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National boundary: Gunflint, Saganaga, Otter Track, Knife and Cypress Lakes: [specimens] 6000-6058. No. 7 1883-08/1883-09

Chauvenet, W. M.

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

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 7

Aug & Sept. 1883.

National Boundary

Gumflint, Saganaga, Otter Track,
Knife and Cypress Lakes

W. M. Chauvenet.

6000-6058

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

#7

No 1 (Chauvenet)

Trip on Gunflint,
Saganaga, Otter Track,
Knife and Cyprus Lakes,
in N. Minnesota and
British Boundary

August & September

1883

by

W. M. Chauvenet.

Asst. Geologist.

This book covers that
portion of the trip from
Grand Marais to Basswood
Lake and contains the
following towns or
portions thereof.

T 61 - R 1 E

" 62 - " 1 E

" 62 - " 1 W

" 63 - " 1 W

" 64 - " 1 W

" 64 - " 2 W

" 64 - " 3 W

" 64 - " 4 W

" 64 - " 5 W

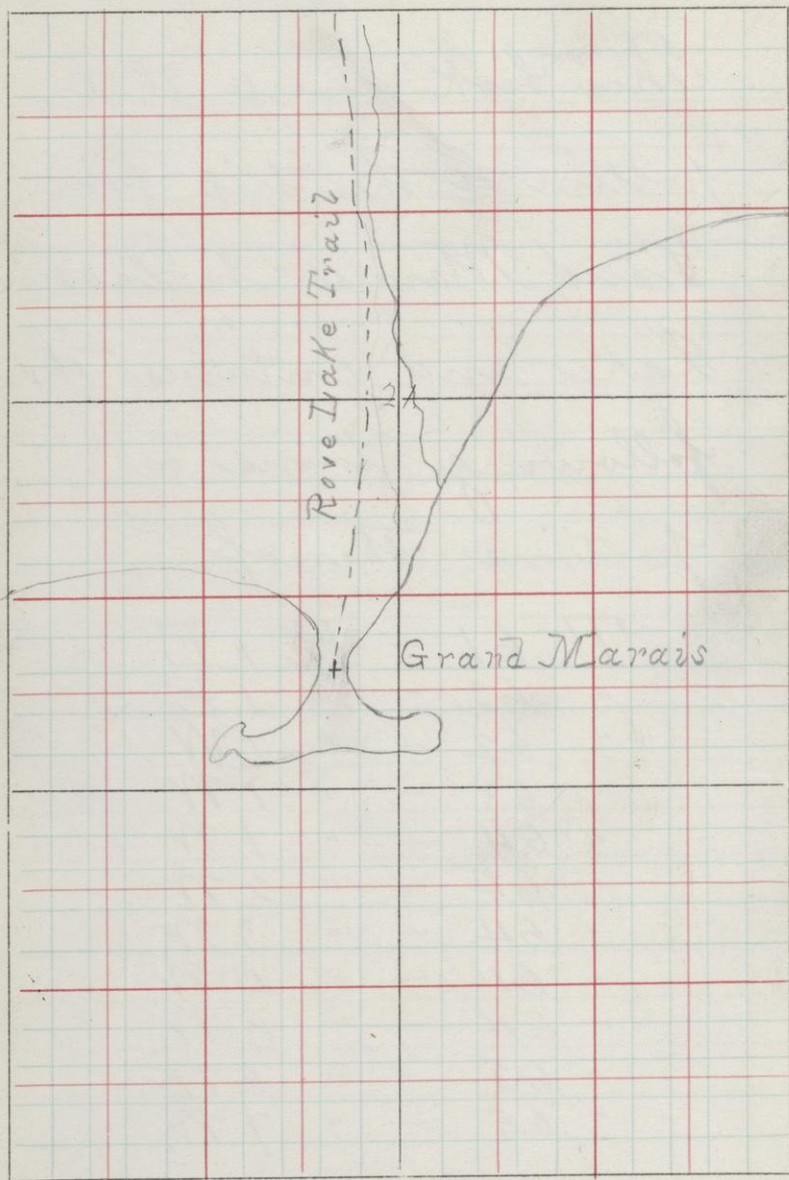
" 65 - " 6 W

" 65 - " 7 W

Sic 21

T. 61

R. 1 E



Aug 10.

Barometers set together at Grand
Marais - read 29.59 -

The field aneroid at 0.

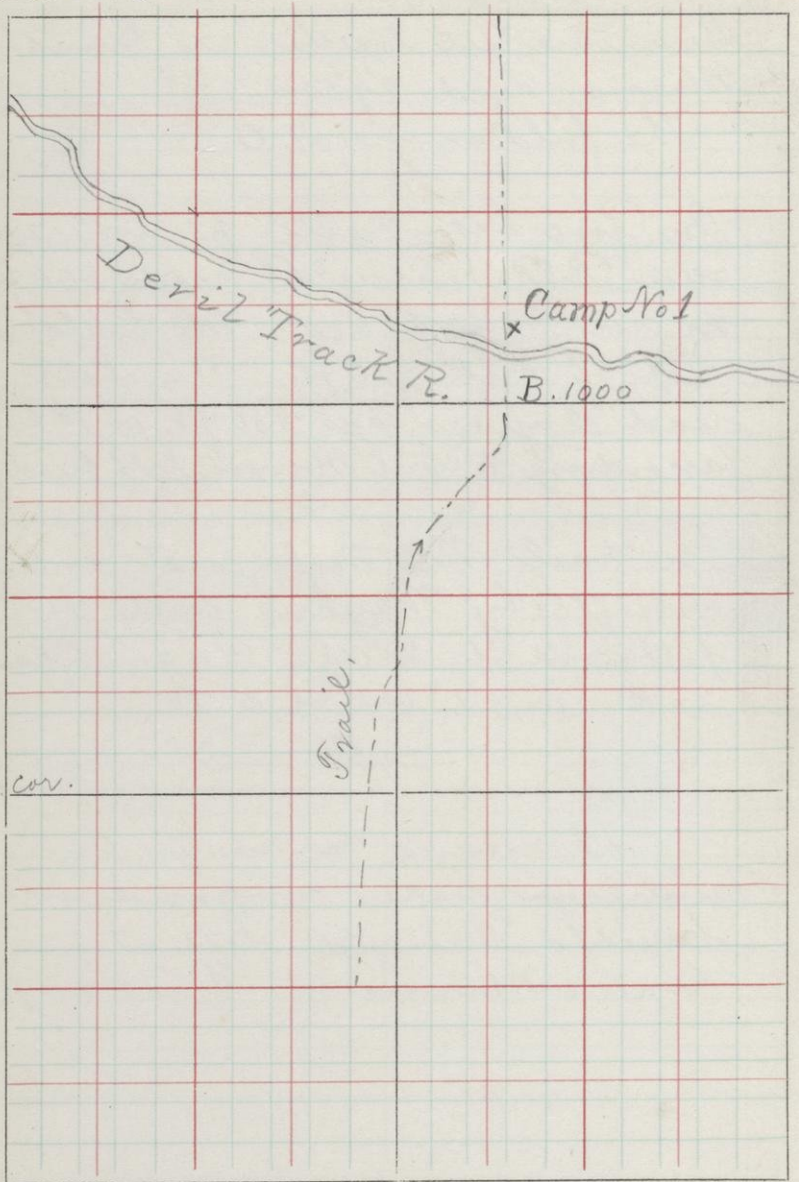
On Pove Lake trail - pt where
new R.R. crosses B. reads 600 ft.
no rock in place - two boulders
Top of hill 820 ft. Winchell
read 5 years ago 830 ft. on 1st height
(according to Paul Morrison half breed)

On trail. New trail just cut
out 1883 by Mayhew will be
followed to Little Saganaga
Lake in T 64 R 5 W.

B means barometer, Aneroid
(american make) compared with
Casella Aneroid left at
Grand Marais - Dial compass

Sec 33 T. 62

R. 1 E.



B at Devils Track 1000 for 24
hours - Aug. 10 - 11 - 12 M to 12 noon
on 11th

Sec 17 T. 62

R. 1 E

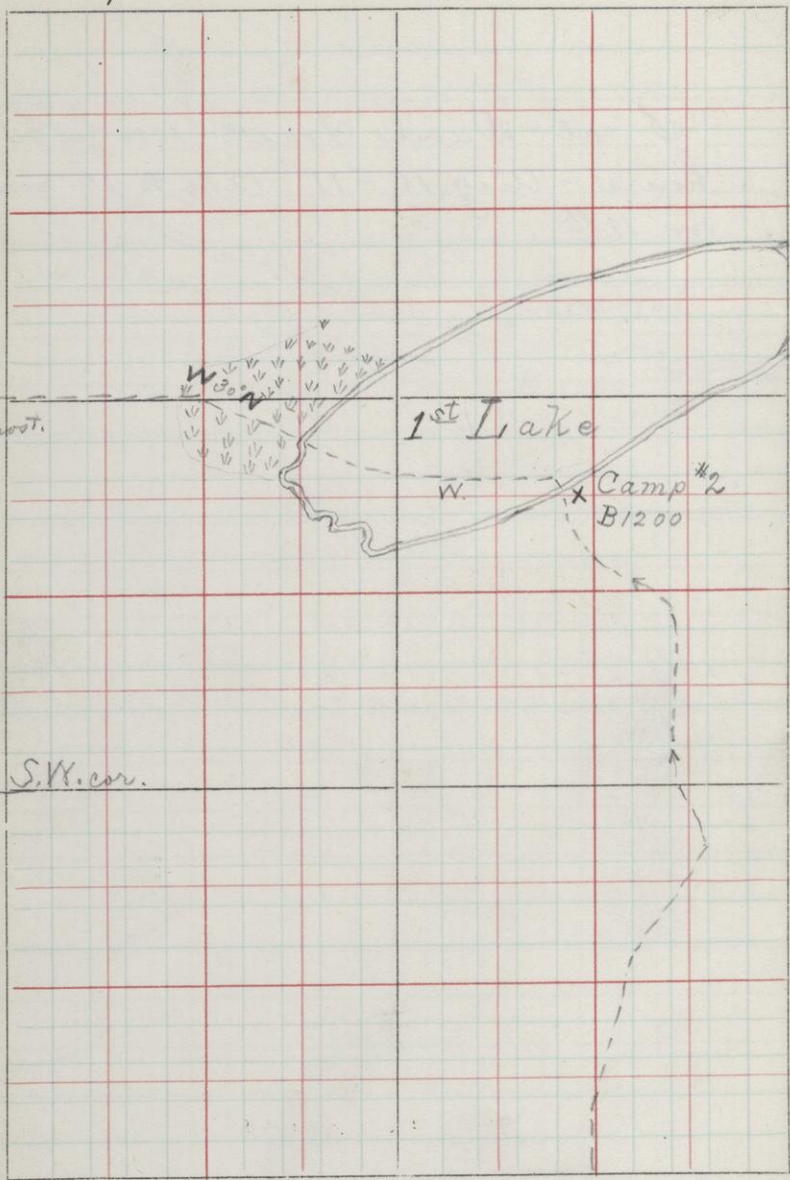
$\frac{1}{4}$ foot.

1st Lake

W.

Camp #2
B1200

S.W. cor.



The trail was well cut and easy work to 1st Lake. The party consisted of myself Paul Morrison - and seven packers taken to put us upon 1st lake without double portages - \$2 a day was paid the packers - Paul does location work and is woodsman.

Rain 24 hours delayed us at Devil Track at our camp #1.

550 pounds of packs and two canoes were carried and only 3 men go on from this camp No 2.

B 1200 Camp No 2 Aug 11 6 P.M.

" 1175 " " " " 12 6 A.M.

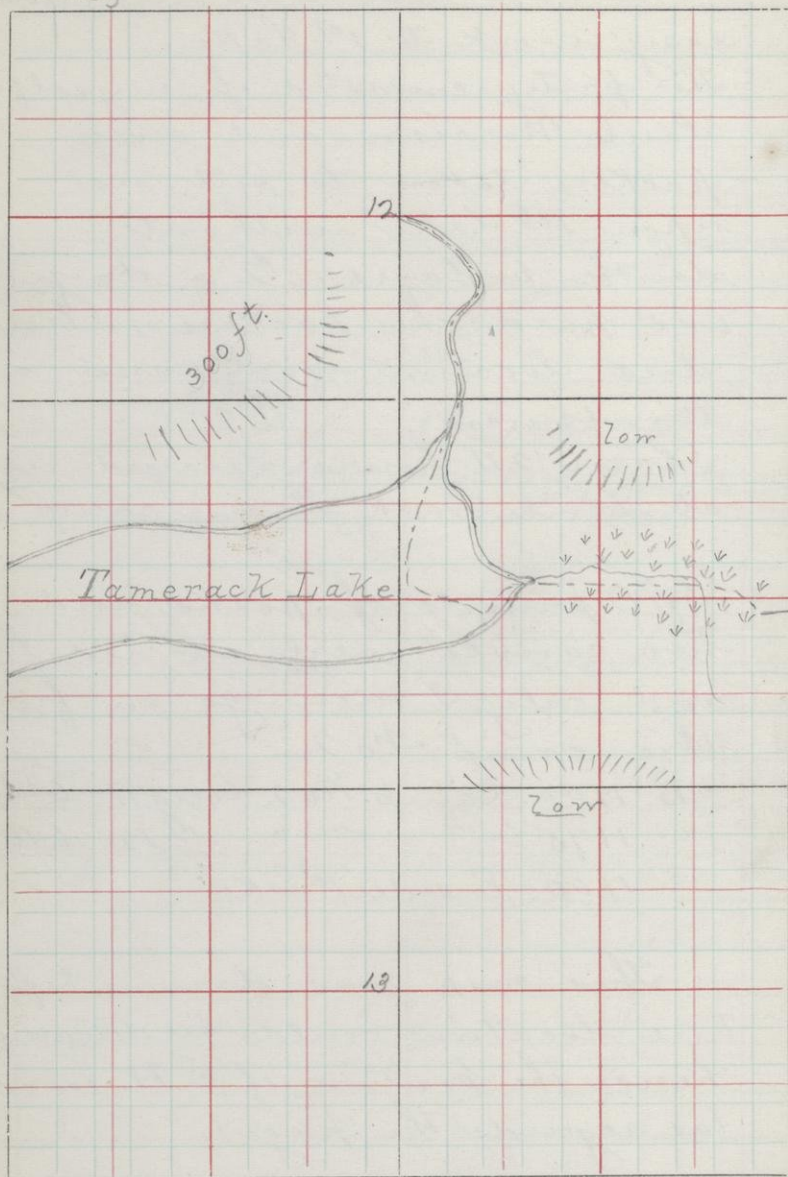
" 1100 E. side 1st Lake

This map was drawn before true location could be determined hence the position of S.W. corner (as regards the page).

Sec 12
13

T. 62

R. 1 W.



B 1050 ft at 2nd lake

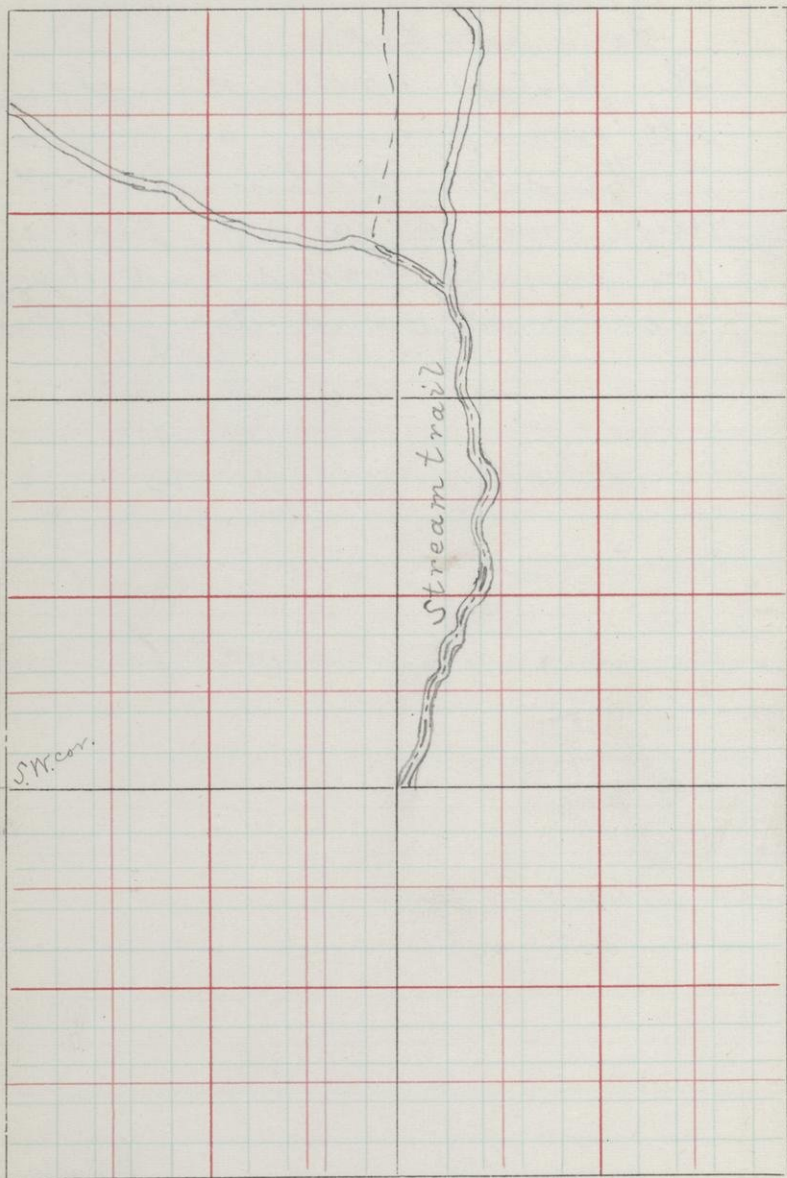
Tamerack Lake

The portage 1 mile through
soft swamp mossy and open

The little stream is not
deep enough in all places
for canoes loaded and the
men waded and dragged them.

