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National boundary: North Lake to Grand Portage: [specimens] 6156-6193. No. 9 1883-09

Chauvenet, W. M.
[s.l.]: [s.n.], 1883-09

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 9
Sept. 1883.

National Boundary
North Lake to Grand Portage.

H. M. Chauvenet

6156 - 6193

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 $2 \times 2 \frac{1}{2} \times \frac{3}{4}$ 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 § 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.

#9
No 3. - (Chauvenet)

Beginning on the South
shore of North Lake,
and going through to
Grand Portage.
Minnesota

Notes by W. M. Beaudouin.
September 1893.

This book covers that
portion of the trip from
North Lake eastward to
Pigeon River and
Grand Portage, and
contains the following
towns or portions thereof.

T	R.
65	2 W.
65	1 W.
65	1 E.
65	2 E.
65	3 E.
64	3 E.
64	4 E.

In leaving North lake we portage by a $\frac{1}{4}$ mile trail to South lake where we find a continuation of the greenstone hills of S. Gneiss with similar interbedded slaty layers. These ranges continue through Rose lake - Rose lake Mountain lake &c.

In Rose lake at the great bluff on the S. shore the capping greenstone 150 feet from the lake or even more is seventy five feet thick. The division between it and the underlying slaty layers is well defined on the face of the cliff.

1st by a weather line the greenstone cap overhanging somewhat and
2nd by a fringe of green timber & bushes where the crumbling slate begins

In Mountain Lake similar distinct cliffs of Animikiee rocks rise on the south and descend to the south at a low angle 5° to 8° to Clear Water Lake which we

are about to describe

In crossing southward over the Clear Water portage from West Mountain lake, the members of the bluff seen so prominently at the N. end of the trail are shown twice 1st a greenstone 2^d a quartzite ledge and stony interbedding

6156 Shows the quartzite taken half way down the hill to Clear Water and

6157 The greenstone forming the ledge H on N. shore of Clear Water lake.

To the east the lake shows on its S. shore and about the E. end generally high hills and tall faces exposing similar sections as the one about to be described in detail and rising in round capped hills - very prominent

T.

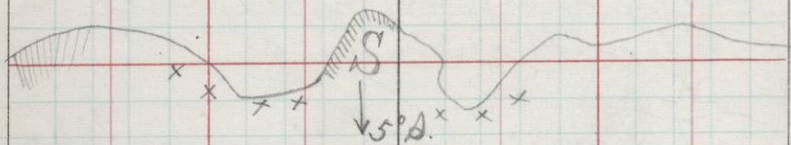
R.

Animikie quartzite.

↓ 5° S.

H

Clear Water Lake.



Str. N. 40° E

The section at S' opposite page
is as follows. It lies wholly
above the layers 6156-6157



