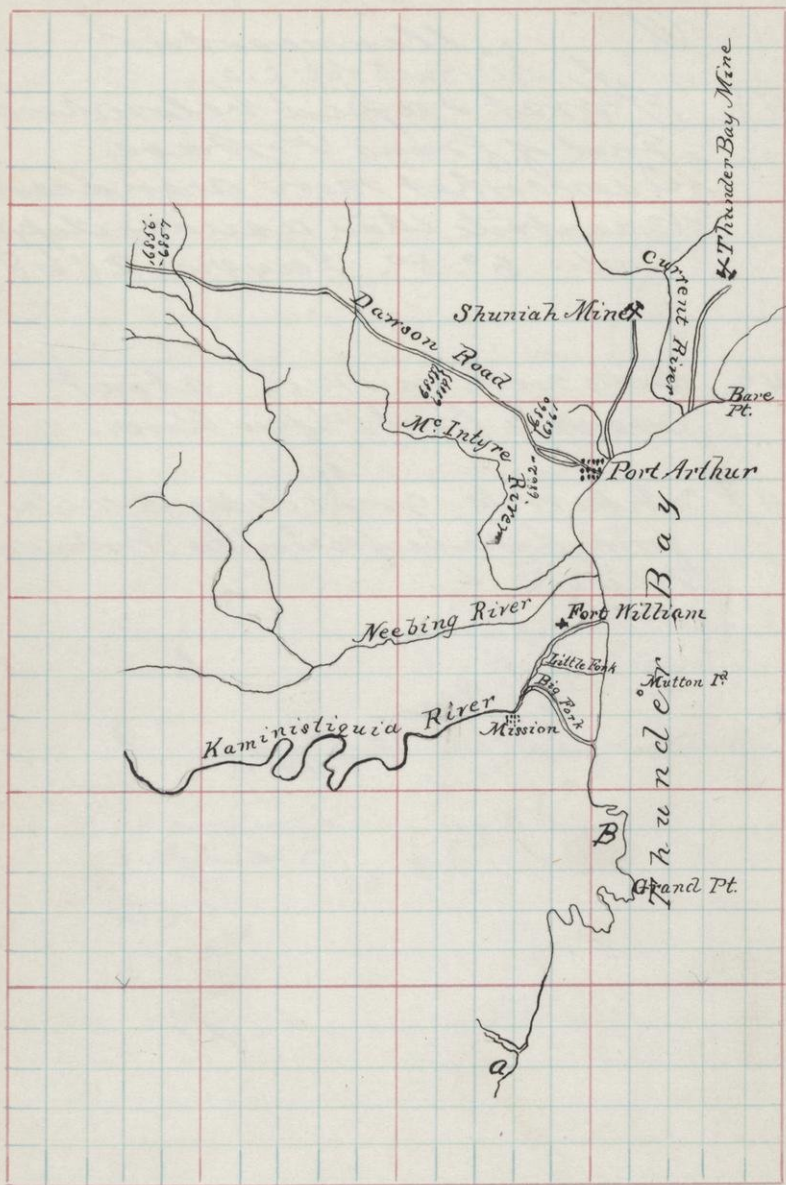
6846 Dike rock on trail about
one mile from Pigeon River.

6847 Dike rock. Great dike 3 miles
from Lake Superior on Portage
trail.

Sec.

T.

R.



Sept 13
1883

50

Grand Portage Bay Minnesota

See map opp p. 2

At Grand Portage Bay the large dike sampled and examined in 1880 carries out to the shore and shows finely bit contacts with the slates. A small dike lies a few feet from the larger one, and exactly parallel bit. The smaller dike is very dense. The larger is coarser in middle and fine at the sides - aph. on tides

Sep 4 15
1883-

Pigeon Point, Minn

See map opp. p. 2.

- 6850 } all phases of the same
6851 } mass of rock on Pigeon
6852 } point - just east of the
6853 } narrow neck across
6854 } the point. Plainly the
red rock is eruptive.
A mass of acid porphy-
ry. The peculiar red
rock found here in 1880 is
the same thing - It is en-
tirely distinct from the
quartzite - having nothing
to do with it.