Sec 12 T. 62

R. 1 W

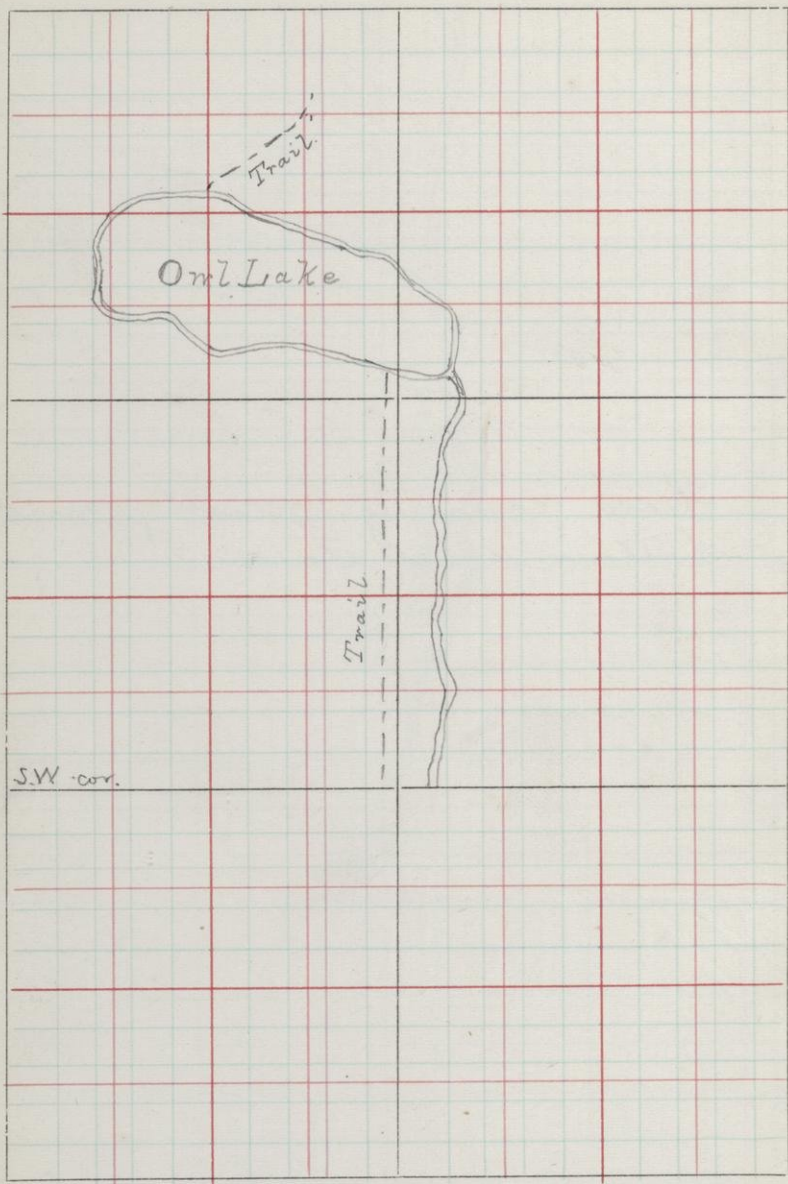


Hard canoeing, mostly mud
bottom some stones

Sec 1

T. 62

R. 1 W.

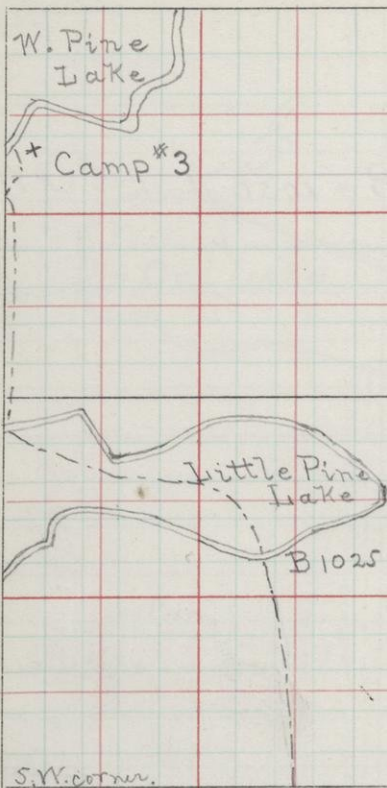


Owl Lake. B = 1050 ft 1:³⁰ P.M.
Aug 12.

Sec 36 T. 63

R. 1 W.

W. Pine
Lake



* Camp #3

Little Pine
Lake

B1025

S.W. corner.

7

Little Pine Lake - Easy portage
B at Little Pine 3 P.M. Aug. 12
1025 ft.

Red Rock covers the hills south
of the Little Pine Lake but none
could be found in place

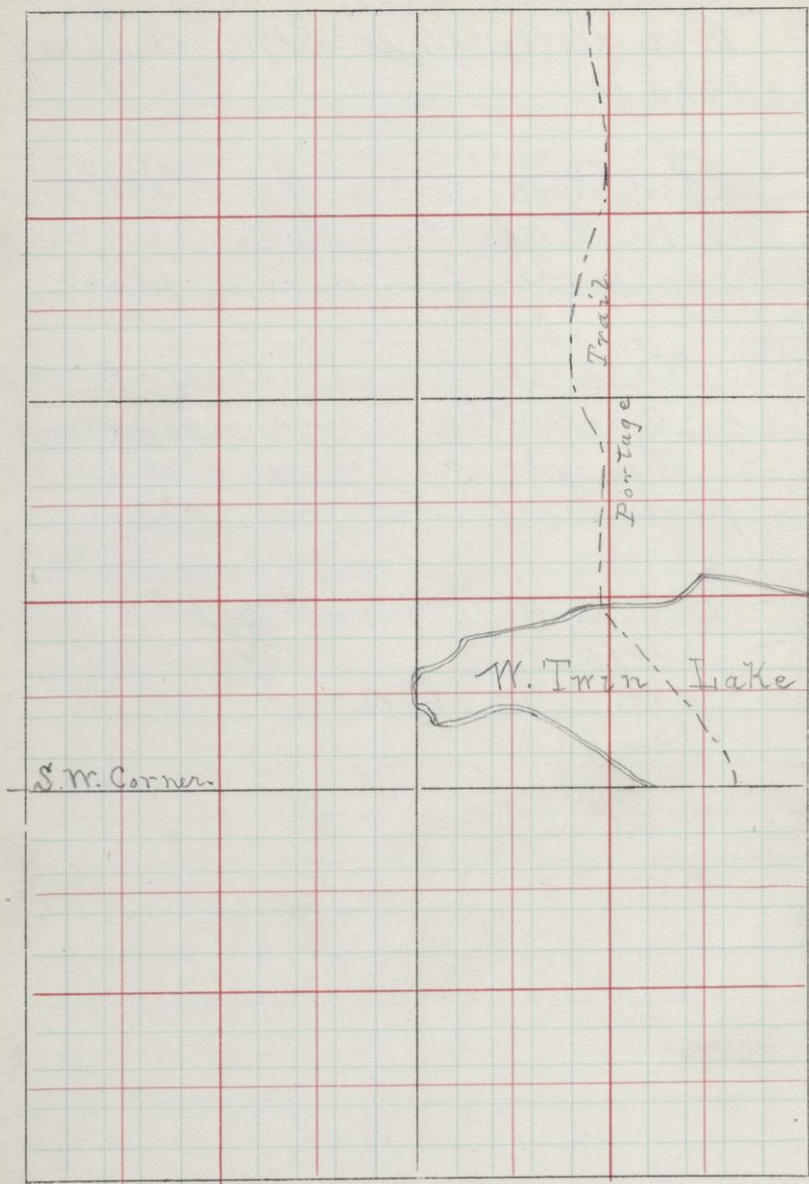
The rock is similar to that
on Eagle Mt. - and according
to the strike there would about
pass here.

B 1075 at W. Twin Camp #3
1060 " " " Lake level
Aug 13. 6. A.M.

Dec 26

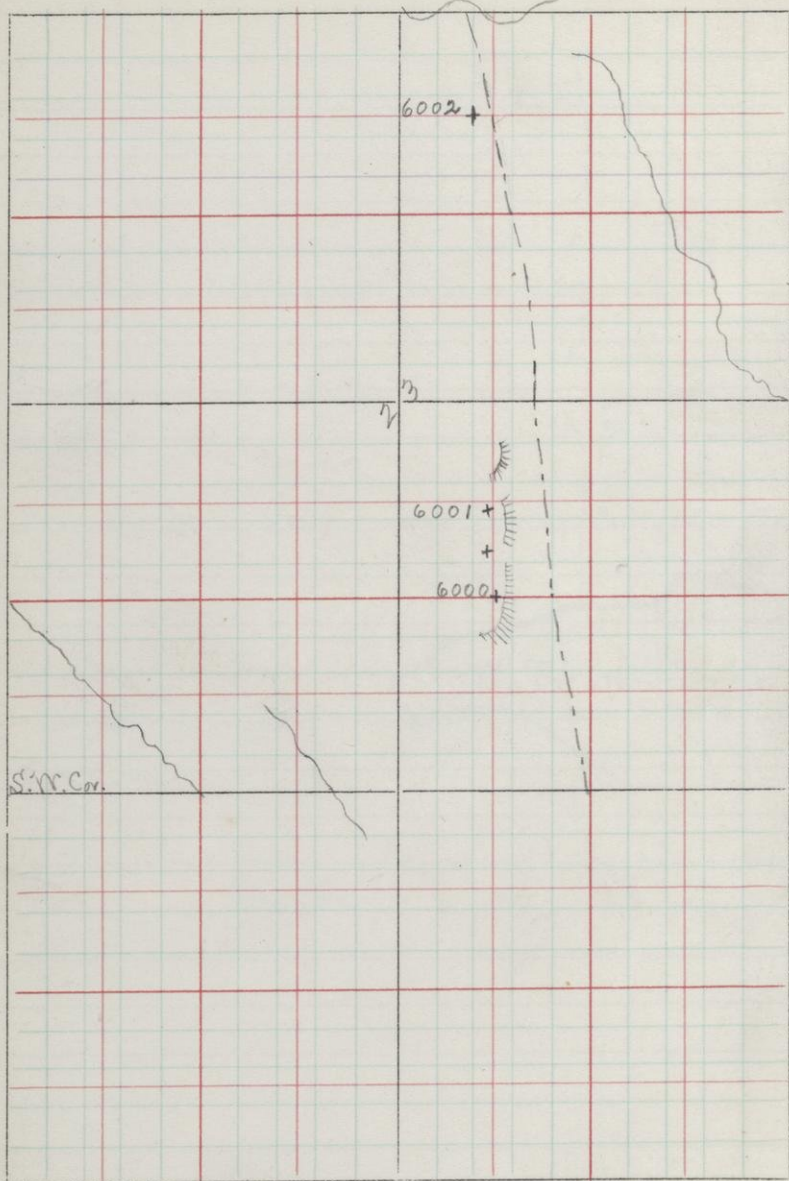
T. 63

R. 1 W.



Sec 23 T. 63

R. 1 W.



6000 635 N 800 W. 23.63.1 W.

Ledge facing east rising 15 ft
broken shattered and jointed in
both vertical and horizontal
directions

Strike appears to be NE by SW.
Dense ashbed diabase

6001 698 N. 800 W 23.63.1 W similar
outcrop to 6000 coarser grain

6002 E side of Portage - 1800 N. 800 W.
23.63.1 W. B 925 ft 1³⁰ P.M.

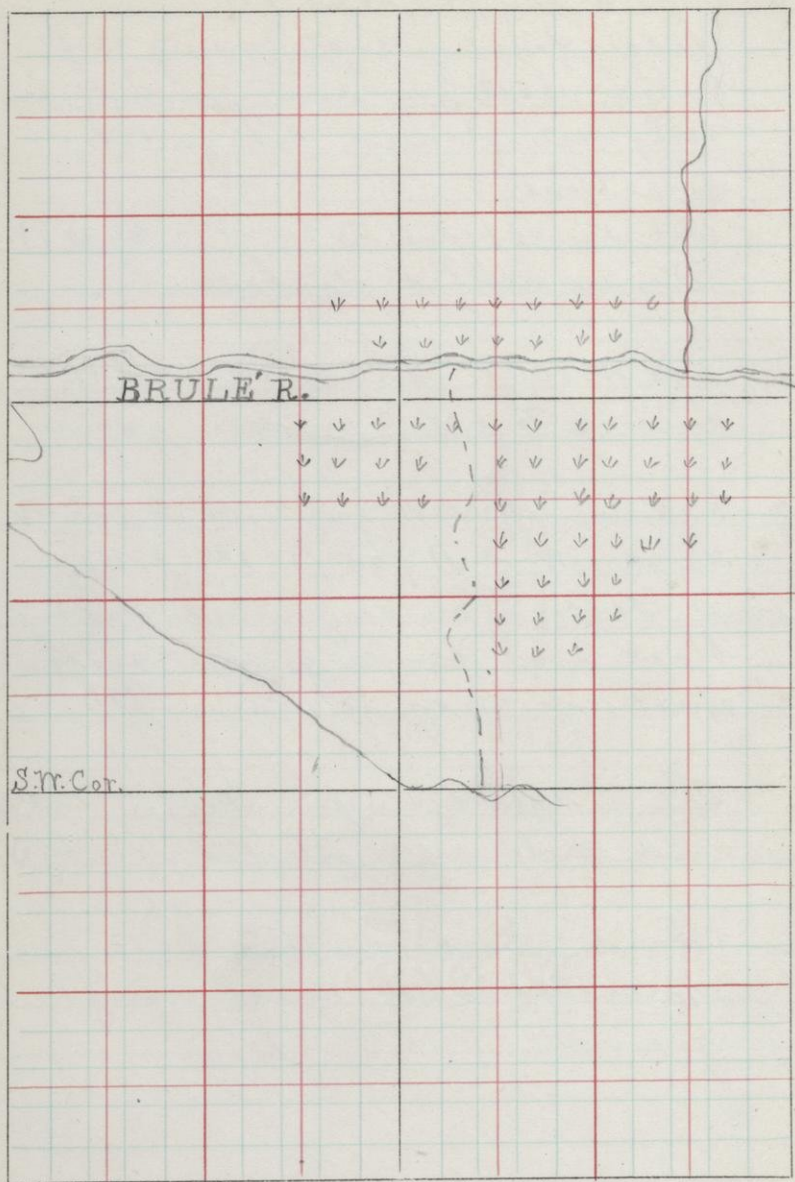
Olivine Gabbro coarse grained gabbro -
black and brown grains, with
specks of magnetic iron (?)

The ridges between Twin lakes
and Pule' river strikes NE. by SW.

Hard work on this portage
2 $\frac{1}{4}$ miles and much rough, bad
ground.

Sec 14 T. 63

R. 1 W



10

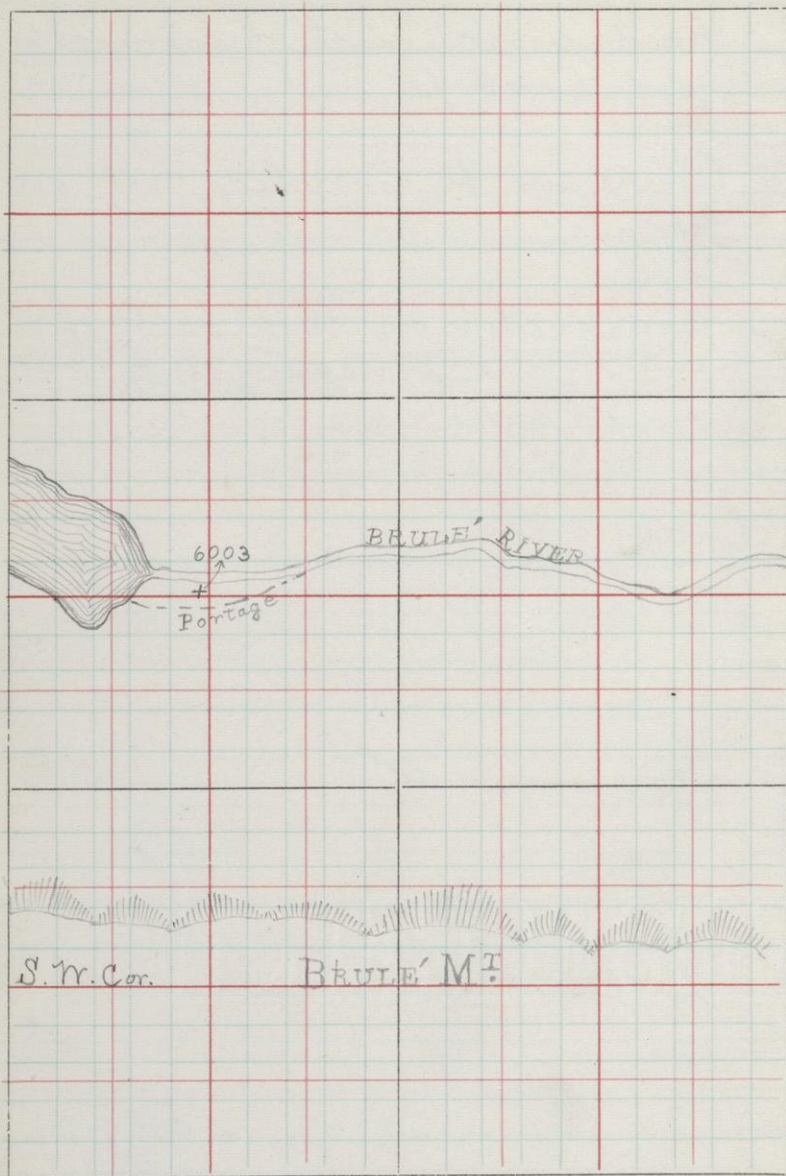
Portage in S. 14 to Brule R is
hard work with hummocks
and swamp.

Rock in the river bed not in
place

Good water in this part of
river two portages - 30 & 60 ft.