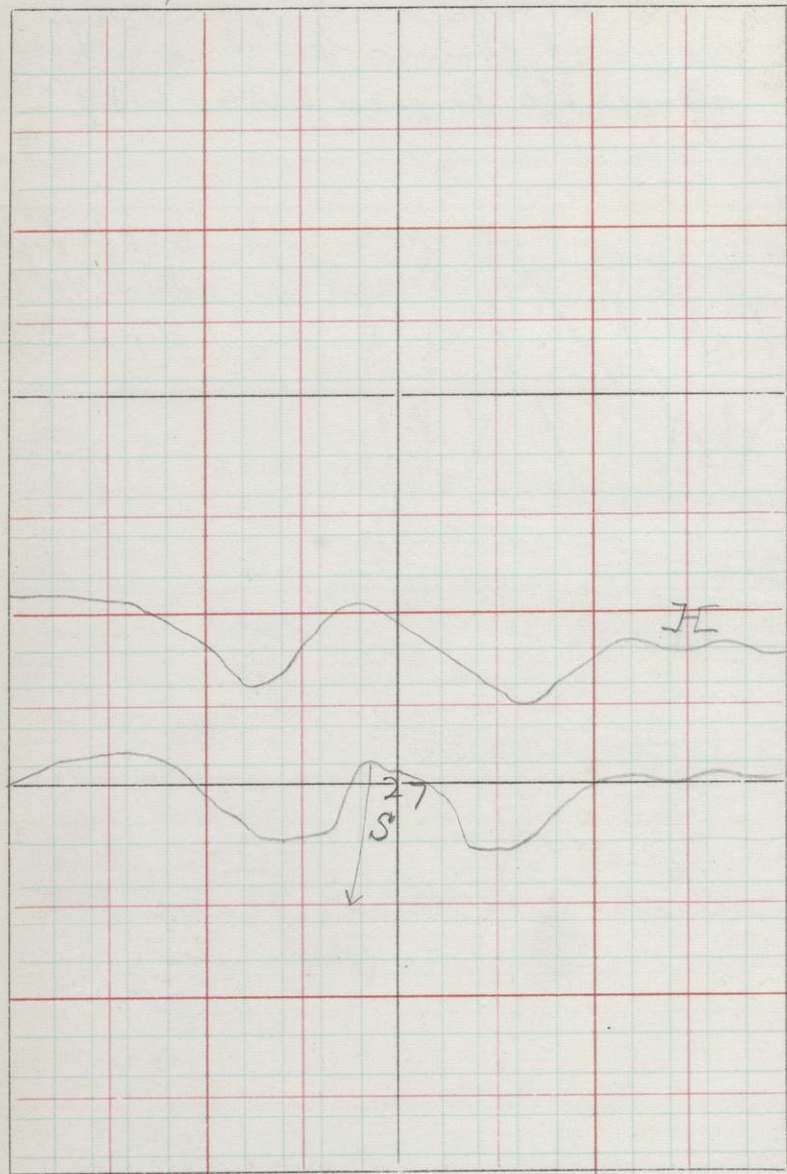
235 ft high
Str. N40° E,
dip 5° S50 E.

Talus.