- 6849 Middle South Side Pigeon
Point, dipping out Lake.
Dip 25° and so along
much of South side of
Pigeon Point.

West Side of Thunder
Bay, Canada

See map opp. p. 49

6848. A brownish porphyry on mainland west side Th. Bay due N.W. from west end of Knob Island. Is it acid? or intermediate? At any rate a very peculiar thing in the Cuimikie.

Note that the great dikes on Thunder Bay have a vertically columnar structure - Recall this also at Partridge Falls, Pyren River. Hence a gr. exposure with vertically columnar structure does not necessarily mean an interbedded flow.

Dawson Road
Thunder Bay
Canada

See map opp. p. 50

6856. From high rounded Knot on Dawson road 10 miles from P.A. Landing. Characteristic sch. or hb greenish. High greenish Knot seamed with veins of reddish granitic material, running mostly in the direction of the schistose structure, but also traversing it and branching in various ways. Compare with the greenish gneisses south of the Huronian at Penokee sup.

- 6857 White weathering granite beginning a few rods S.E. of 6856 and making numerous large Exp. cones and contains Schist fragments. In places somewhat greenish.

- 6858 Granite on road several miles nearer to P.A. Landing shows for half a mile back East of the road.

Dawson Road - Cont.

See map opp. p. 50
 6859 Irregular band ccutting
 6858. Intrusive?

6860-61 a few ^{mile} rods S.E. of 6859 - Gun-
flint beds - cherty - ferru-
 ginous - Still at a crossroad -
 In the elevation above P.A. & L.
 These run along road for half
 a mile or more.

6860-61 are from top of hill
 immediately above P.A. & L. where
 they are digging for "steel
 metal" Dip here E; 25° or
 even more. Very ferruginous
 here with magnetite etc. Typi-
 cal Gunflint beds. Cherty
 or chalcadonic

6862 Some 20 rods S.E. of last -
 steep exposure facing S.E. on
 S.W. side of road - Cliff 10-15'
 high. Same "Gunflint beds" -
 Cherty ferruginous - rusty -
 standing nearly vertical - Cur-
 ving - striking here nearly S.W.
 (note change from quarry.) 6862
 Much fresher and less altered
 than most of the rock here

List Of Photo. negs. taken
on Northern Boundary
Aug. - Sept. 1883.

No. 33. Duplicated

View in Nipigon Straits looking west
from island on west side of straits

No. 34 Duplicated
View in Nipigon straits looking
southwest from steamer

No. 35 Duplicated
View in Nipigon straits looking northeast
from steamer

No. 36.

View of Grand Portage village bay and
island looking southeast

No. 37

View of Grand Portage Village, Bay and
Island looking southward

Sto. 38 Duplicated
View of Partridge Falls looking south

No. 39 Duplicated

View of Ravine below Partridge Falls
looking north

No 40 Duplicated.

View of south dipping rock at head
of Partridge Falls looking east

No. 41 Duplicated
Camp at south end of Powl portage
looking south

No. 42 Duplicated

View of bluff at south end of South
Fowl Lake looking east from point
B map p. 9.

No. 42.

View of bluffs on south side Gunflint
lake from point A. map p. 14 looking
S. E.

No. 114 Duplicated
View on Gunflint Lake looking west
from point B p. 14

No. 44

View on Gunflint lake looking south
along point B p. 14

No 46 Duplicated
View on Mud Lake looking east
from point B map p. 30

No 47 Duplicated

View on Mud Lake looking east from
point A. Map p. 30

No 48 Duplicated

View of bluff on south side Rove lake
looking east from point E map p. 35

No. 49 Duplicated

View of bluffs on east side North Powl
lake looking east from point A map p. 12

No. 50

View of bluff west of Grand Portage
village looking south of west

No. 51.

View of same bluff as seen in 50 looking
west

No 52

View looking north from point A
map p. 2.

No. 53 Duplicated

View of jointed quartz porphyry ledge
east side of Thunder Bay looking south-
west from point A. map p. 49

No. 54

View of Greenstone bluff west side of
Thunder Bay looking south west from
point A map p. 50

No 55 Duplicated

View of Thunder Cape looking east
from point B map p. 50