Sec 15 T. 63

R. 1 W.



6003

1020 N 1500 W 15, 63. - 1 W.

11

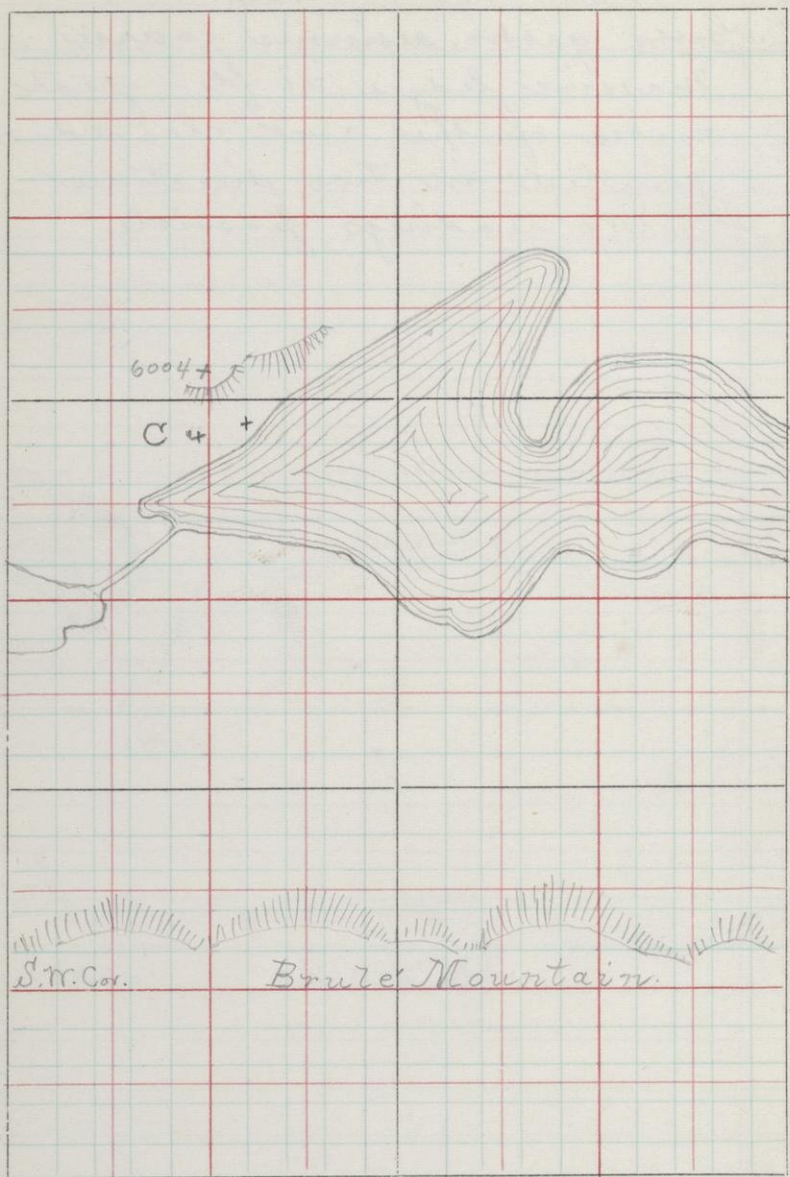
Alvins

Gabbro gabbro, resinous, coarse
massive ledges 20 ft - great
cubes of the rock cleaved or
jointed in two directions
no readings possible

Sec 16

T. 63.

R. 1 W.



6004

1400 N 1400 W. 16, 63 - 1 W

Coarse black gabbro exposed
on hill facing the lake

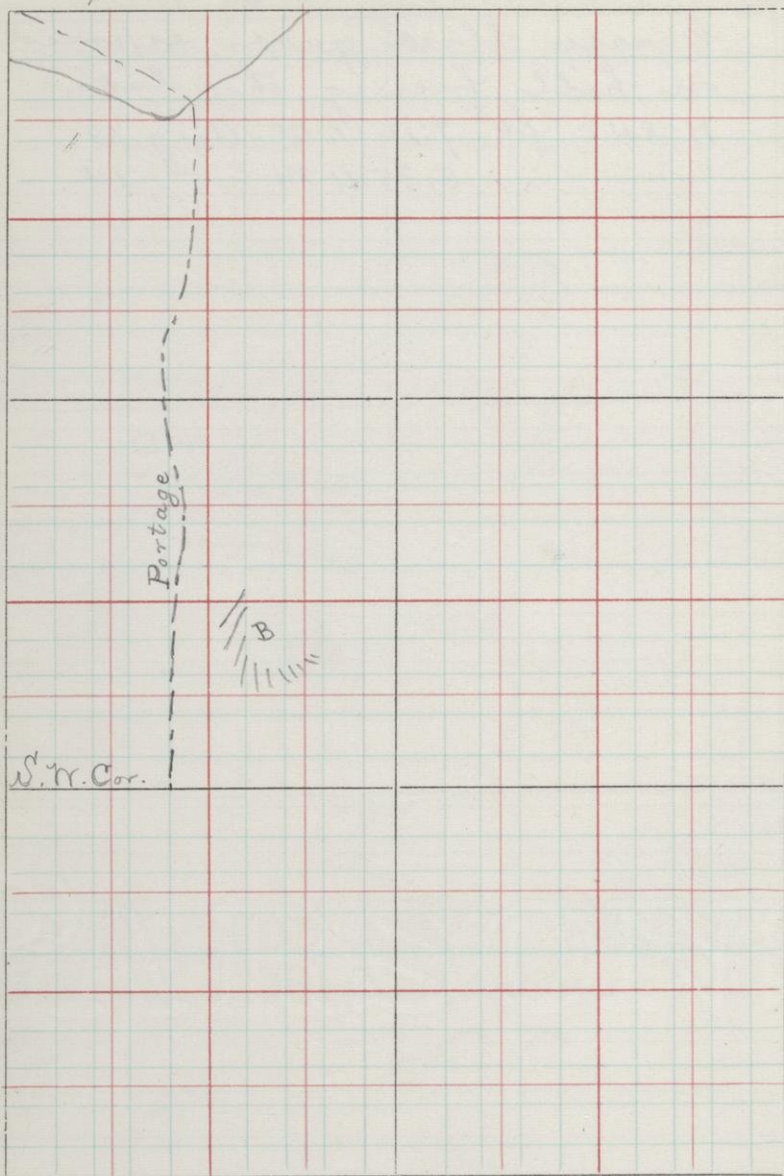
B 840 ft 7:10 P.M. Aug. 13

" " " 6.35 A.M. " 14.

Sec 9

T. 63

R. 1 W



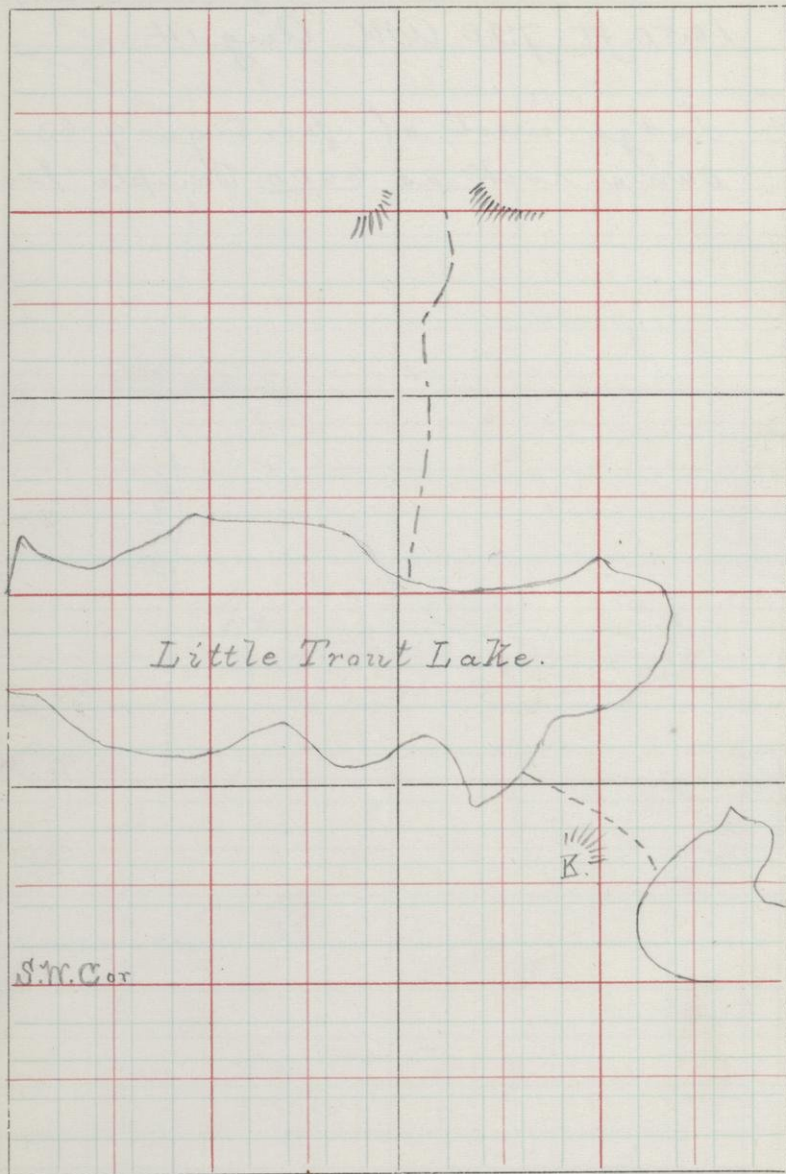
B on hill north of Little Bulli
1050 ft 7:20 A.M. Aug 14.

Ledge west of postage 9-63-1W
same rock as 6000 (sample lost)

Sec 5

T. 63

R. 1 W



144

Ledge of 6000 at west side portage (K)

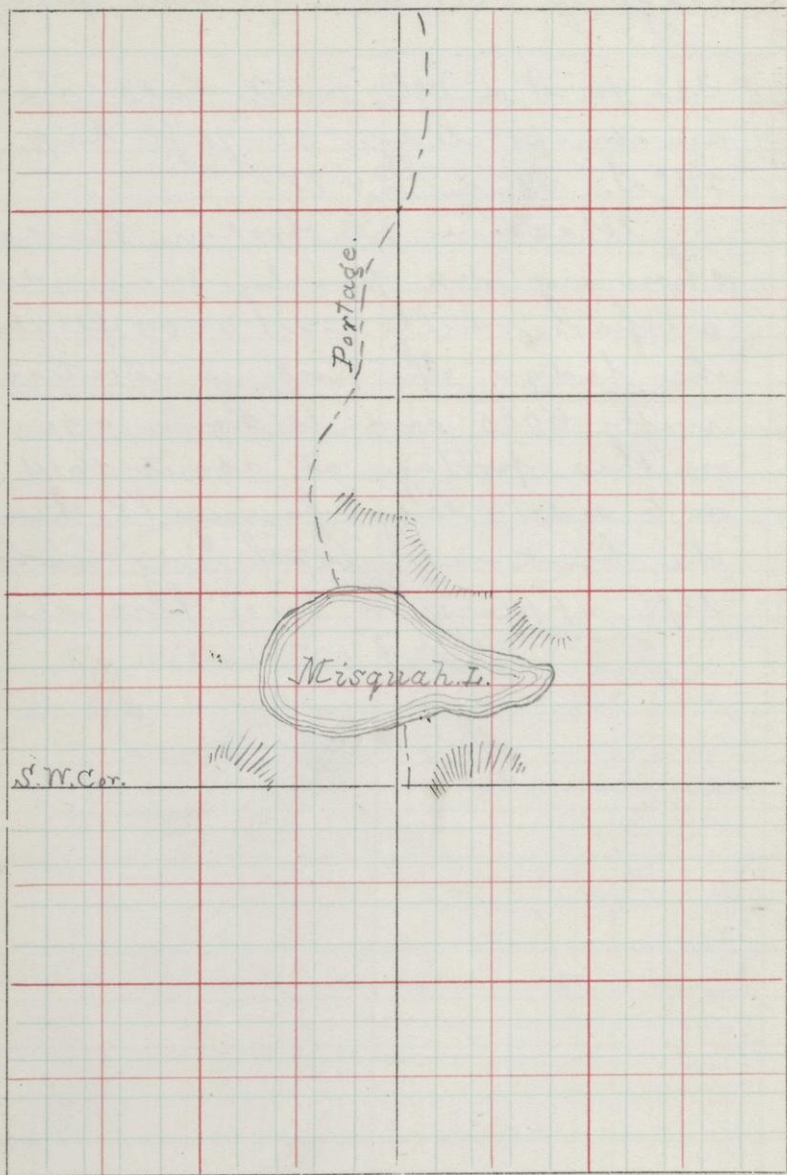
332 ft. N. Little Trout Lake rises
an abrupt ledge 50-70 ft Dip
 24° S. Strike E + W.

Massive in broken blocks
showing dip poorly on under
surfaces, hill rises 200+ ft above
the ledge. The rock is identical
with 6005 and is shown again
on this portage at about 1614 N
on E side - ledge facing W. here
the brick red weathering is seen
dip appears to be S here also

Sec. 32

T. 64

R. 1 W



Notice

{ No survey of this town yet made, the readings and the mapping only approximate

The Misquah hills are high abrupt and bare covered with scanty dead pine and exposing their red rocky walls everywhere

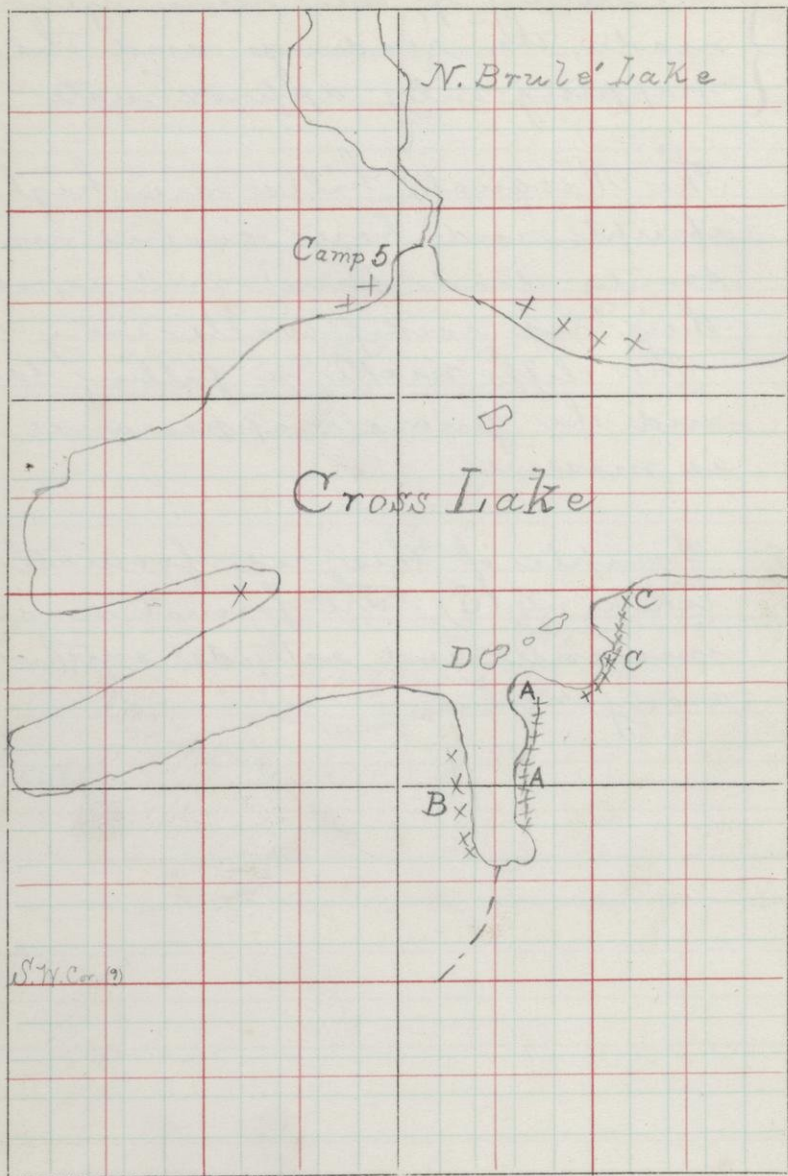
The cliffs make a falling talus and the general appearance is massive.

6005 Sample of this red formation taken at (S) The formation is immense and extends southwest many miles.

(Sec 29-64-1W)(?)

T.

R.



S. 1/4 Cor. 9)

6006 At [A] prominent shores at
"B" also and on island "D"

6007 H C varying in its mottling
at times even at others with
blotches of white.

General trend of these rocks
not indicated clearly -

B at Cross lake 10³⁰ P.M., Aug 14
1155 ft.

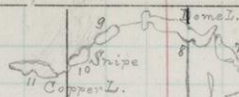
5 W

4 W

3 W

2 W

1 W



T64.

F.

R.

Continued two pages on.

Map of lakes on route - cut portages between - in the

unsurveyed towns marked.

Estimated distances -

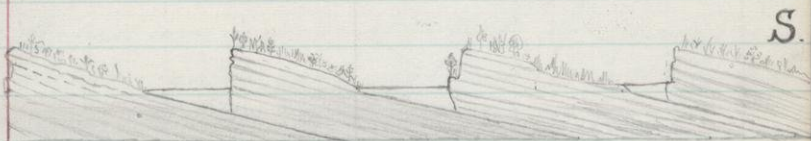
Manakorin - osumit

Kishkadina - Hill.

After leaving N. Bruli' lake in T'64 R 1 W. the route lies directly westward through four unsurveyed towns - i.e. R 2-3-4-5 W. T'64. The rock at Cross lake at A + B (see 6006) occurs again in N. Bruli at right of Portage near S point of lake and throughout the next three towns this great formation persists. Much may be learned of the structure of the country from this passage westward through the long drawnout lakes which lie east and west crossing the trend of the layers of Gassio [all similar to 6008] at a slight angle. Thus the south shores of all these lakes are precipitous often making sheer cliffs 100 ft. in height which rise from the water line while the north shores are low and rise in long gradual slopes showing only occasional layers dipping 25° under the lakes. The waters are deep along the S shores and shallower on the N. The south shores are in each

formed by jutting points very prominent ridges while the N. shores are straighter and unbroken. The strike was plainly seen in several places and measured, though the needle was somewhat disturbed and the day was dark. The readings however were constant Strike $N. 55^{\circ} E.$ dip (S. $35^{\circ} E.$) $25^{\circ} - 15^{\circ} - 22^{\circ} - 25^{\circ}$.

N.



S.

Cross section N.W. + S.E.

"Key" Lake especially conspicuous for its ledges and precipitous cliffs is fully five miles in length.

The water is 1'6" lower than the highest lines on ~~lakes~~ rocks. B 1150 ft 10³⁵ AM Aug. 15 at surface of first lake west of N. Brule - between it and Brule hill rises 95-100 ft.

6008 at E. end of first lake (see map preceding page)

6009 From great $\perp$ ledge 100 ft high

Portage to
Agemok Lake

5 W.

4 W.

3 W.

See next map

A

Little Daganaga

Round L.
Copper L.

Dome T.

Little
Eagle

T.64

F.

Gabbro crosses Daganaga - Iron Ore + quartzite
strike N+S dip E at A in Sec. 7-64-5 W.

R.

South shore of Key lake (2^d) here
strike was read with needle
(no sun) $N 55^{\circ} E$ Dip $S 35^{\circ} E - 25^{\circ}$ at "L"
Further west a great smooth
faced rises from water forming
a distinct point in lake
Face 125 ft high striking $N 55^{\circ} E$
showing the fracture to be with
the strike

6010 Directly opposite the layers on
N. shore dip 25° into lake showing
fossils in woods bare of growth
while a small island on N. shore
gives $N 55^{\circ} E$.

B at entrance to portage 3^d lake
~~1375~~ 1350 ft 3 P.M. Aug 15.

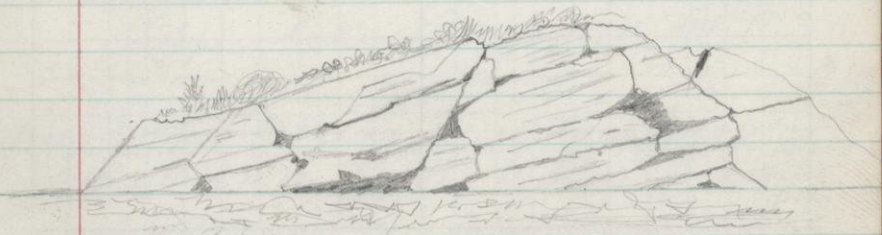
1375 " " " " " at 3^d lake
On S shore of 3^d lake against the
cliff the needle swings and
reverses

At N end of 3^d lake 1375 ft at
4 P.M.

B 1425 ft on top of ridge between
the 3^d + 4th lakes where great
smooth back of same gabbro as
6009 B at 4th lake 1375 ft.

Same rock throughout the 4th lake.

No more perfect canoe route could be devised short easy portages and all in green timber the most picturesque region imaginable with abrupt heights and open lakes Brown tamarack water throughout. The divide between Pule' waters flowing to Superior and the water going to the north is between 3rd + 4th lakes according to Paul Morrison. Between 4th + 5th lakes in T64-3W. a fine grained gabbro probably belonging to the same great formation as similar fine crystals are found side by side with the coarse rocks. Here a wall 20 ft high gives strike N. & dip S.E. (15°-20°)



This rock weathers a deep brown
 B 1300 ft at ledge 8³⁰ A.M. Aug 16th
 Hill 75 ft high between 4th & 5th lakes
 The coarse gabbro shows again
 lower down the hill and somewhat
 N.W. of 6011 giving distinct readings
 Strike N. 60° E. dip 15° S.E. B. 1250 ft
 8³⁰ A.M. B. 1135 at 5th lake 8³⁰ A.M.
 6th lake 1225 ft 9⁰⁰ A.M.

Large ledges of gabbro (same) on
 both sides portage between 5th & 6th lakes
 center of T'64-3N.