Section in Clear Water lake,

Dec 27 T. 65

R. 18

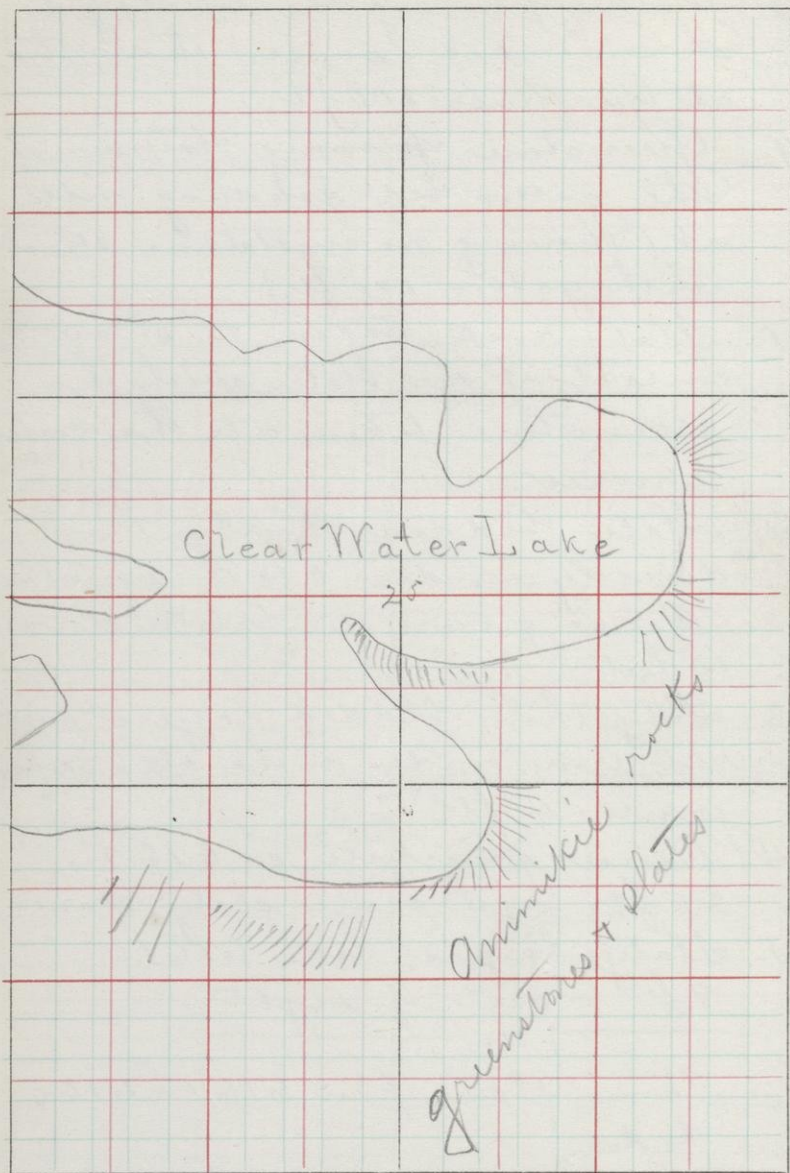


Section.

6158. Gabbro forming the top layer
is somewhat coarser than that
at Gunflint 100 ft.
6159. Greenstone forming bottom of
the gabbro bed grading into
it (showing no crystalline structure
with gabbro 100 ft.)
- 6160 Slaty rock, taken to show
contact of the slate with the
greenstone taken at the contact
2 inches
- 6161 Slate bedded thinly 1 in.
directly under 6160 2 inches.
- 6162 Dense quartzite brittle, dense
10 feet.
- 6163 Slaty thin bedded layers with
red iron oxide on the cleavage
joints 4 ft.
- 6164 Dense quartzite as 6162,
25 ft. with same slaty seam
- 6165 Slaty layers like 6161
8 ft. — out of sight.
" "
- 6166 Thin slate from 6161-6165
beds.

Sec 25 T. 61

R. 1. E.



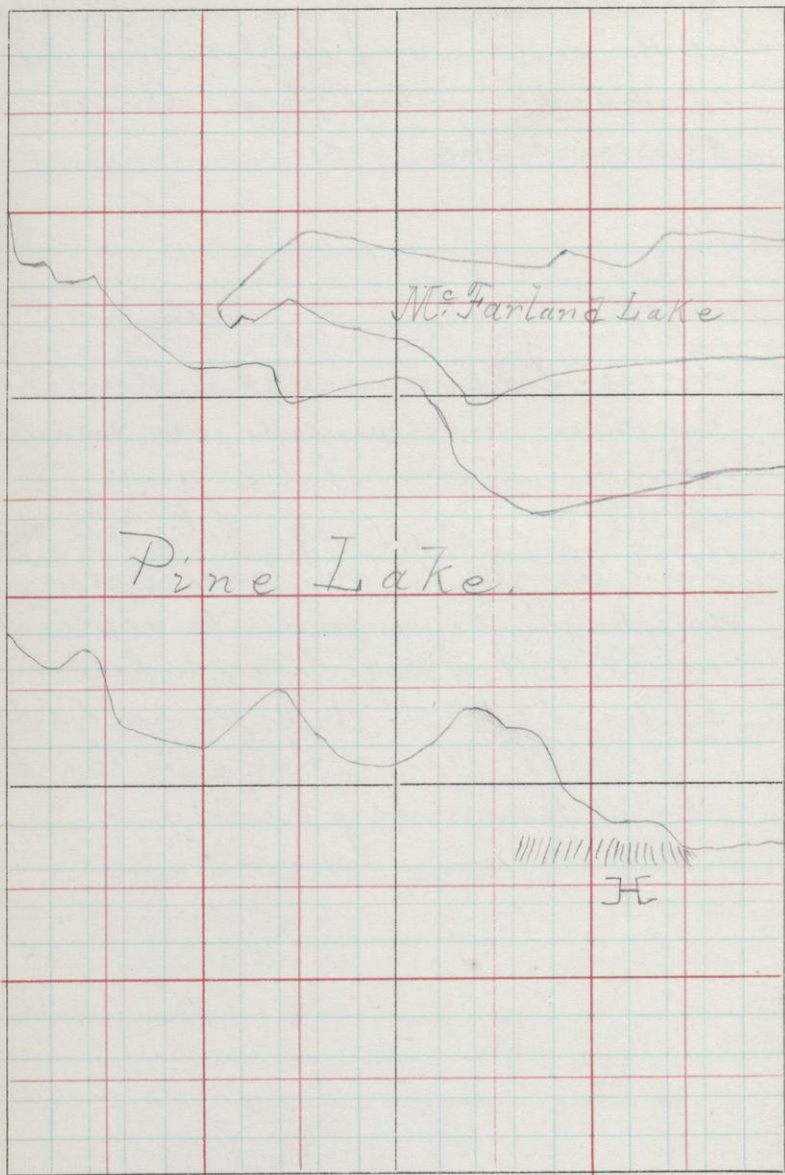
The section is again seen plainly at the east end of the lake in Sec. 25-65-1E, where high bluffs surround the lake.

