Vermilion district: [specimens] 28642-28716. No. 315 Summer of 1898

U. S. GEOLOGICAL SURVEY

FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

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

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

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of 2 x 2½ x ¾ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

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

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

18647-18716

Notebook 315 Cont. from 314

Vermilion District

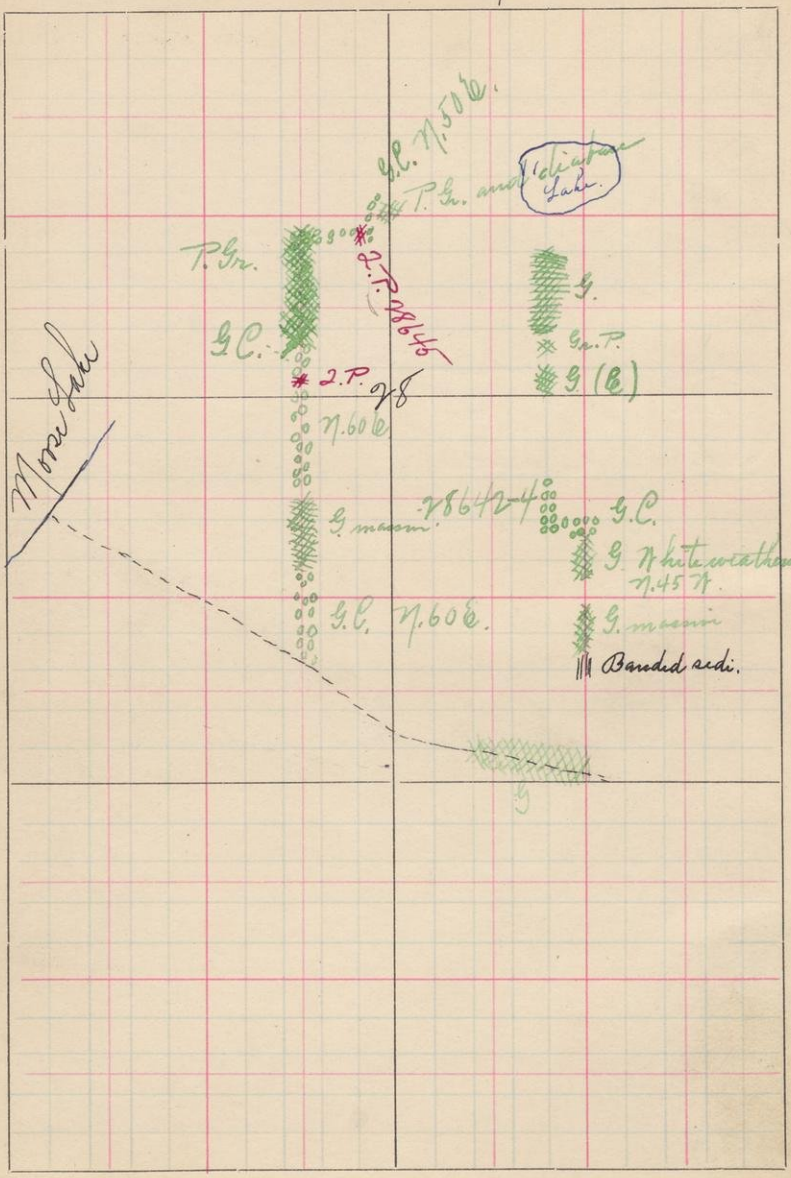
Summer of 1898

C. K. Leith,

Iva Valley Compassman.

Continued from Notebook ———.

S. 28 T. 64 R. 9



6—747

Hade given instead of dip.

July 27.

Ran east on the Moose lake-Flask lake portage trail, from the quarter line of 28, from which I ran NW yesterday.

The porphyritic greenstone continues to 120 E.

At 225 W is massive coarse greenstone, which continues to 500 E. of the quarter line on the trail.

Here we started north, the starting point being 500 W. 50 N. in 28.

At 340 N. of the trail is some of the banded material in close association with the massive coarse greenstone, the latter predominating. The coarse greenstone continues to 475 N.

At 550 N. is dark massive coarse greenstone, followed immediately by a very slightly porphyritic white-weathering greenstone, which I think is a phase of the porphyritic greenstone. The strike is N. 45° W. This continues to 650 N. of the trail where the first greenstone conglomerate appears. Many of the fragments are here distinctly scoriaceous.