Little Eagle lake the 6th in
 the series W. of N. Brule' drops over
 rapids into 7th lake - 7th lake B 1230 ft
 1 P.M. Aug. 16th

6012 Snipe lake shows smooth face
 on S. shore giving strike along face
 of N 50° E. The coarser varieties
 of the formation occur immediately
 S.W.

Copper lake B 1275 ft. 4 P.M. Aug 16

Notice Copper lake is in sections 9 & 10
 T. 64-R. 4 N. the N & S. line passing
 about centre of lake. Here at the
 W. end on the N. Shore rises a great

Mr. John Miller thinks the Iron
at Eckley Lake is in bedded
quartzite

Note. At Eckley Lake in the west side
of S. 27-28 T6S-R4W. Mayhews
most important location, this also
in P. 29 & 30 where the iron is
bedded and largely exposed.

The varieties shown me are fine
grain distinctly crystalline magnetite
It has here been traced
long distances

6013. broken much crumbled and falling
face of 6013 which is stained on
weathered surfaces by green copper
The sample 6013 is unaltered near
the W. end but where the green
comes in, the cliff forms a talus
rotten and crumbling - weathering
in concentric layers on the
rounded masses of the rocks

6014 No reading could be made here
This is some of the green copper
rock showing here

On the top of the cliff has
lodged a five ton mass of iron
ore similar in everything to 6015

6015 100 paces W. of this copper ledge
at the extreme west end of lake
a very small outcrop of iron ore
Notes. is seen apparently in place
→ giving strike on a small face
of $2\frac{1}{2}$ by 2 ft of N + S. dipping
N. 60°

13 This Iron is probably floating
and not in place here - as other
boulders of the ore lie about
1st because its location must make

T.

R.

Mr Henry Mayhew informs me
that the country in 65-4 N.
is much broken in the S. W.
especially.

it interbedded with gabbro which continues striking N.E. for some distance six miles or more.

2nd its dip is unlikely 3° 2 miles N. of this point in D.

Don ore again shows largely this will put the line of the outcrop exactly as it should be considering the ore at B. 7-564-R 5 W. to strike (average) N 55° E.

B This ore is to be described directly
Copper lake 7° A.M. B 1300 ft Aug 17.

On portage between Round lake and Copper lake the same green copper rock appears in large ledges (crumbling) striking N. of N dipping 25° N. of E.

Round lakes surrounded by hills and points of gabbro similar to preceding samples

B. at Round lake 9^{30} A.M. Aug 17
1250 ft. B at lake #14-1275 ft at noon

Never a moment out of sight of these massive ledges of coarse gabbro the whole of these lakes

T.

R.

*

Banded ore 6017 bag shows the
interstratified quartzite taken
against the west wall of outcrop

This is similar throughout

are held and formed by this great formation layer upon layer of great thickness. The whole country is burnt and the shoulders of bare rock rise on all sides. Wherever readings can be got Strike N. 55° - 60° E was shown. B at lake #15-1st P.M. Aug 17th 1200 ft.

6016 Between 16th lake and Little Sagana-ga in 15-64-5 N. 6016 was taken to show peculiar white weathering of gabbro in this burnt country probably due to the intense heat as it is not so seen on the unburnt islands in the lakes which are numerous. This sample from bare back on top of hill as above.

6017 In S. 7-64-5 N. H. Mayhew has a location on iron which is shown in 6017. The outcrop is large 15 ft thick and the ore very rich and heavy magnetite. The strike is N and the dip is - appears 45° to 60° .

6018 Directly S of the outcrop a distinctly stratified cliff of 6018

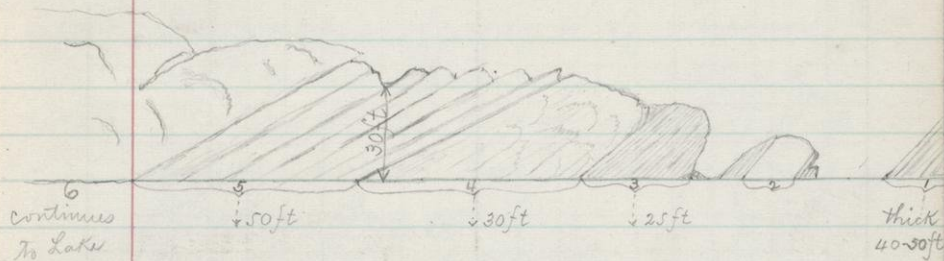
shows 25 to 30 ft high giving strike of $N 5^{\circ} E$. and dip of $20^{\circ} E$.

Immediately across a low swamp some 100 ft N of the iron 6018 again appears in a tumbling hill where no readings could be taken but where the outcrop was large. Continuing the strike N would soon bring us against the granite of Big Baganaga Lake. It probably swerves away E. N. E (?)

In the pack 6017 some black sand from the lake shore is put.

The rock next E of this quartzite ledge (the one S of the iron appears the same rock shown in 6016 3 miles eastward and further E still. This rock juts into the lake in Mayhew bay a few rods from the iron formation

Further examination of this region gives the following section.



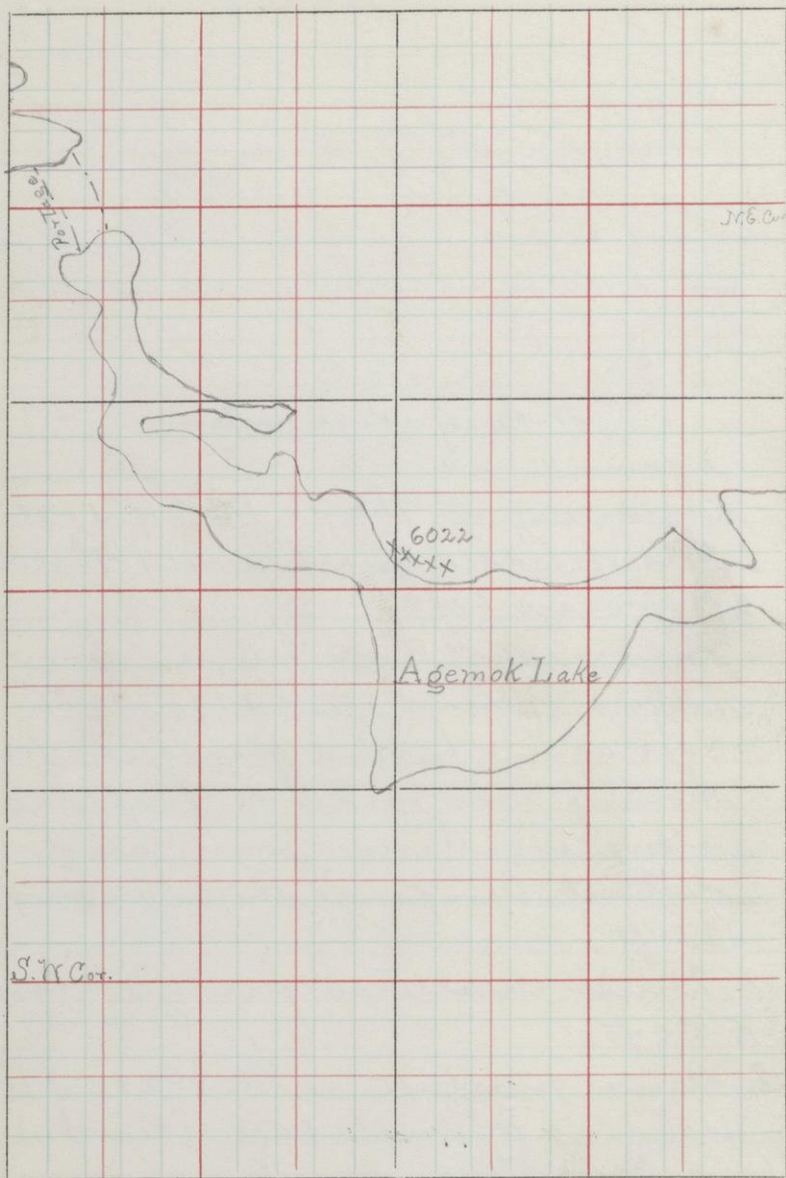
Strike of above section $N 3-5^{\circ} E$
 again " " " " " N.

Beginning at the W. (Dip of $5/20^{\circ} E$.)

- 1 Hill of bedded quartzite - 40 ft thick shown in 6018
- 2 Iron ore 10 ft thick between poorer layers of lean ore (6017)
- 3 6018 again bedded quartzite friable showing iron oxide on fracture along weathered joint and distinct bands as shown in sample 25 ft.
- 4 Dense unaltered quartzite (gray) 6018A 30 ft.
- 5 Same quartzite as Nos 1-2 & 3 of this section 50 ft Sample 6018 taken here
- 6 gabbro black coarse and massive extending to edge of bay

Dec 36 T. 65

R. 6 W.



at times showing rusty streaks
of (6018) the bedded quartzite (6019)

6019 The gabbro of No 6 of above
section

6020 The rock directly east of this
great gabbro layer (6) jutting into
Mayhew Bay. //

B B on N shore Little Saganaga Lake
9 A.M., Aug 18. 1280 ft. Crooked lake
30 ft lower than Little Saganaga

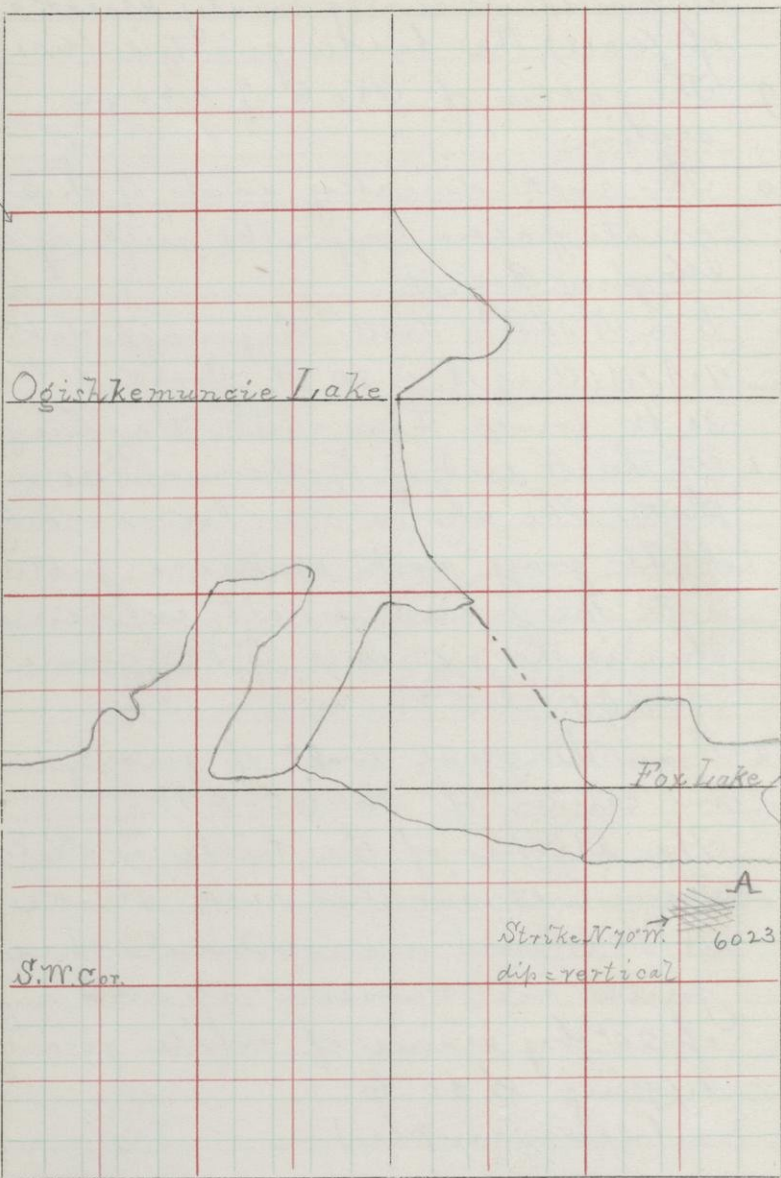
6021 At the N end of Gobbemichigomog
Lake The shores are low and the
light gray rock appears jutting
into the water. Small exposure
this is the extreme S.W. corner
of T65 R5N.

6022 From the great wall of quartzite
in center of 36-65-6N.
The strike of the hills is N.E.
The joints in this rock strike
N 50° E. and are vertical these
joints are crossed at an angle
of 20° by seams of white quartz
dipping S 10° E.
(See sample)

Sec 26

T. 65

R. 6 W.



We now enter a region of the great Quartzite formation. This quartzite is distinctly and beautifully banded on the hill tops exceedingly brittle with keen edges when fractured and varied in texture as shown in the following samples.

The banded exposures show different colors and from this point 36-65-6 N. the hills are all bare and of this quartzite weathered white.

Again at center of N. N. 36-65-6 N. the strike of the bands is $N 50^{\circ} E$.

In the extreme S. W. corner S 25-65-6 N. on the west shores of Agemok lake fine exposures of the quartzites are obtained on a number of ridges and domes with deep gulches between with deep gulches here the banding changes gives strike of $N-70^{\circ} W$. $E 20^{\circ} S$.

On top of this hill and following into S 26-65-6 N.

on the W. shores of Agemok lake
fine exposures of the quartzite
are obtained at A the following
sketch of the banded weathered
surface was taken

The strike is $N 70^{\circ} W$. in directions
of bands. The white layers are
cherty and about $\frac{1}{2}$ inch thick
and then fracture black and
crystalline. The dark layers
seem to show no difference of
fracture below the surface

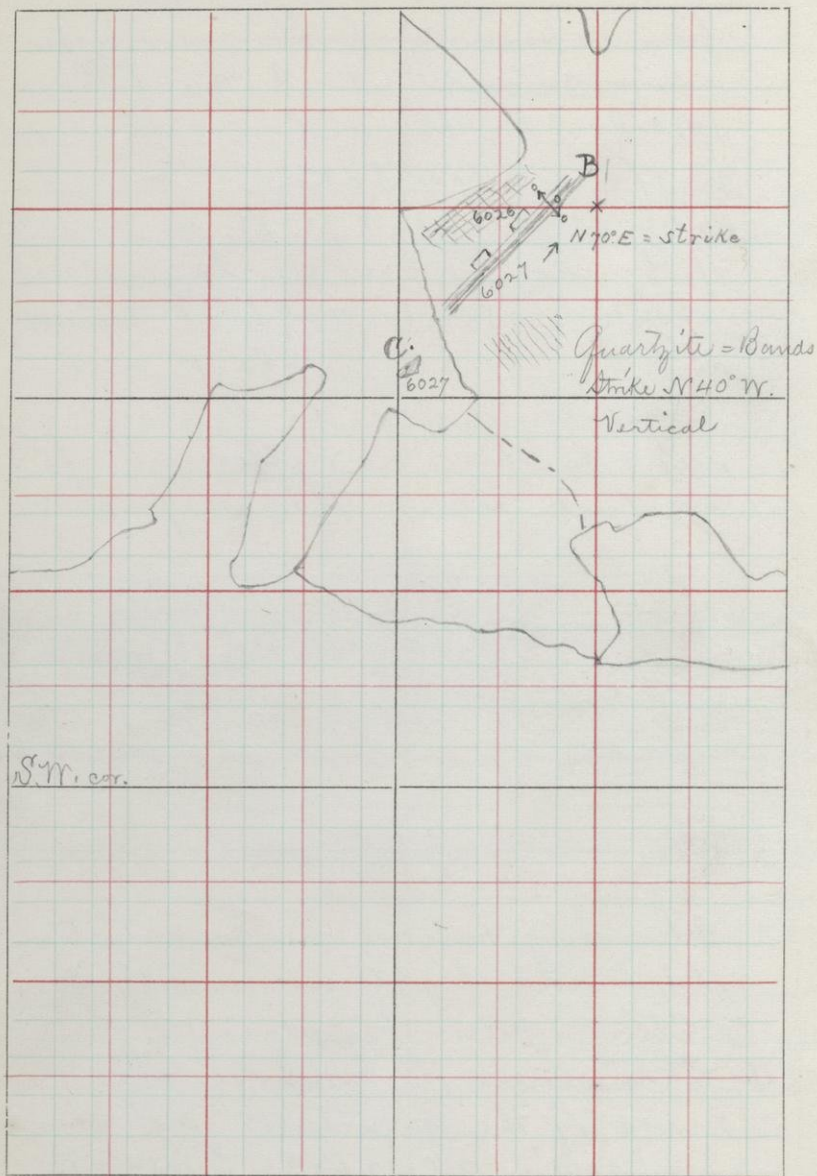


6023 Showing bands in quartzite
dark and light as in above
section (from this place)

6024 This seems to compose the
mass of the quartzite as seen
in sec's 25-26-36 T65-6 W

Dec 26 T. 65

R. 6 W.



6025 The slaty 6025 shows slate
associated with the quartzite
6026 Calcareous rock with its weathering
shown. This occurs in a range of
shaly somewhat calcareous rock
The layers crumbling and rotten
and much discolored. This rock
lies in a valley running N. E.,
and the layers of the shaly
rock standing vertical strike $N 30^{\circ} E$

Not E + W. as said by Winchell
(Winchell used an inferior little
compass now in possession of
Paul Morrison in a region of
iron ores. This was quite useless)

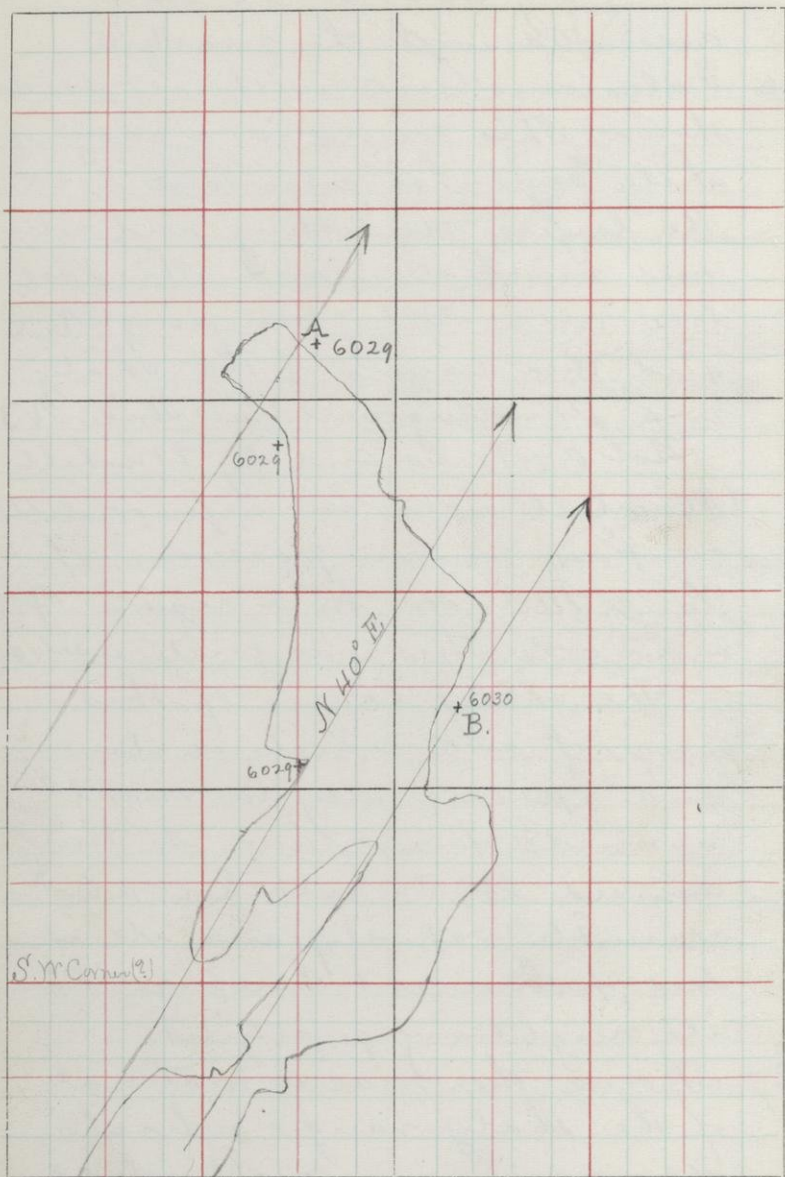
The shaly layers of this
range of rock which is low
and appears only in small
mounds from time to time
caused it to weather and
crumble rapidly and it is
less prominent therefore than
its neighboring quartzites.