Through Mountain Lake, Moose Lake and N. & S. Fowl Lake no new developments are seen. The Animikie slates and Greenstones dipping S.E. at a low angle 5° or less rise in high escarpments especially on N. & S. Fowl lakes where the bluffs are 350 ft high and where the strike seems more to the S.E. than previously read.

Sec. 6

T. 64

R. 38.



Pine lake beginning in Sec 5-
T64-3W. was next visited

It is reached by ascending
Pine River to Roy lake thence
to McFarland lake where a portage
is necessary, and thence by a 2^d
portage making 3 portages between
N. Fowl lake and Pine lake.

The great bluff, the conspicuous
feature of South Fowl lake continues
S.E. of Roy lake showing its
composite nature plainly. The face
of this cliff seems to strike E. & W. at
this point.

The shores of McFarland lake
show fine exposures in similar bluffs
and on entering Pine Lake the range
continues on the S. side while the
characteristic low shores rising at
a small angle northward form
the N. shores throughout.

Continuing westward on Pine Lake
across Sec 6. we follow the line of
a high cliff which extends E & W.
on the exposed wall until, in the
W. of Sec. 6. it gradually descends

to the lake and the shores of the lake are seen to be low without exposures across the next town west for many miles.

Attention was given on returning to the cliff in Sec 6.-64-3 E. South shore of Pine Lake at H

{	Strike E. 20° S. - E. 20° S - E 3° N
	E 4° N Average E. 10° S.

6167 The exposure is good. The cliff was ascended. On the crown some distance back from the vertical face a coarse gabbro outcrops largely shown in 6167 With its various gradations toward the staly beds beneath it it is 100 ft thick..

6168. Is a greenstone into which the coarser beds above grade by imperceptible stages. Its weathering is less rough.

6169 At one place on the cliff face a vein runs upward through the mass of the greenstone dipping N. W. 80° undoubtedly in its original position as regards the greenstone which is certainly not fallen down at this point

This slaty intrusion is 6ⁱⁿ wide regular and continues 30 ft before it disappears beneath the talus below. 6169 shows this dyke or vein

6170 Directly beneath the greenstone shows a denser finer grained appearance = 6170

6171 The greenstone 6170 is in close contact with 6171 a light gray quartzite 1 ft thick showing little tendency to cleave along its bedding planes.

6172. From this point for 80 ft downwards is a fine exposure of the slate beds in which occur at frequent intervals beds of 6171 showing bands and irregular bedding at times and breaking quite easily along these band lines. 6172 is a piece showing its common fracture.

6173. Thinner layers and scales from the bottom of the slaty beds.
The dip is always 10° (a little N. of S. see strike)

So much am I impressed by the similarity of the Clear Water section and this one just given on Pine Lake

and the quartzite + slate beds of Agamok and Fox lakes (see N. B. *) that I have little hesitation in pronouncing them the same. Though they are there standing on edge and though the greenstones are not ~~a~~ prominent features there as here. In fact no distinct greenstones were recorded as occurring on Agamok lake, but their identity may not have been recognised. The samples may settle this point as they cover all rocks seen there.