At 670 N., 75 W. of the starting point on the trail. is a huge vein of quartz in

the conglomerate.

At 700 N., 75 W. the greenstone conglomerate contains fragments of the banded material.

28642 Specimens of the conglomerate.
28643
28644

The conglomerate continues to 800 N.

At 1000 N. is massive slightly porphyritic greenstone, weathering white, containing very rare fragments. This seems to be but a phase of the greenstone conglomerate.
Continues for 100 paces

At 1150 N. is typical porphyritic greenstone.

This is followed immediately by massive fine grained greenstone, which continues to 1400 N.

At 1500 N., offset west to 1250 W. of the east line of 28.

At 1000 W. is the porphyritic greenstone in close association with a true diabase.

At 1025 W. of the ~~quarter~~ line the greenstone conglomerate again appears. Here it strikes N. 50° E.

At 1425 N., 1060 W. the conglomerate is cut by a true red weathering quartz porpyry

Q.P. 28645. Quartz porphyry. This occurs in two bands about 8 feet across, parallel to the strike. They seem to be dikes.

The conglomerate continues to 1250 W. On the western end it is seen to be a part of the porphyritic greenstone.

From point 1450 N., 1250 W. ran south.

To 300 S. are various phases of the porphyritic greenstone, occasionally showing conglomeratic forms, containing fragments like themselves.

At 300 S. the greenstone contains rare fragments of other darker colored greenstone, and also occasional large fragments of the porphyry, 28645.
I would call this rock but a phase of the greenstone conglomerate.

A little farther one this develops into the true greenstone conglomerate.

At 420 S. is another dike of the quartz porphyry in the conglomerate.

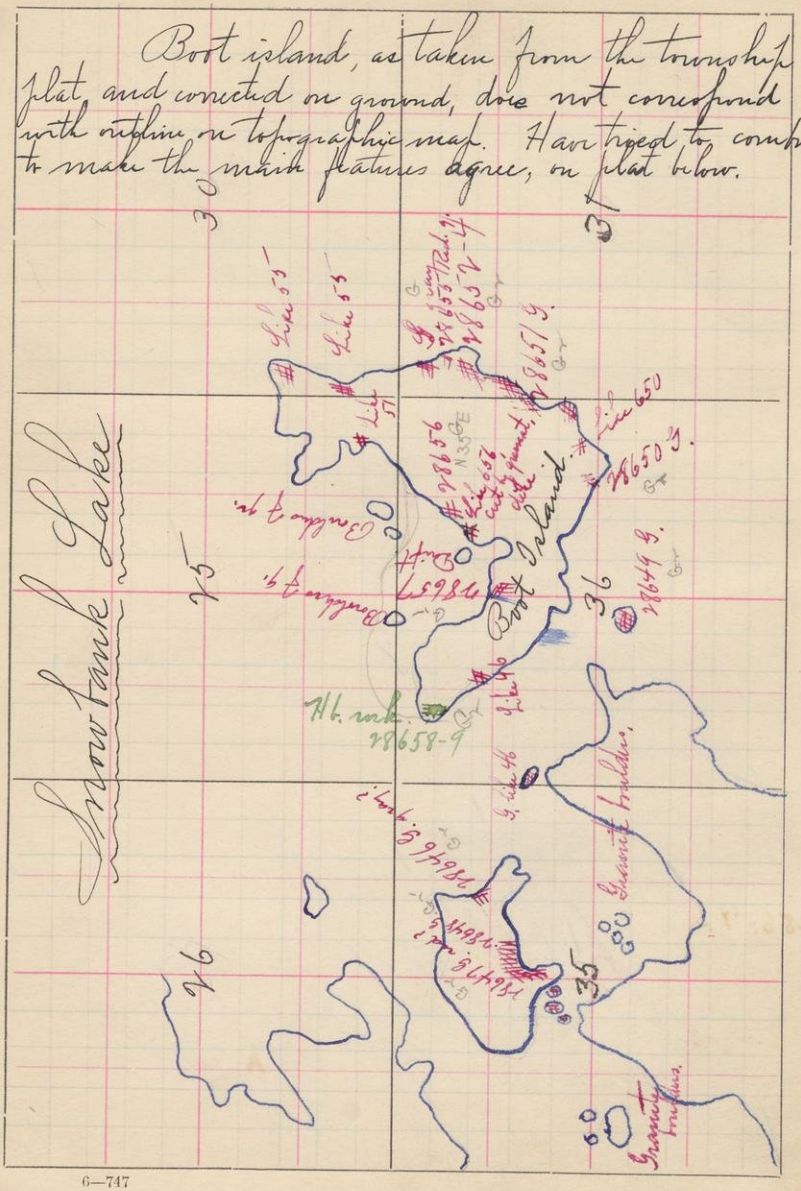
[illegible] conglomerate

The greenstone conglomerate continues in large and typical exposure to 675 S. Here the strike is N. 60 E.