6027 Shows the main material
of the shaly range which
appears again on a small island
S. W. of the mouth of the valley in which it lies

Dec 13

T. 65

R. 67N.



The ridge was traced from the island center of D 26 N.E. with the strike of the layers. At intervals the white marble like rock (6026) leans against it and intrudes into it so that it appears to replace it in spots—but lies on the flanks of the ridge is jointed at right angles to it—It was traced to "B" from "C." and further N.E. see following.

I do not know what the bands of this rock indicate the strike of the rock. If they do the strike is varied in a most remarkable manner from $N. 50^{\circ} E$ to $N. 70^{\circ} W$. and at the entrance of the portage in $N. W. \frac{1}{4} N. E. \frac{1}{4} 26-65-6 W$. they strike again $N. 40^{\circ} W$. dip vertical

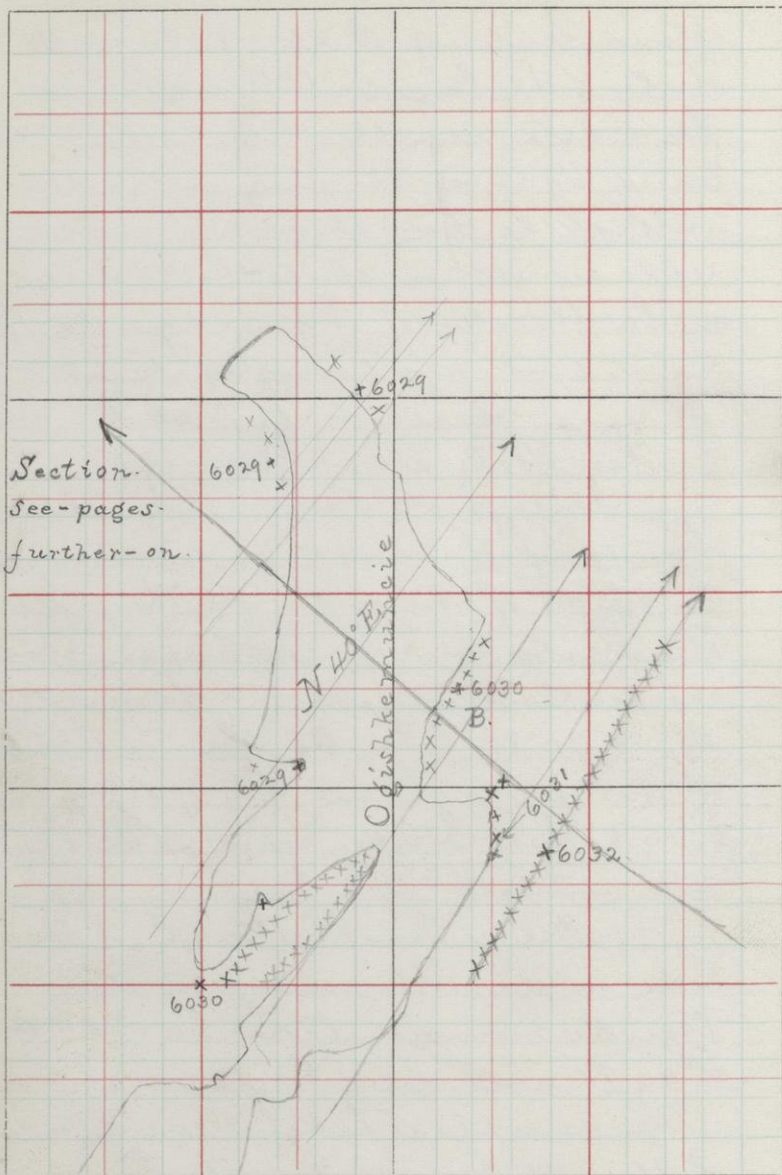
The general strike of the beds on the N.E. extremity of Ogishke muncie lake is $N. 40^{\circ} E$ or $N. 40^{\circ} W$. according to cleavage

*Note

The samples taken were as follows beginning at the extreme N of the lake at A

Dec 13 T. 65

R. 67r.



The layers are on edge.

6029

The great conglomerate formation or bed. Showing no apparent dip or strike but massive walls of a green color with joints + great cracks. These cracks run $N 20^{\circ} W$. and incline $N. 20^{\circ} S$ (65° Dip). The pebbles protrude in masses the great pink granite pebbles being most numerous often as large as 3 ft through and the bright red Jasper giving the rock a handsome appearance besides quartzite and some slate pebbles.

6030

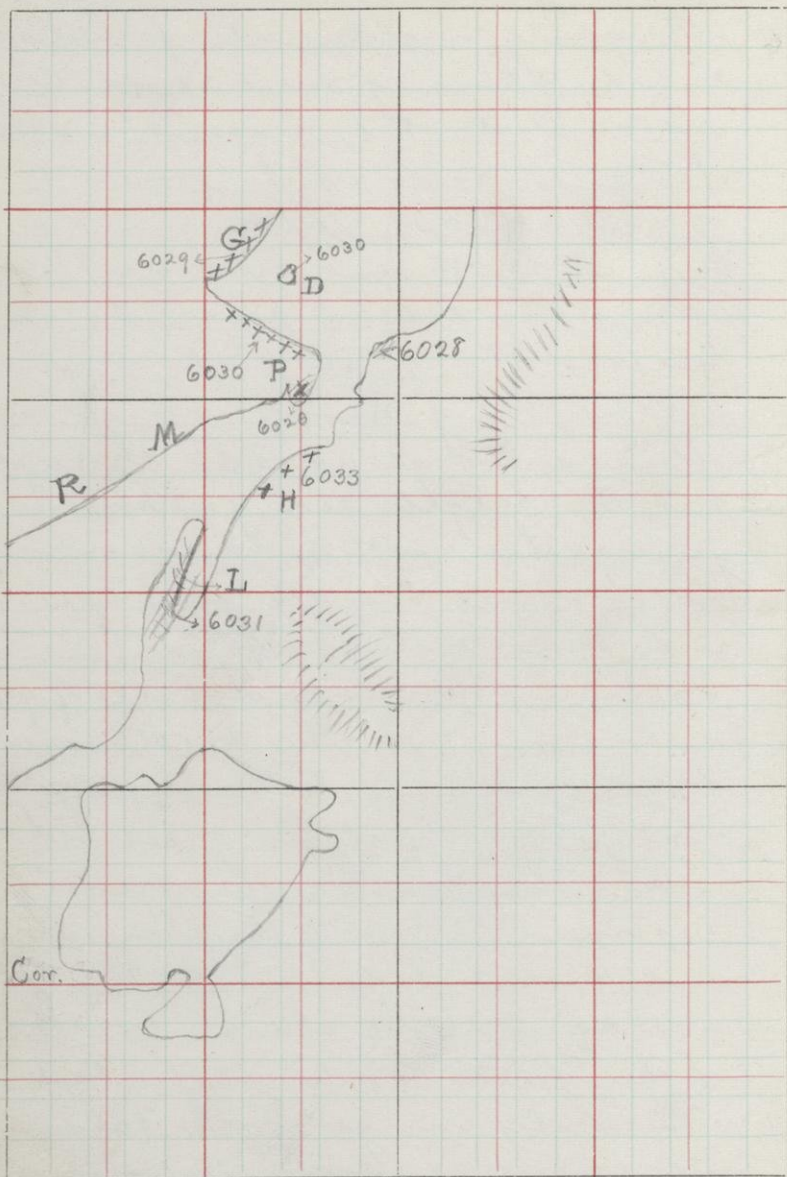
Following the shore a hill of greenish rock rises at B. The pebbles are black and green in a dense matrix of crystalline greenish rock. - this sample the greater matrix. This one of the largest and thickest beds about the lake and as will be shown lies S.E. of the great conglomerate bed.

6031

The shaly range with calcareous intrusions appears strongly on the east shore at C striking

Dec 24 T. 65

R. 6 N.



See map on previous page.

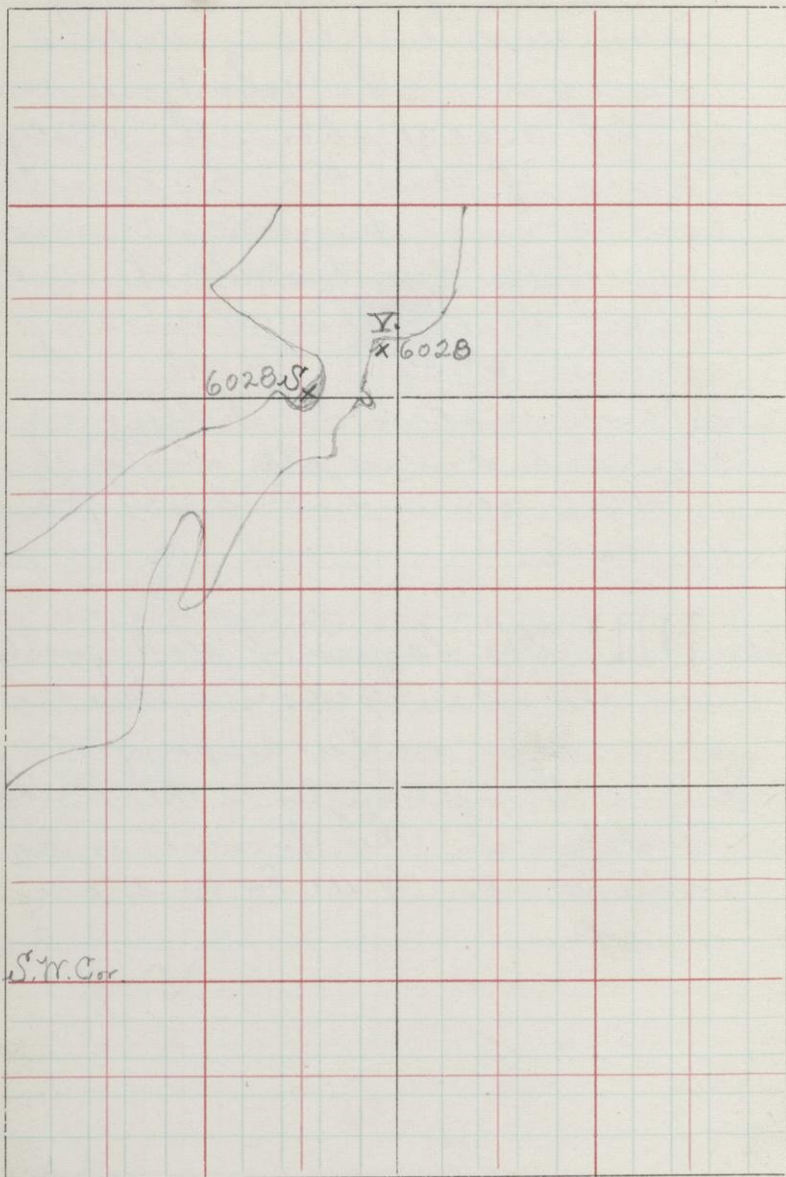
N 40° E. as before and forming a rotten and tumbling debris pile against the quartzite wall S.E. of it. 6031 shows the shaly variety of this bed the denser rock forming prominent and steep cliffs further south on the line of Strike This is directly against 6032.

6032 - which makes the hills and rounded domes all along the E shore somewhat back from the lake.

~~*Note~~ **DIP** The layers of slate quartzite and all other rocks in this region are on edge or else dipping 85-87° S.E. or at right angles to the strike which varies. The formations as a whole strike N 40° E. and are on edge.

T.

R.



See map on previous page.

6033 A sample of the dense calcareous range at H This range occupies the bottom of the little deep bay L that runs with the strike

The crumbling remains of the shale can be seen covering the shores in mounds on each side of the bay and account for the bay itself it is the line of the soft easily weathered shaly rock. Bluffs of 6033 show here

The island at D is 6030

The Conglomerate is in high cliffs 40 ft at G

The dense greenish rock 6030 is in cliffs at the shore of the point P

6034 At M Basaltic cliffs (structure) where slaty layers of (6028) are in contact and mixed with (6030) The two kinds of rock are jumbled together indiscriminately Both kinds of rock are shown in sample 6034 in contact.

At R, the conglomerate and the green less conglomeratic rocks rise in contact forming a cliff

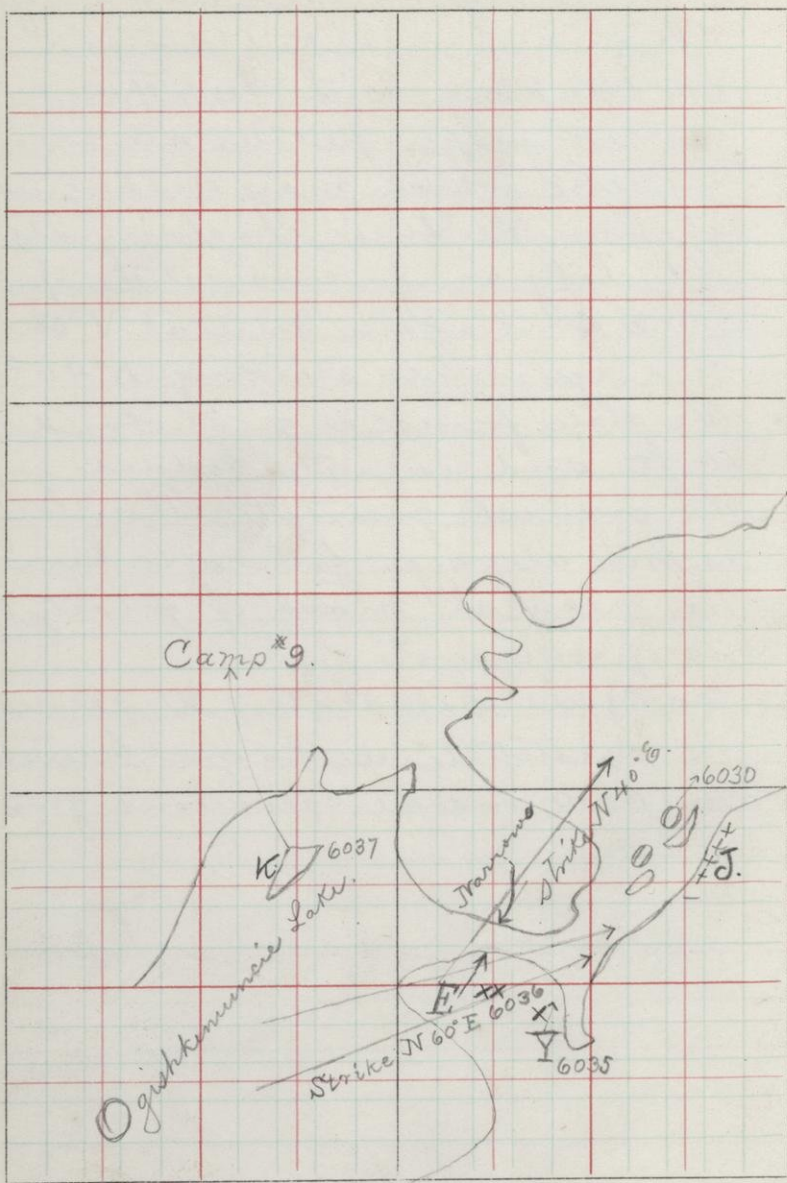
30-40 ft high broken and irregular
There is no marked division
one blending with the other only
no red jasper pebbles are seen
in 6030 which may distinguish
it from the true conglomerate.

Note A slaty range crosses the point
at D. and again seen at V shows
cleavage lines striking N 40 E
The slate forms a great band
10 ft and is interbedded with
the greenish quartzite. The slatiness
is not always found where
the greenish mass of quartzite
is prominent

6028 (omitted) is this slate. It seems
to constitute a layer between
the 6030 and the calcareous group.

Sec. 23 T. 65

R. 6 W.



At J rise vertical cliffs 15 ft high of the dense calcareous rock (6033)

6035 The islands OO are of (6030) while again on the point of the peninsula Y a variety of the same in dense unbanded masses making a high hill bare and blunt.

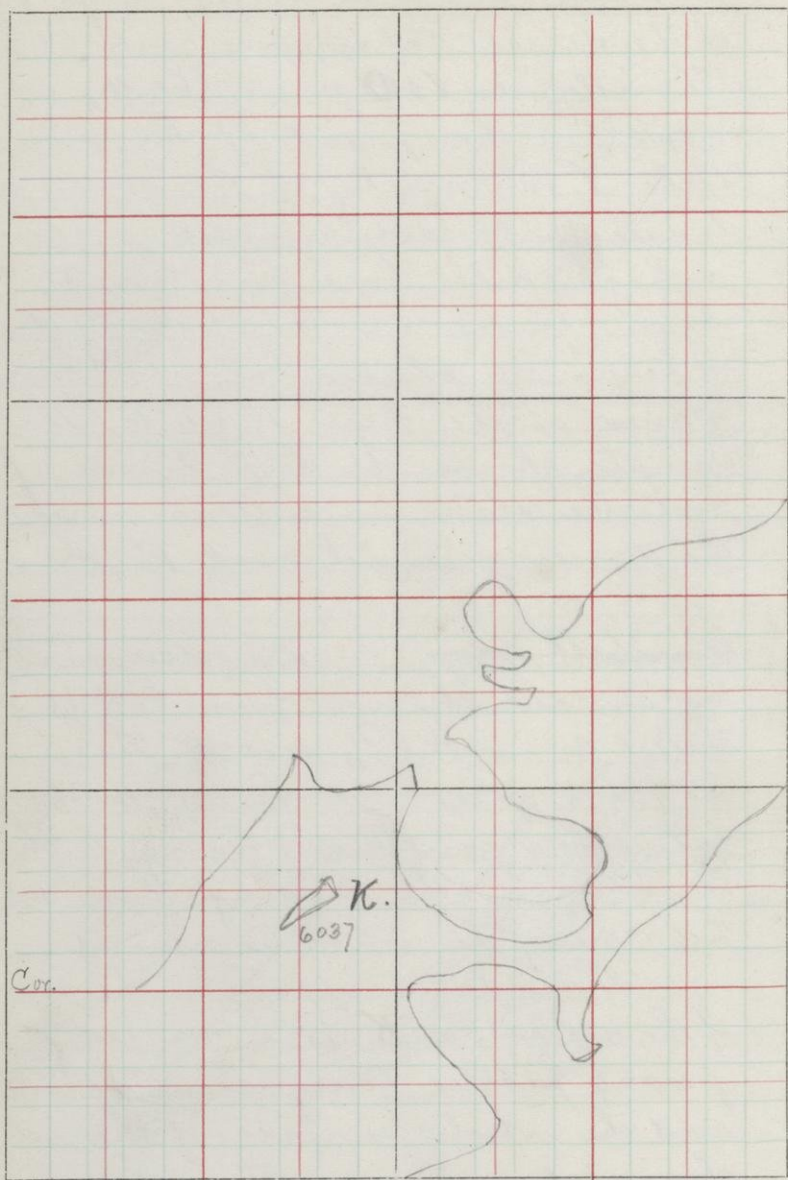
6036 Again comes in this slaty band or layer in place but its cleavage planes strike here $N 60^{\circ} E$. The sample shows the two kinds of rock - the slate in contact with the denser greenish rock F.