6174 Other samples of quartzite from Pine Lake - section just explained from various beds in the slate near the bottom of the wall.

6175 From low shore line at the S. of McFarland lake E $\frac{1}{2}$ Sec 4 T. 64 - 3 ~~N.~~ E.

Pigeon River

Beginning at the second falls Sect. 1 T 64-4 E. at the N. end of Partridge Portage.

Here the river falls 65 ft over quartzite and shows a fine exposure. At the upper edge of the falls the gray quartzite exposed on the margin of the river shows very fine surfaces of ripple marks which cover many of the large slabs, their direction is nearly N. & S. though the strike read here with the needle gives E. 20° N. dip 5° S. 20° E. Above these beds more slaty layers appear unevenly bedded and showing reddish surface and rusty joints.

6176 = shows the quartzite with the ripple marks.

6177 = shows the broken slaty layers

6178 — the dike
Climbing the hill on the S. bank
which plunges steeply down to
the river bed below, the falls
a heavy bed (40 ft thick) of quartzite
(or greenstone) 6178 - a dike rock,
which continues downward to
the bed rock of the river which is
made of 6179.

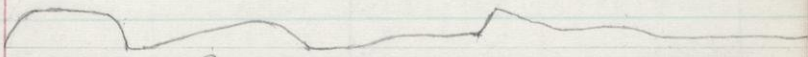
6179 Clearing in thin layers on edge
the planes striking N. 40° E and
giving a strike on its bedding of E
 20° N. dip 5° S. 20° E. Above the wall
(6178) (up stream). This rock differs
from the quartzite above the falls
is greener and less dense.

6180. A variety of quartzite from below
6177 near the top of the falls ^{showing} 40 ft
thick. The bed 6178 presents some
peculiarities as 6180 seems below it
yet does not seem to appear on
the wall further down stream.

However the section on the wall
could not be approached satisfactorily.
Upon further examination of the river
we conclude that the bed 6178 is one of the
dikes cutting the slate.

Pigeon River was again reached and followed at the N. end of Poplar Portage where the great U bend is seen on the map.

As the river is approached going N. from the grand portage abrupt hills rise on the south bank, the outline giving sudden drops and domes.



Profile.
Reaching the crown of these hills the river is seen to flow through a wide bottom land for some miles N.W. (up stream) to show no exposures and to twist about the great bend being all visible. The shore line was followed some distance up stream but without finding any rock in place.

Attention was given to the line of hills or rather the prominent ridge south of this river. On top of this ridge
6181 was taken a quartzite in appearance showing irregular joints and no distinct structure or bedding.

Continuing N.E. we follow the wall of this rock which does not vary and descending a ~~see~~ steep defile close against the wall we come upon the river as it turns S. and cuts through this ridge which is 100 ft high at the river rising in vertical walls on either side the gorge. These walls strike E. 35° S. The direction of the flow here and are 200 ft long.

Climbing the cliff on the right hand or S. bank and down upon the lower side of this gorge we find bare exposures of slate on both sides of the river.

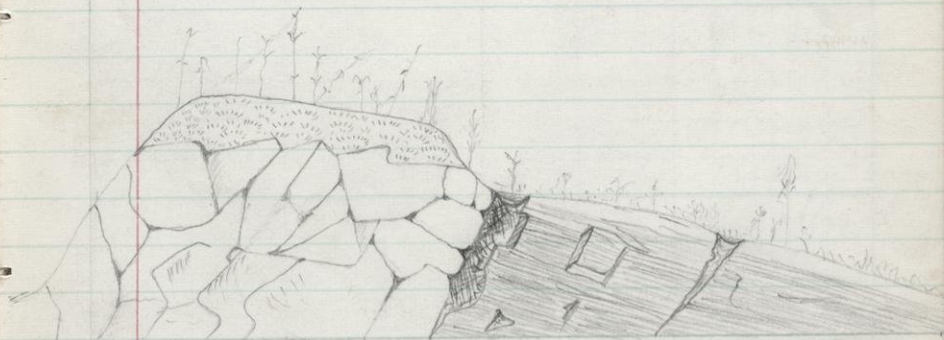
6182. The rock similar to 6181 taken at water level where the whole of this great ridge is seen to be a dike cutting the slates. No slate beds however appear N. of it at this place but along the river bed and high up on the south flank of the ridge south of it the following observations were made.