From here the conglomerate continues south to the trail 1100 S.

S. T. 64 R. 9 - 8

Boot island, as taken from the township plat and corrected on ground, does not correspond with outline on topographic map. Have tried to combine to make the main features agree, on plat below.



6—747

I cannot make out its relations to the gabbro. It forms an exposure 25 paces across.

July 29.

Worked the islands of Snowbank lake. See opposite plat.

28646. Island in 35. Granite. Gray?

28647. Granite. Red? This granite is cut or apparently cut by an exceedingly fine grained acid rock, 28648.

28648.

28649. Granite.

28650. Granite.

28651. Granite porphyry, very coarse.

28651A Here found a series of large exposures of several kinds. The ledges are covered with lichen, and the relations are very obscure. The predominant granite seems to be a gray one (28651A), in some cases at least in irregular areas and dike-like stringers are areas of red granite included in it, some of which is almost

pure feldspar (28652)

28652. Show some phases of the redder
28653 varieties.
28654

28655. Red granite a little farther on.

28656. Fine grained massive red granite. Here the rock has a cleavage which strikes N. 35° E.

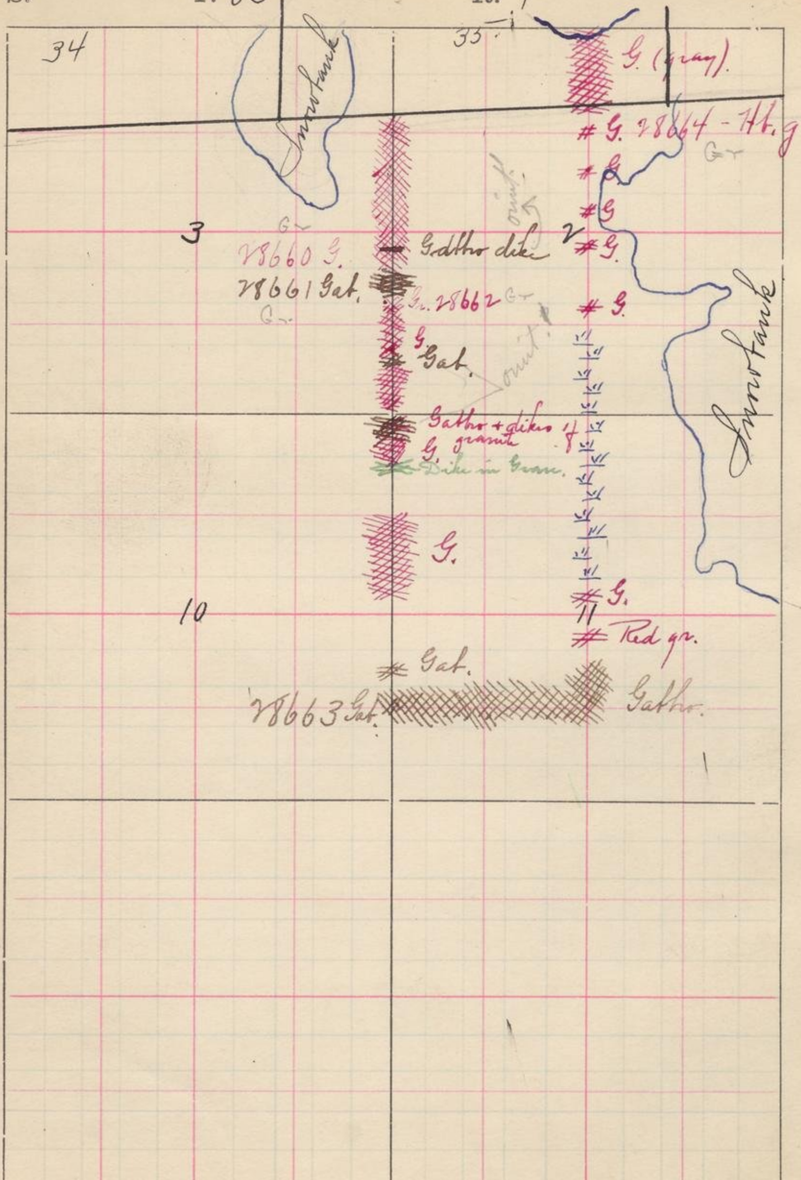
A few rods west on the shore the same rock is found associated with a band of very fine gr ained greenstone. I could not tell whether the greenstone was included in the granite, or was a dike.