~~Winchell says~~, I can discover no sudden change from E & W. strike to N & W. in N.E. $\frac{1}{4}$ sec 26. There is no E. & W. strike yet found on the lake. How could it change? This variation in the cleavage from 40° to 60° may be what is meant.

The island opposite the mouth of the narrows K is a variety of 6029 pebbles being seen therein and the whole surface of the island glaciated and smoothed. It is a true conglomerate but though

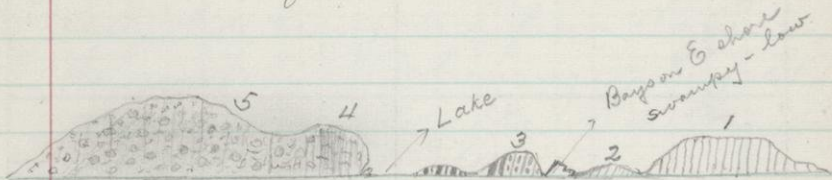
Dec. 23. T. 65

R. 67r.



it shows more granite pebbles
than 6030 - has like this group
throughout no red jasper
6037 is from the N end of the island

Having established the main
relations of these 5 bands thus



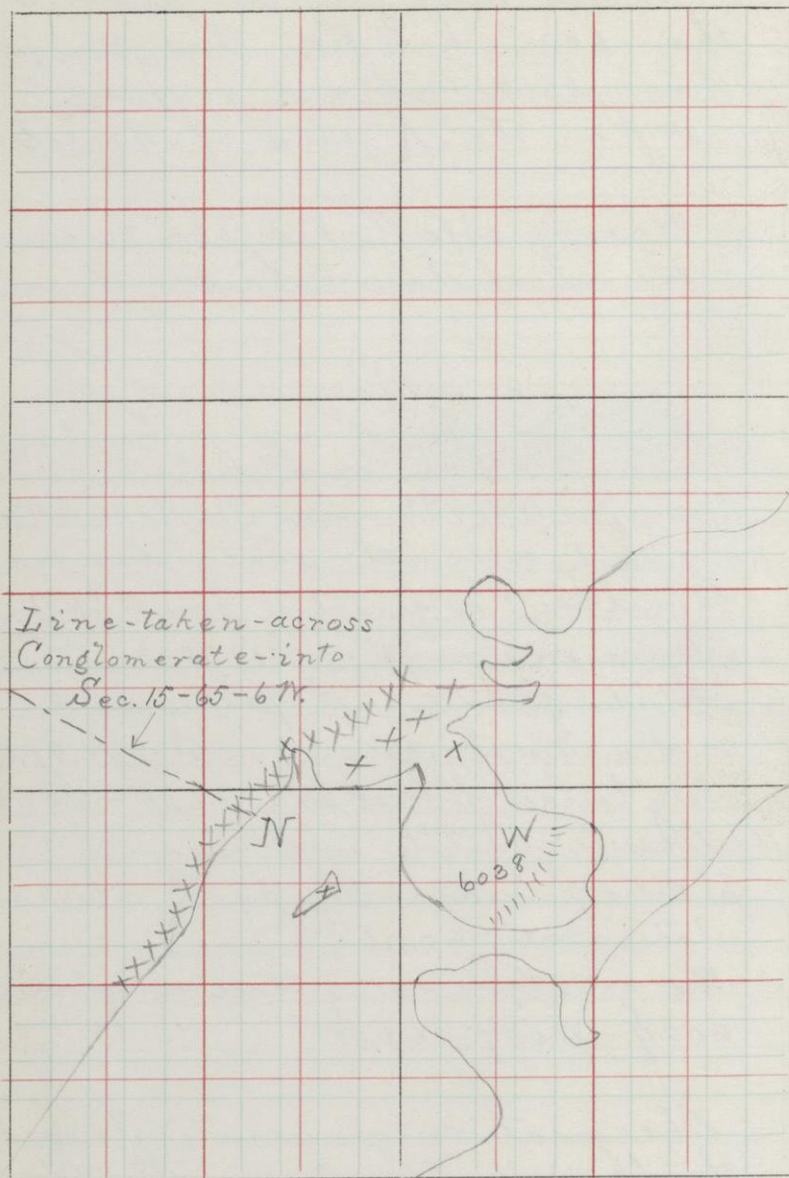
Cross-section N.W. & S.E. across Sec 15-65-6 W.

- 1 = quartzite with slaty layers
banded chert or quartzite, very thick (6032)
- 2 = Calcareous group - 6031-6033
- 3 = Banded quartzite with pebbles and
conglomeritic streaks and on the N.W.
slaty bands of black slate 6030-6028
- 4 = Massive quartzite with scanty
pebbles mixed with dark dense
slate rock, 6034
- 5 The great Pudding stone conglomerate
6029-6037-6038

The great conglomerate forms
the large peninsula on the N side
of Ogishtemuncie Lake,

Sec 23 T. 65

R. 67r.



It is smoothed on the crown exhibiting a most curious appearance, as the smooth surfaces cross matrix & pebbles alike reducing all to a common surface level.

Few jasper pebbles were seen here the main mass of the conglomerate bed being free from them on the surface - or showing only at rare intervals. Like other bands,

For the whole formation is streaked and banded, the jasper horizon occurring at intervals further N.W. Granite pebbles are thickly scattered throughout the Saganaga granite and though the streaks of pebbles are sometimes well defined striking N.E. at various angles to be seen immediately the greater part of the exposed surface is free from banding or lines except joints to be illustrated hereafter.

6038 - Is the main sample to illustrate this great conglomerate. It comes from the crown of the peninsula at T.V. S. 23-65-6N.

T.

R.

E

N

23

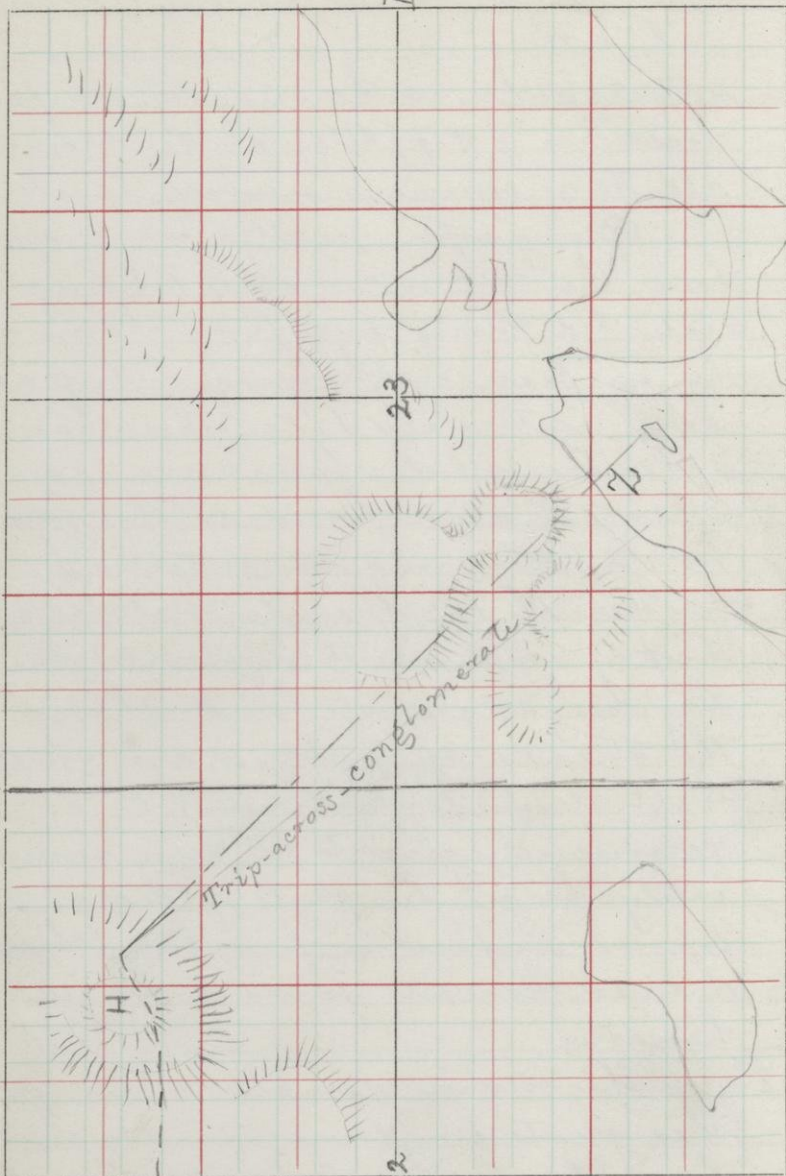
22

N

Trip-across-conglomerate

I

N 22



The glaciation or else the clearance
lines on the crown of the great
tongue at W. strike $N40^{\circ}E$.
dip vertical

It will be seen by comparing
6029 + 6038 that the conglomerate
at the head of the lake is greener
in appearance and contains
a greater number of red Jasper
pebbles and is somewhat
different. It is however only
one variety of this bed as is
shown by the fact that the
red pebbles are found elsewhere
abundantly.

To get a thorough idea of the
nature of the great conglomerate bed
an afternoon was occupied in
crossing it in a N.W. direction
Starting from the shores of the lake
at Z (turn the map so that the top
of the page is F.) I crossed into
sec. 22 over the rounded smoothed
hummocks of the formation
the debris of which fills all the
valleys. The high hill at H

was ascended and a second high hill to the west was gained. From this point the conglomerate could be seen extending N. W. still for some miles. The following observations were made.

1st There are few red jasper pebbles near the lake shore at Z.

2nd The first change 500 yds from the lake shore was shown by a slaty band - similar to that already shown in 6036 and the strike $N 55^{\circ} E$.

3rd Dense intrusions of a dense dark heavy rock apparently ~~surrounded~~ by conglomerate but covering large areas 30-40 ft. across and breaking with a conchoidal fracture.

6038A

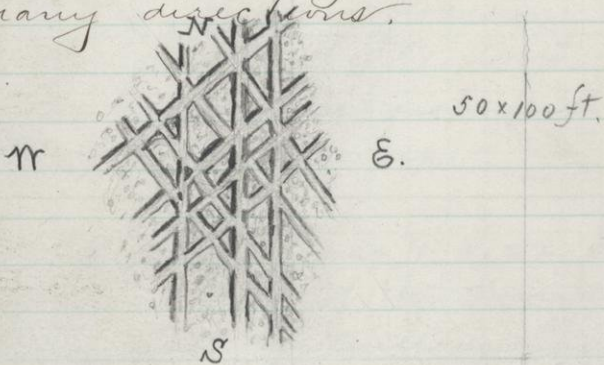
4th Wide bands 30-100-200 ft in which the red jasper is thickly scattered - making a beautiful surface on the glaciated domes.

5th Bands of very fine pebbles white and red running in one direction with dense rock

between. free from pebbles
These pebble bands strike N 65 E on
top of H (the mountain)

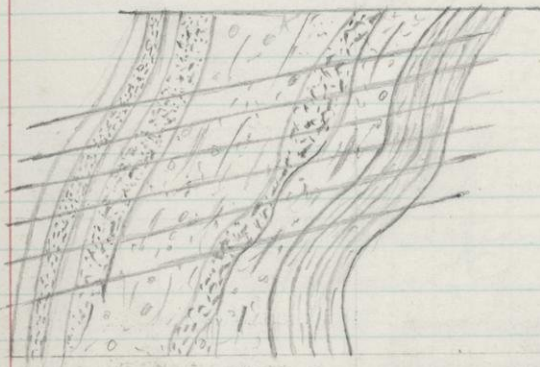
These conditions are repeated many
times and have no order the
following sketches show some
peculiarities.

$\frac{1}{2}$ mile N. W. of Z the joints were
observed as follows but in no
place could either dip or incline
except one such joint - then in
many directions.



At a point where the fine
white pebbles ran in bands
weathered surface cracks over a
space 10-15 ft were as follows
Quartz (white filled the S lines

in many places especially the
little dashes + gashes between the
cross lines which were cracks
not glaciation marks.



- 6039 Shows the surface in one
of the jasper belts, with some
of the pebbles also (jasper) knocked
out and picked up.

In this trip across to O. 22 I passed
over a country of the burnt and
fallen tract of timber. The rugged
steeps and the swampy hollows
combine to make this part of the
world a miserable and desolate
region fit for no use that I
can conceive except a natural
museum for conglomerate display

a sort of geological national park

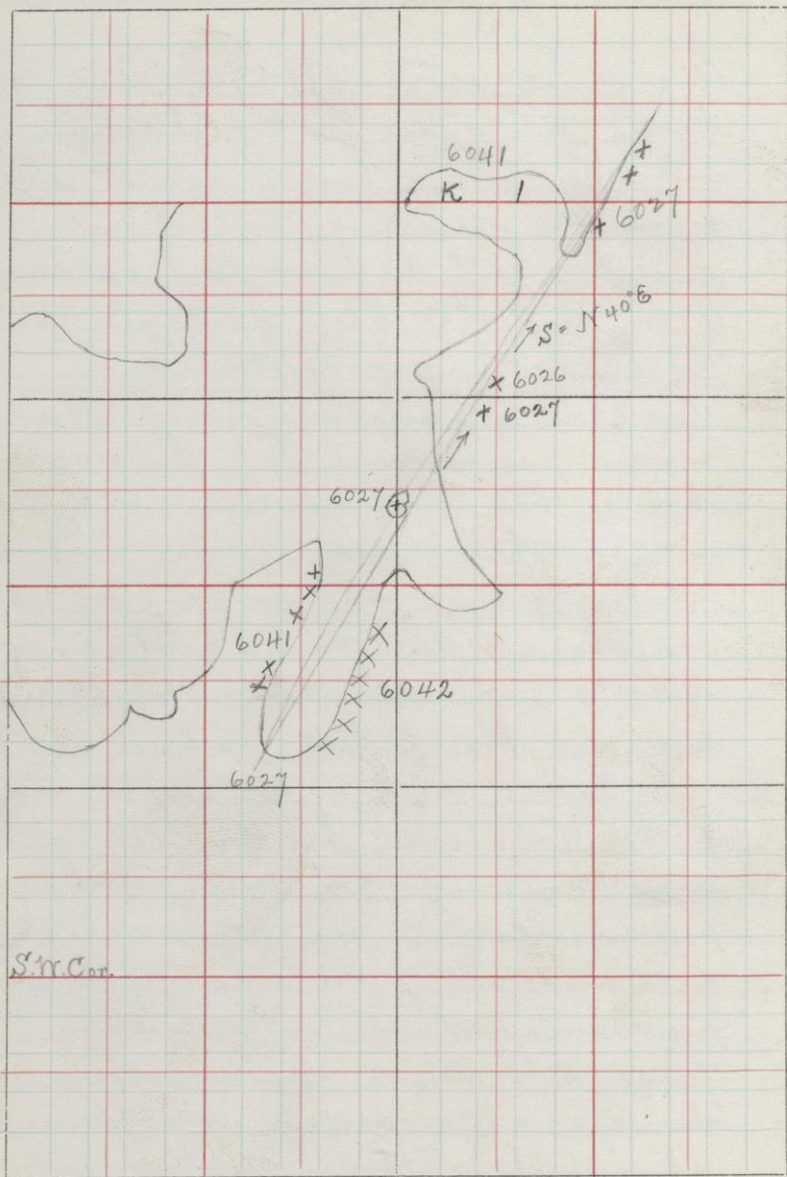
A violent storm B 27.6 = 1650 ft lasted two days on Ogishkemuncie and only a few hours work was possible during that time

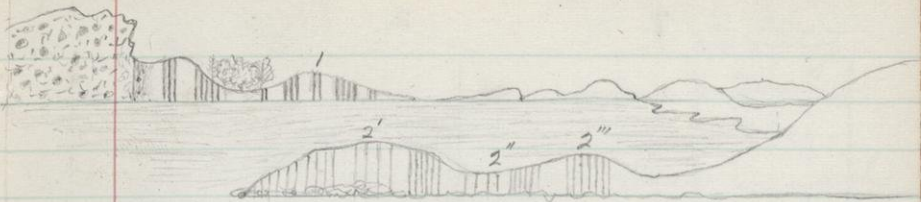
On the 21st the work was completed there and the three portages to Knife Lake accomplished.

Further examination of the main peninsula ^N of the narrows shows that its eastern extremity is not the conglomerate but the slaty group, shown in 6028 & elsewhere. The bands striking N 40° E were seen upon sighting to cross the point where 6028 was taken and on the south side of the narrows the bands can be seen crossing the crown of that peninsula in the same direction. Examination of the whole of the two peninsulas shows no deviation from this strike cross sections ~~on~~ the N.W. & S.E. on the N. & S peninsulas shows the following,

T.

R.