1st The slate beds are very uneven in their bedding and observations were unsatisfactory but the readings were as follows.

Strike (on S. bank 30 ft exposures of slate) = 1. (E. 15° S.) 2. (E. 10° S.) 3. (E. 25° S.) 4. (E. 25° S.) dip 1. (8°) 2. (7°) 3. (10°) 4. (11°)

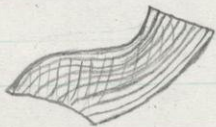
The numbers 1-2-3-4 refer to the observations.

The slate is seen to project against the dike on both shores S. of the gorge rising at about 10° . The following sketch was made of the N. side.



A close examination of the contact on the S. shore revealed the following facts (over)

1st That the slate was much disturbed, bent, shattered + broken near the juncture, large fragments on the edge of the contact showing twisted bedding.



No such beds could be seen in place

2^d There was a gap on both sides of the river between the slate + the dike evidently due to the weathering out of the broken beds of the contact. This gap did not extend far back from the river and the contact was covered. The slate showed much reddening along the edge of the dike and a shattered condition in which the bedding was lost.

3^d A curious dike of contorted rock lay between the slate and the great dike rising from the river and reaching the crown of the slate. On being broken it was found to be chiefly Calcite mixed with a greenish rock

Additional numbers

6191 Sec 29-65-1N.

North side of ore.

6192 - Ore Sec 29-65-1N.

6193 Sec 29-65-1N. running
through the ore on North side

The above are from the surveyors
engaged in subdividing
townships Oct 1883. Through
Mr. Chauvenet.

See also numbers 6863-4-5
brought in by Mr Chauvenet.

4th The slate was very uneven waving and showing strange mammillary (?) forms, waving lapping bedding shown in the sample. It had many beds of quartzite from $\frac{1}{4}$ in. to 5 in. thick shows more rusty layers than heretofore.

Samples are as follows.

6183. The Calcite rock between the slate beds and the great dike
- 6184 Rock from the crown of the great dike where the weathering is coarse showing a shot like surface.
- 6185 Quartzite from near the contact
6186. Rusty slate layers near the contact
- 6187 Quartzite from the slate beds near the crown (2 in. thick)
6188. Varieties of slate, thin layers &c
- 6189 Slaty quartzite to show uneven bedding
- 6190 Partridge
- 6190 Partridge Portage, West end out crop in river bed.
no reading.

The trip occupied
58 days from time of
start to return. Actual
time in field.

Aug 10 Went into camp
at Grand Marais on
Devil Track at 6. P.M.

Aug 18(?) Arrived on boundary
at King Fisher lake

Sept. 15 Reached Grand
Portage on Lake
Superior.

(Over.)

The great cross section from
Grand Marais N.W. through
Otter Track. at the East end
would be as follows.

- 1 = Rocks of Superior copper bearing
series ending N. of Brule' lake
- 2 = The coarse gabbro beds of great
thickness Animikie (?) which
terminate or are much thinner
as they pass eastward though
the crown layers on Pine Lake
T64-3E are of similar ~~is~~
coarse nature.
3. The quartzites and interbedded
slates on edge at Agemok lake
and extending to Ogishkemuncie
Doubtless containing much iron
and at times as they reach
eastward large exposures of magnetite
Probably identical with the
greenstone group of Gunflint lake
- 4 = A calcareous group with
shaly layers seen S. E. of
Ogishkemuncie

- 5 = A quartzite with pebbles
- 6 = Slates distinctly bedded and on edge on the center of Ogishkemuncie striking N. 40° E. and well exposed.
7. The great Jasper Conglomerate
- 8 = The Huronian Slates of Otter Track.
- 9 = The granite of Basswood Lake.

Finis