28657. Granite.

28658-9 are hornblendic rocks, showing a spheroidal wea hering on weathered surface.

Instructions were given me to distinguish between the gray and red granites. I was able to do this only in a very rough way. Certain of the granites defy classification in any such way. In such cases specimens were collected.

S. T. 64/63 R. 9


34
33
G. (gray)
Snowbank
G. 28664 - Hb. g.
G
G
3
2
28660 G.
Gabbro dike
28661 Gab.
Gr. 28662
G.
Gab.
Gabbro + dikes of G. granite
Dike in Gran.
G.
10
G.
11
Red gr.
Gab.
28663 Gab.
Gabbro

July 30.

Ran south on the east line of 3 and 10 from Snowbank lake.

For the first 400 paces from the lake is almost continuous exposure of gray granite. Dr. Clements has specimen. At numerous places it is cut by red granite in dikes. Occasionally small areas of the red granite may be seen to contain fragments of the gray granite.

The granite, the gray, continues to 625 S.

At 625 S. is a gabbro dike in the granite. The dike strikes N. 70 E. The gabbro narrows at both ends, and may be an inclusion. However should call it a dike.

28660 is a specimen of the granite here, close to the contact.

28661. At 650 comes in a large mass of typical gabbro, which continues to 790 N. At numerous places this gabbro is cut by narrow dikes of fine grained granite. These are narrow, and often there can be no doubt as to their nature.

28662. At 790 S. is a coarse red granite. I cannot make out its relations to the gab-

I cannot make out its relations to the gabbro. It forms an exposure 25 paces across.

Granite continues to 1100 S., where another outcrop of gabbro is seen. After this the granite again appears, mainly the fine grained red variety, but sometimes becoming coarser and more hornblendic, and approaching a hornblende rock in appearance. This continues to 50 S. in 10. The corner was struck at 1560 paces S.

At 50 S. in 10 gabbro again appears. Here it is in contact with the granite, and the granite is undoubtedly later. The granite ramifies through the gabbro, and contains fragments of it.

The granite continues to 200 S. At several places the granite was found associated with, and apparently including irregular areas of true quartz porphyry. Coarse and fine and hornblendic and nonhornblendic phases of the granite are here found cutting one another in a most intricate fashion, and I was unable to satisfy myself of the true relations.

At 200 S. the red granite is seen cutting the gray granite, and the gray granite includes irregular fragments of a dark hornblendic greenstone.

At 250 S. is a dike of exceedingly fine grained and massive greenstone in the granite.

500 to 700 S. is more massive red granite. At 600 this contains more of the hornblende granite or greenstone, which may be a phase of the gabbro. See 28664

Red granite continues to 900 S.

At 1340 S. is a low moss covered ledge of massive gabbro.

28663. At 1500 S. in 11 is a big blowout of the typical massive gabbro.

Offset E. 1000 paces, and ran north on the quarter line of 11.

For the entire offset ran on a huge ridge of massive gabbro, and for 150 paces north on the quarter line.

At 880 N. in 11 we first strike the gr granite again, which is here massive, red and medium grained.

At 1175 N. is bright red massice franite containing very little of the ferro-magnesian constituent. Almost entirely feldspar.

From here to 580 N. in 2 is open swamp.

580 N. in 2 is medium grained massive red granite. In low knob in open cedar swamp.

920 N. same thing.

1150 N., medium grained red granite.

1300 N. is what I would call a gray granite.

gr
Hb. Sy.

28664. At 1500 N. is massive hornblende granite. This is similar to the material which I thought was a phase of the gabbro on the south run.