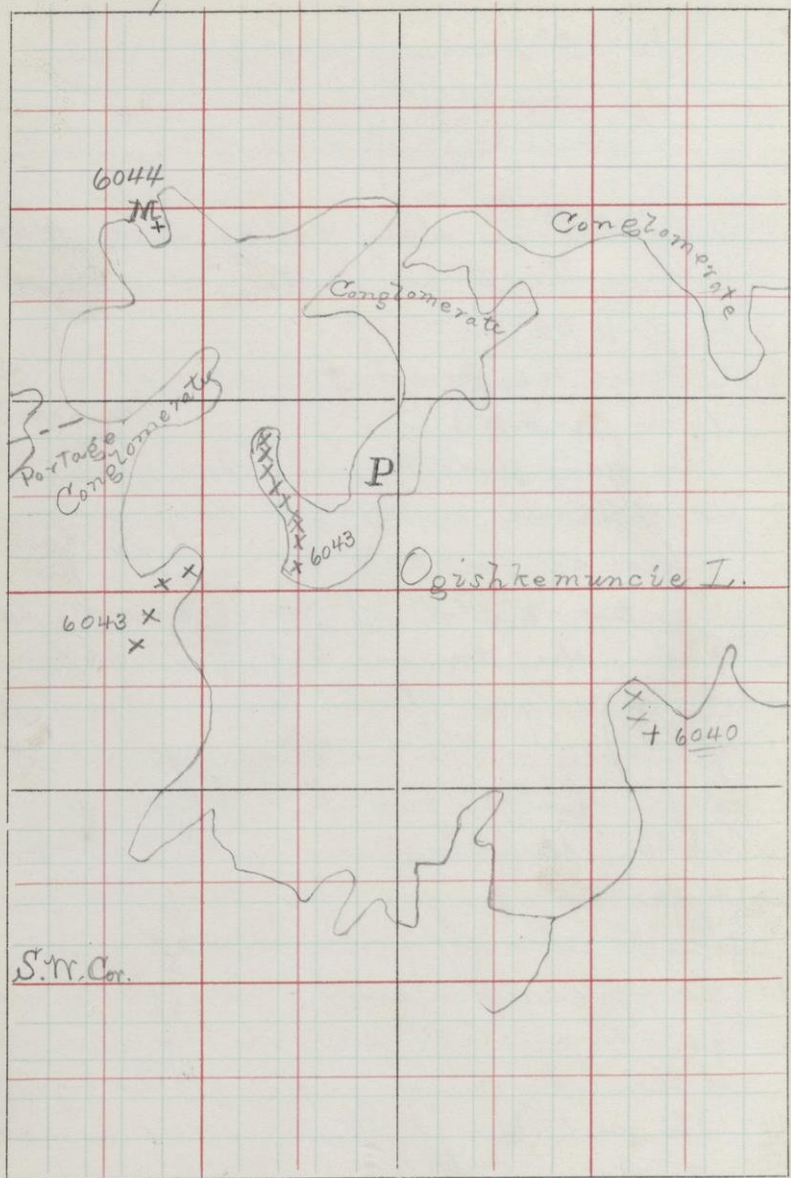


sections, - The slaty bands strike $N 40^{\circ} E$
and on the S. peninsula ^{at 2} were observed
to dip $80^{\circ} S 50^{\circ} E$

- 6040 Shows the ~~south~~ peninsula at 2'
(K on map.)
- 6041 The group N. N. in order from the
calciferous range. it shows the
same as in 6030 here.
- 6042 The group S. E. of the calciferous
where the bands begin to show on
the margin of the great Fox lake
Quartzite - The weathering out of the
soft shaly group, makes as is
well illustrated on the map
(preceding page) the deep bays on
the S shore of the lake
- 6043 So conglomerate showing green matrix
as where first seen at the N. end
of the lake. many jasper pebbles & granite
The whole of the crooked peninsula
at P is of this

Dec 27 T. 65

R. 6 W.



6044. Is a ~~fo~~ speckled rock, a variety
of conglomerate found in massive
walls at M just where the
E + W. line crosses. This was the
last sample taken on Ogishke
Muncie + Knife lake.
" "

Portages between Ogishke Muncie
and Knife lake.

Conglomerate crosses the portage
between the first lake and O. M.

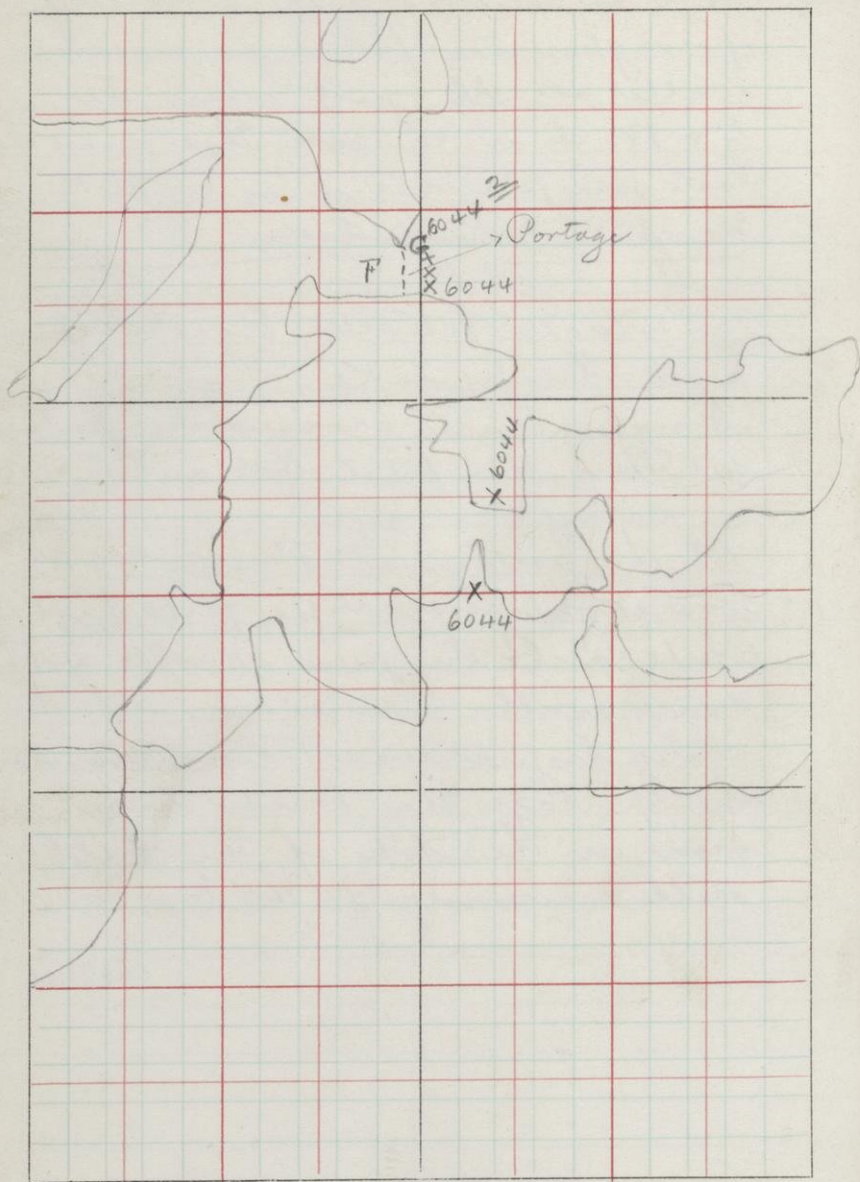
See maps next pages.

At the portage at F-28-65-6 W.

6045 was in massive cliffs 75 ft high
while at G the green sample of the
same wall interbedded with the
slaty layers was taken. Crossing
the portage the bands were
seen on the top of the hill
still running N. 40° E.

Sec 28 T. 65

R. 6W.



See map next page.

Knife Lake East end - S. branch

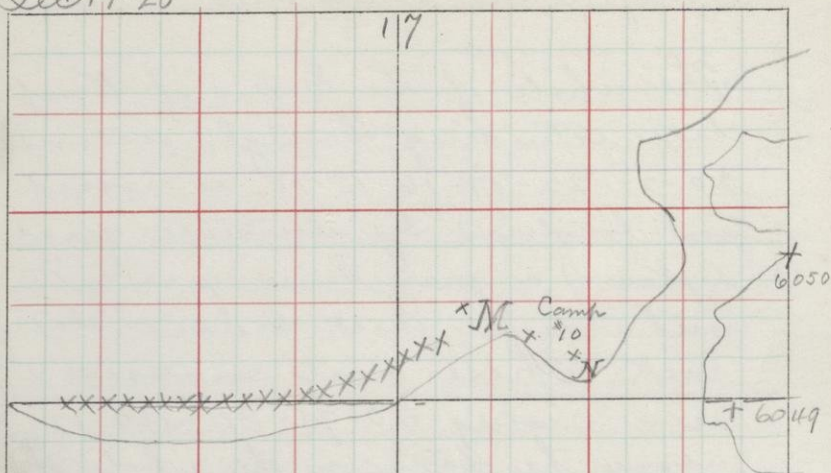
The whole of the E. end of Knife lake extending through sections 20-21-22-17-16-15-10 is crossed and bordered by alternate great dykes of a gray dense quartzite and a dense thick bedded platy rock. These great masses are seen rising 50-75-80-100-125 ft above the lake on the whole shore line of this portion and though both the slate and the quartzite grade imperceptibly the one into the other, the alternation is distinct. Sometimes the one extends $\frac{1}{2}$ a mile and at another place only 100 feet or so but they both form magnificent escarpments rising like the palisades on Superior 100 ft vertical at times. Though little idea of structure can be had from these broken & massively built walls some observations were made as follows.

Wherever weathered surfaces showed banding the strike was

Sec 17-20 T. 65

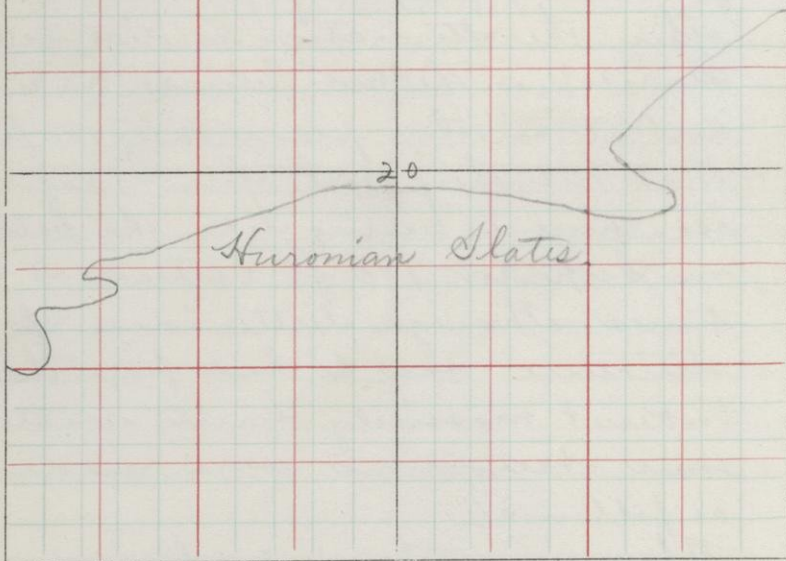
R. 6 W

17



Knife Lake

20



Huronian Slates

See map next page.

pretty uniformly $N 40^{\circ} E$. (exceptions are noted) and at times the great layers plunging into the lake were seen to have a S dip and strike E. + W.

6054 at M) The rock shore is continuous.

6055 at N)

6046 Was taken in 22-65-6W.-A

Frequent seams of quartz are found therein at this place

The rock rises in ridges southward

6047 Is a true slate and weathers as one in thin laminae and splinters. The cleavage planes strike $N 40 E$ and dip S. E 70° at N the strike is the same and the slate bedded thinly in quartzite which rises in high cliffs at the W. quarter post.

6048 Is a great wall of a darkish green rock with a lighter green mixed in clouds through it.

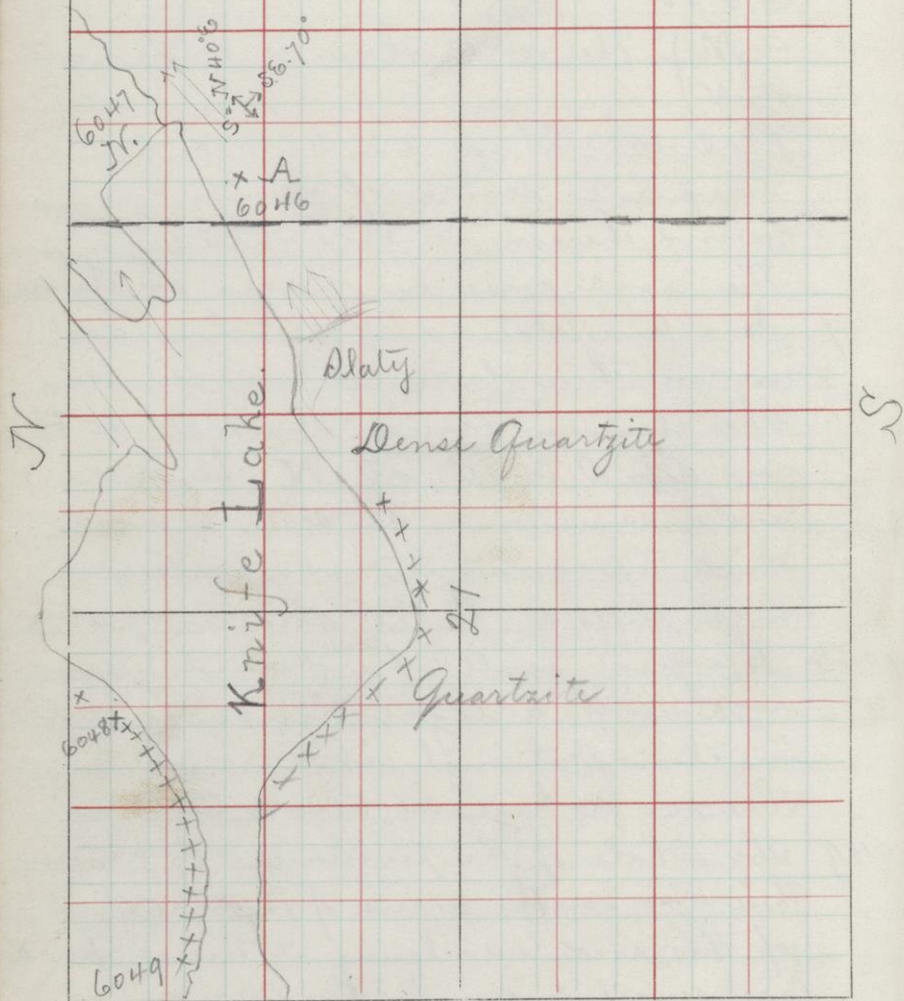
Here 100 ft high 21-65-6W. at C.

6049 The whole of the peninsula S. between these two south arms of the lake is of this rock weathering at times pink (see small piece in bag)

Sec 21-22 T. 65

R. 6 W.

22



See map on next page.

6050 Here the banding in the beds is similar to the many described on Ogishkemuncie and strike $N40^{\circ}E$ dip $70^{\circ}S.50E$. At L. the great quartzite with no apparent bedding comes in. At K bands again $N25^{\circ}E$. the rock is like 6046 in all respects.

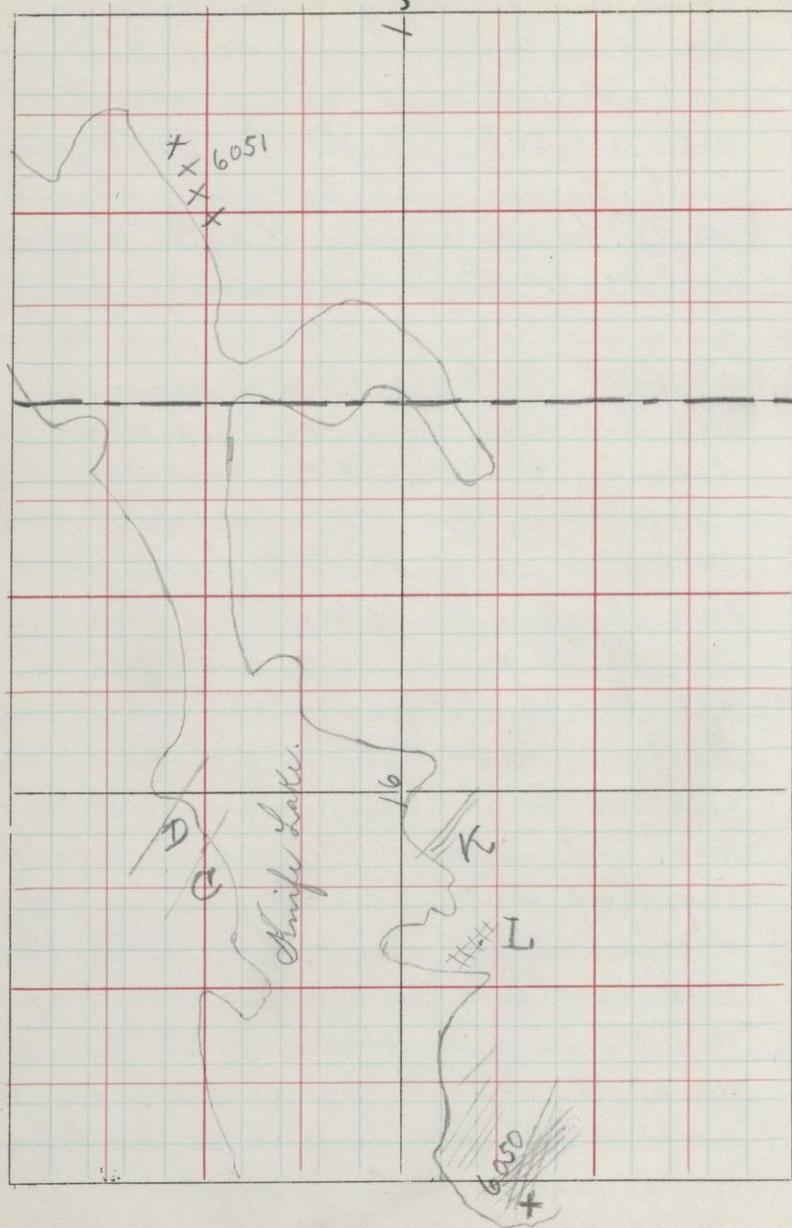
6051 gave a shaly fracture and debris at foot of high cliff.

At extreme end of this arm of lake in S. 10-65-6W. climbed a mountain in all respects like (6049) Two great beds here form two high and separate cliffs at D is a whitish quartzite.

6052. At C. is a dense slaty rock. No form or strike or dip could be seen on first inspection but by many fractures a bedding corresponding with the main layers was discovered in the mass of the slaty rock. (see sample 6052) according to this bedding the strike is $E \& W$. dip 42 south. Great joints traverse the wall at right angles to this bedding. At H (see following page, Sec. 17) the beds lie toward the lake

Dec 15-16 T. 65

R. 67r.



See map next page
appearing to dip $S. 40^\circ$. The layers
could not be approached

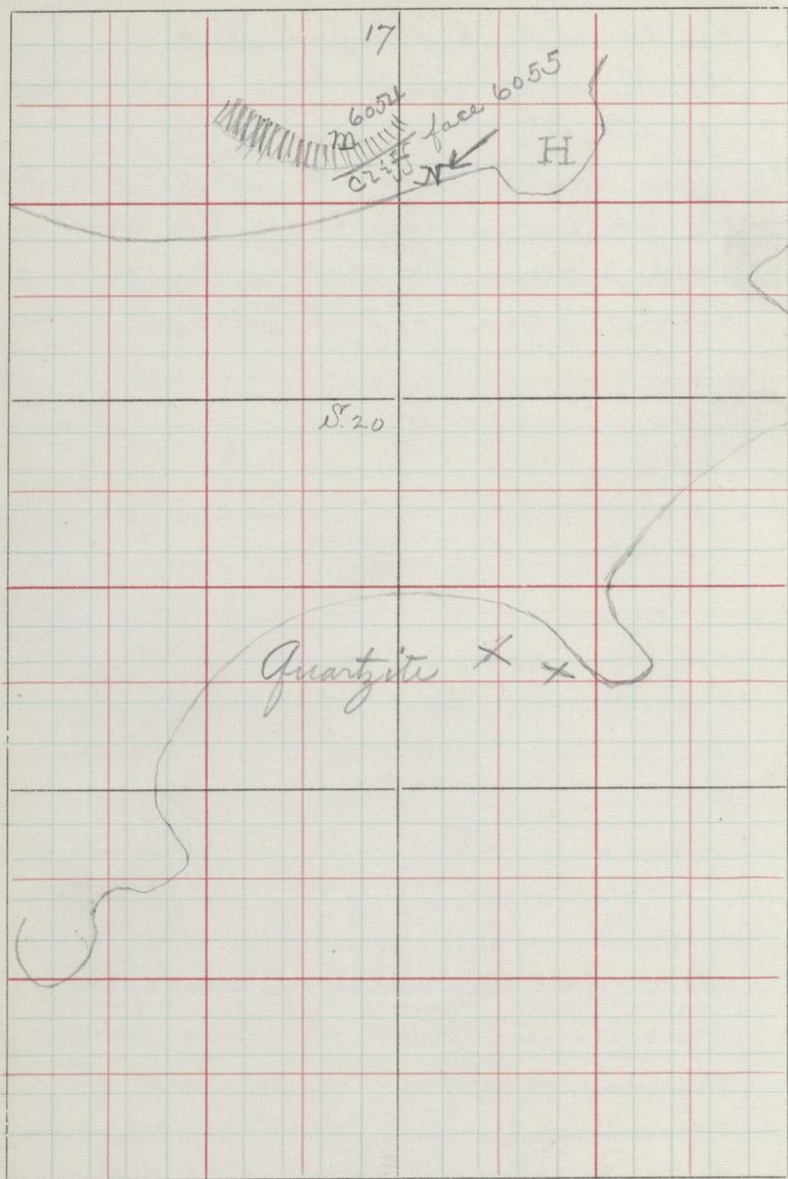
At M is a great bare wall of
quartzite shown in

6054. This wall was climbed - sample
at top same as base. No strike
or dip seen the following gives a
rude idea of its appearance

6055 Is a darker wall of slaty rock
fine grained and showing some
shining mineral on planes of
cleavage (pyrites) It lies across
a deep ravine from 6055 + S. of it.

Sec 20-17 T. 65

R. 6 W.



See map next page

6056

Shows white weathering.
Going westward on Knife lake
probably means going with the strike
of the quartzite and slate beds which
continue into ~~IX~~ West. T. 65 quite
the same as at the east end of the
lake already plentifully illustrated
Sec 24-65-6 N. is similar and
every island (and there are many
not indicated on the plots) is of the
same formation.

6057

Is from the central narrows in
S. 24. and here as indeed along
both shores the whole length of the
lake the hills and cliffs are steep
and expose their rock. As we
approach 65-10 N. the shores
become less bold and rounded
ridges slope away westward.

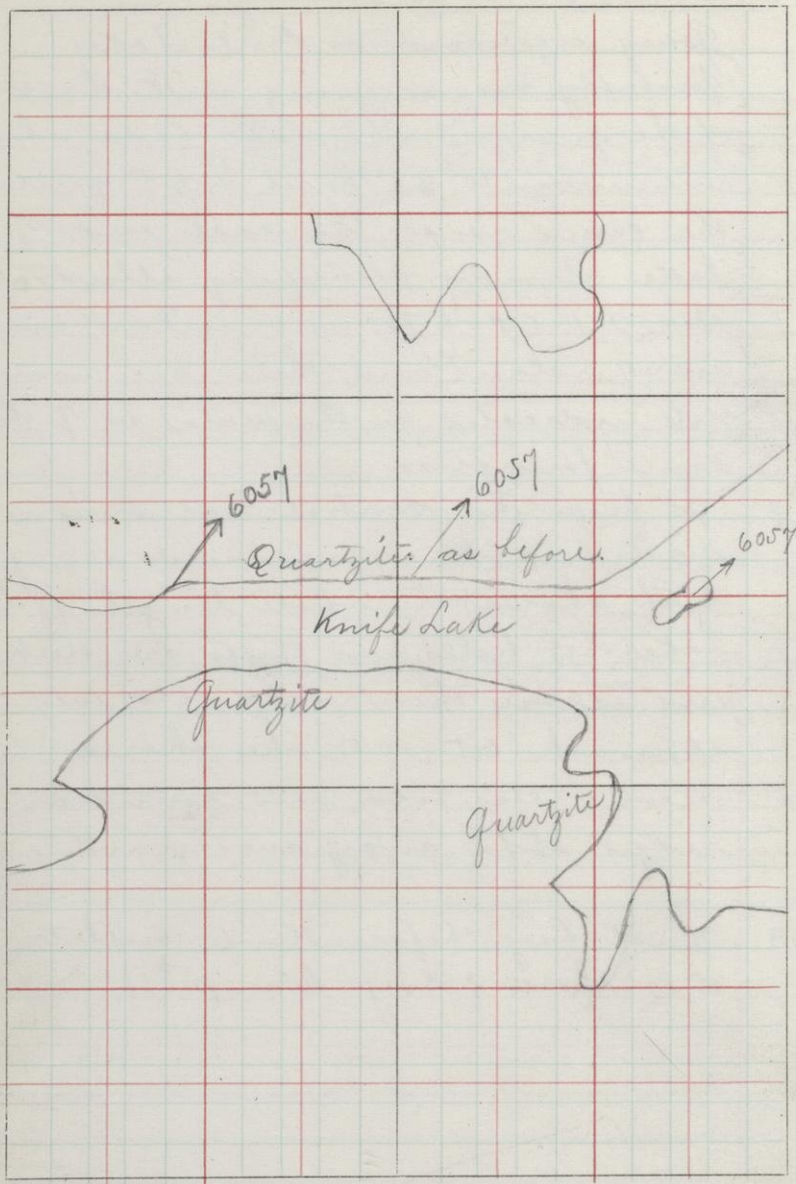
6058

Last bay before Knife outlet
S.E. shore of bay Camp *11.

Sec 24

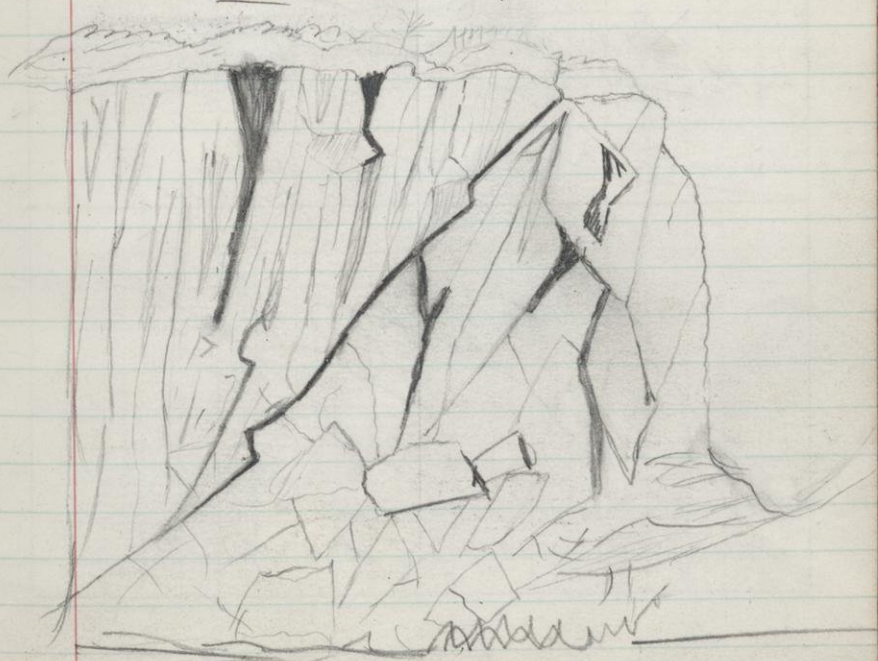
T. 65

R. 7 W.



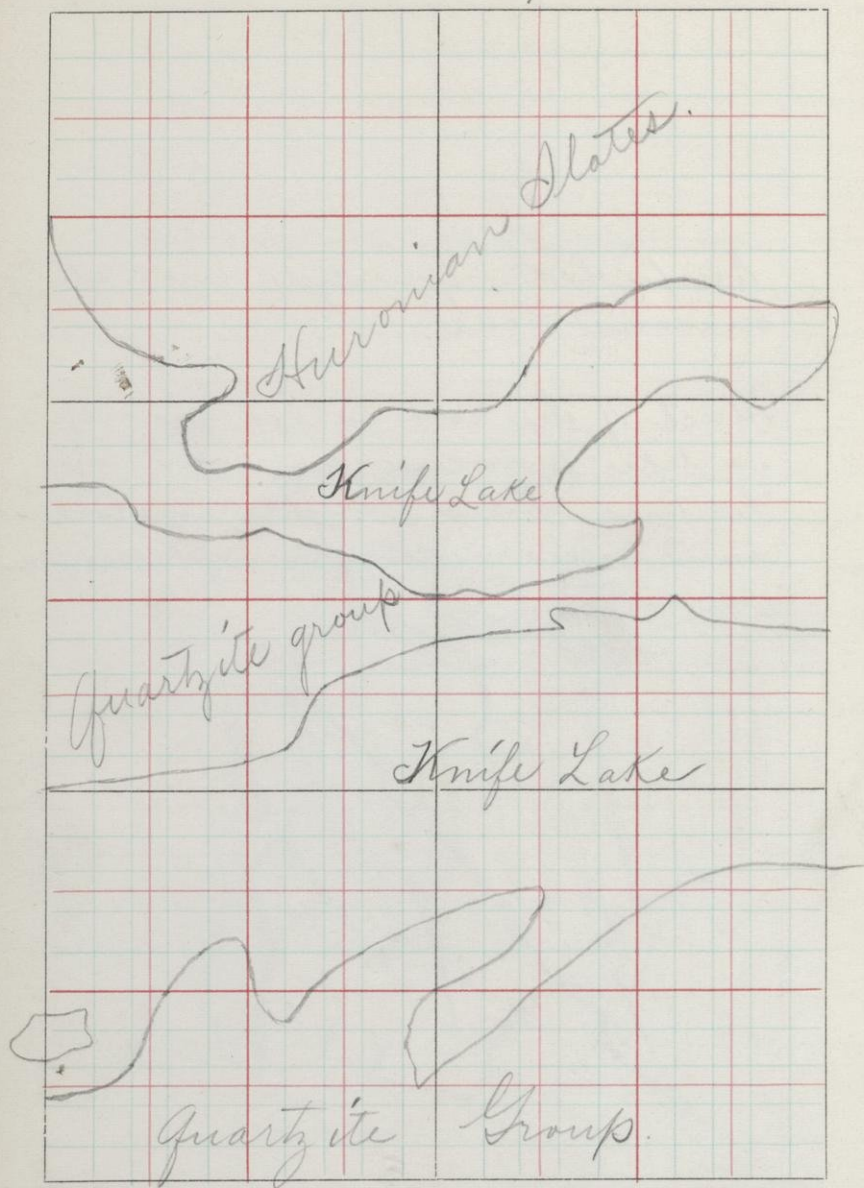
See map on next page.
Knife Lake - Quartzite and slaty
massive beds.

Much of the rock called quartzite
is like pyroxene in color, and
fracture though cryptocrystalline
sometimes like greenish sandstone



Sec 23 T. 65

R. 7 N.

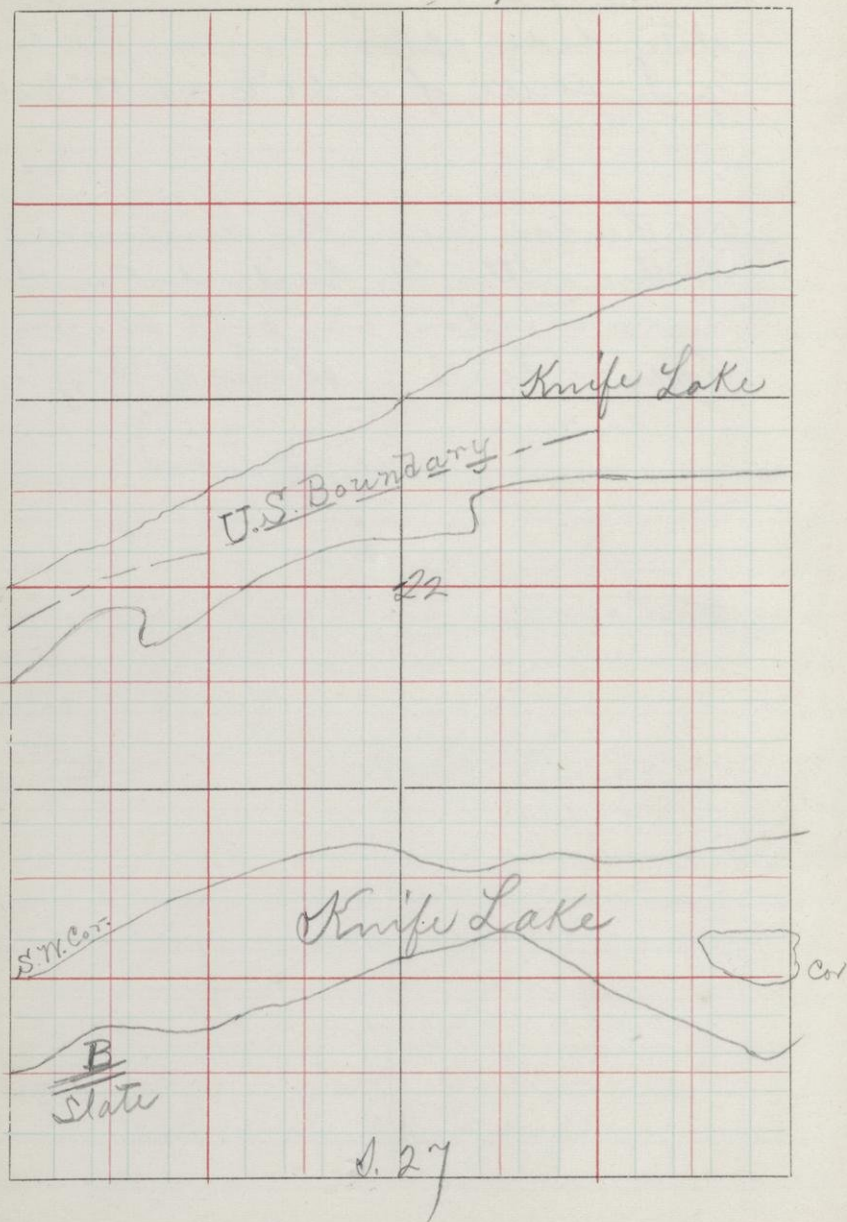


See map next page
At B. 22-65-7W. The banded
slaty beds appear and in the bands
give strike of $N 60^{\circ} E$ dip $55^{\circ} S. 30^{\circ} E$.

At the bay near the entrance
to the outlet to Knife Lake the
rocks are low and 6058 shows
those on the S. E. shore of Bay.

Dec 22 T. 65

R. 7 W.



IV Notes

The portion of the trip covered in this book extends from Aug 10 to Aug 23.rd

3. There was no way of reading the strike in this region the slaty cleavage was therefore supposed to be with the strike

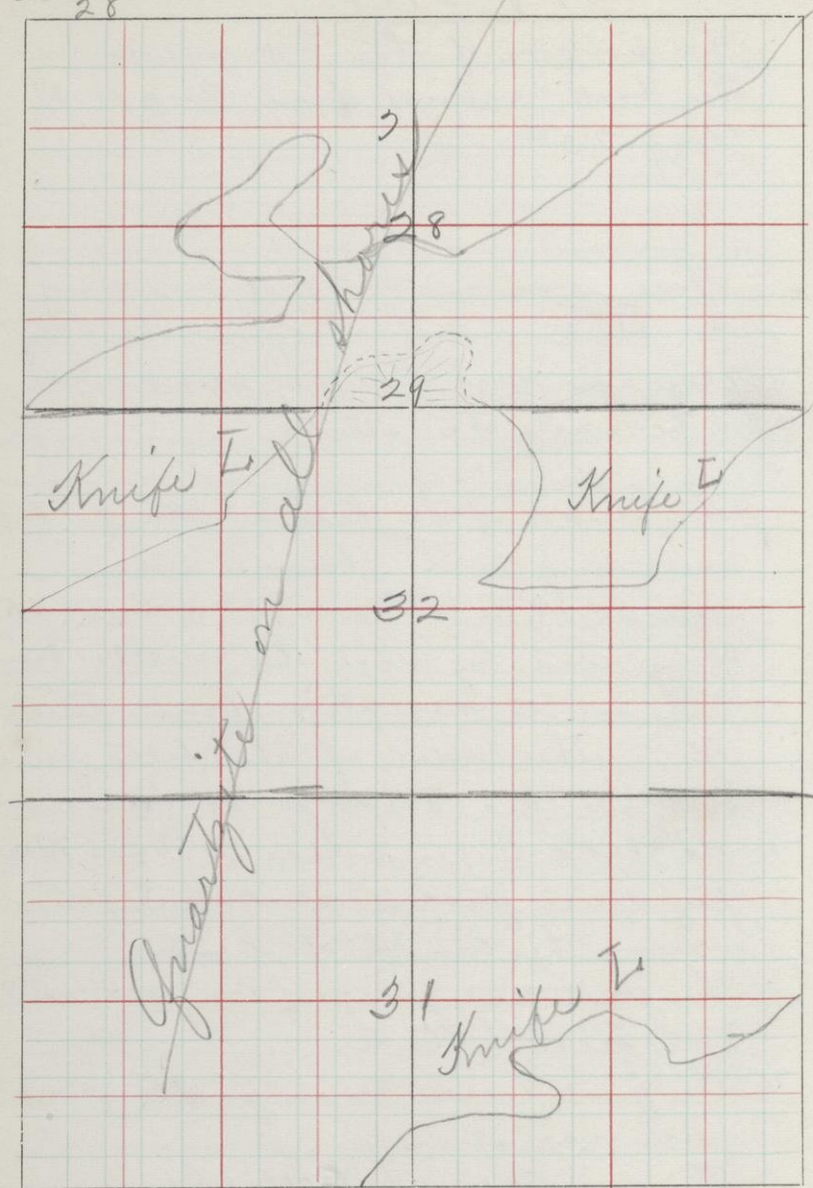
The strike of the beds on Knife Lake according to the bands where seen is N.E. 40° - 60° - 25° - 55° - 50° - 45° E being read by dial the needle being 5° E. in its variation from true N. The order of the belts gone over in this book is as follows

1. The lake Superior beds at Grand Marais
2. Gray dense gabbros striking Superior at or near the mouth of Brulé
3. The great red group of Eagle Mountain Misquah hills &c.
4. The great coarse brown gabbro group with variations.
5. The quartzites of Little Saganaga with magnetic iron &c &c

Sec 31
32
28

T.

R.



6. The grayish green gabbro or quartzite of Gobenichigomog Lake.
7. The banded Quartzites of Agimok Lake, Fox Lake and Ogishkemuncie
- 8 The Calcareous group at Ogishkemuncie
9. The heavy green rock with some pebbles and some resemblance to quartzite
10. The slaty (thick bedded) slate range interbedded with quartzite running down center of Ogishkemuncie.
11. The great conglomerate bed of Ogishkemuncie lake
12. The massive alternating beds of quartzite and black slate rock of Knife Lake

The strike of all these beds is a pretty constant N. 40° E. though at times local deviations are found.

The next book continues Knife & Basswood Lake regions

Watch broken on 22nd
One hand alone left and this indicating time within 10 minutes.

The readings are by the dial where dial allowed and the strike was verified by sun time throughout this volume

During the 14th - 20th 21^d - 22nd of August
a gale of such fury prevailed that much
time was lost as no use of the canoes
could be had during much of the time.

Work was continued on shore during
such times but the delay on these wide
waters is often protracted.

The larger maps of this country are
all wrong after reaching the W. end
of Knife lake. Here a little stream
10 ft wide tumbles down into
and through a series of lakes not
shown while on the map the Knife
lake seems to continue uninterruptedly
into Basswood in a lake passage
half a mile wide. Six portages
were made between Knife and
Basswood lakes and 4 are at all
times unavoidable by the old Hudson
Bay route.

The meander corners are in most
instances wanting in R IX - X W.
T65 and little idea can be had of

location. No section lines are anywhere
traceable as the great fires have swept
away the earlier surveys: —