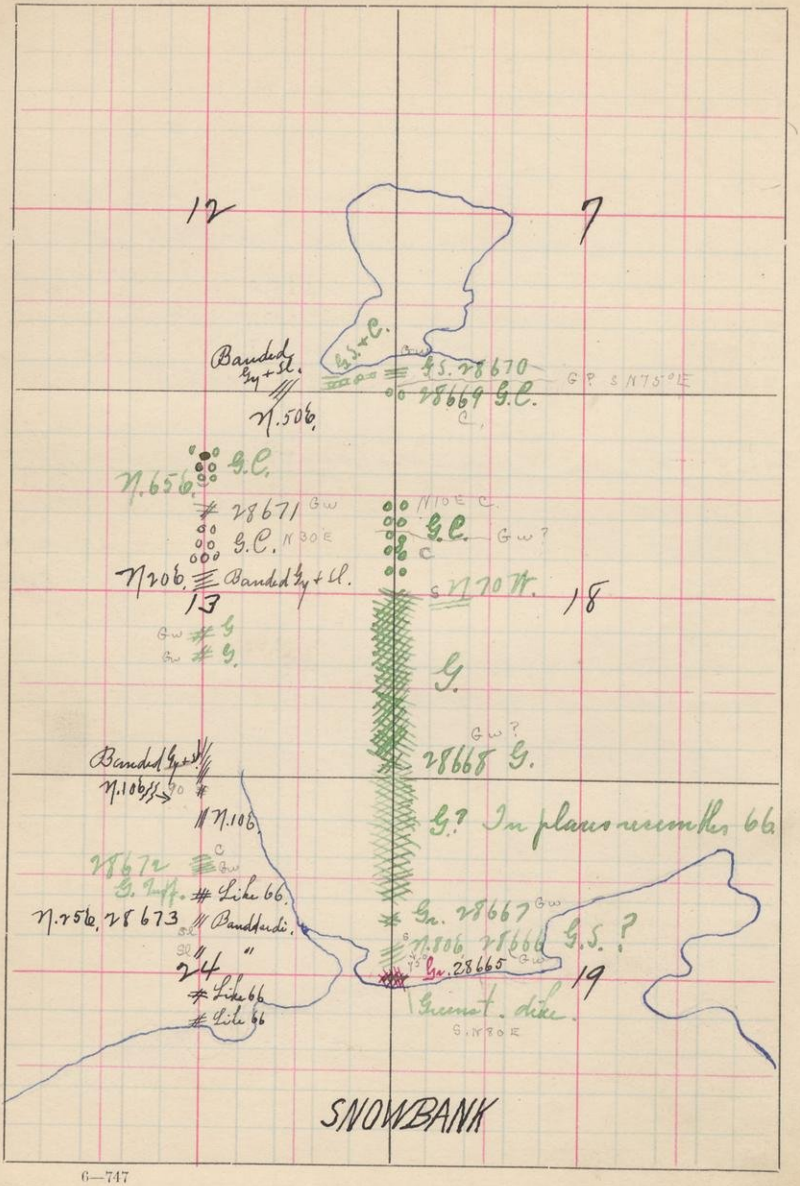
This almost immediately apparently changes by a diminution of the hornblende into an ordinary gray granite, which continues in ~~almost~~ frequent exposure to the lake 380 N in 35 . However, to the north it has many

stringers of the red granite in it, and it appaars to be intruded by the red granite.

Also in places there are a parently two kinds of gray granite, a coarse one included by or including a finer one, as though there had been two injections of this material. At the lake the red granite at one place is almost entirely coarse pink feldspar, the crystals averaging a half inch in length.

The meander line of the Snowbank lake shore is wrong on the plats. In going north on the quarter line, the bay of the lake was not struck at all, but at 1000 N. in 2 we came close to it. Also in 35, instead of striking the lake at 800 N., struck it at 380 N. of the line.

S. T. 64 R. 9-8



6—747

Aug. 1.

Started at the town line on the east line of 24-64-9, on Snowbank lake, and ran north to Cap lake. Offset 1000 paces W., and then south to Snowbank lake.

28665. At the shore is granite, which I would call the gray granite. This is in very massive exposure on the shore. It is here cut by a dike of fine grained greenstone, somewhat epidotized. The greenstone is schistose, the schistosity striking about N. 80° E.

The granite is followed immediately by at 25 paces from the shore by

28666, a peculiar graywacke or greenstone schist, which I am in doubt about. It may be a sedimentary. In exposure the rock appears rather massive. However, there is a schistosity which strikes N. 80° E. The dip is 15° to the south.

This material continues to 200 N.

At 265 N. after a sharp depression is a high knob of

28667, fine grained greenstone. Very massive.

This material from here on seems to grade into or be associated with material identical with 28666. Indeed until 640 N. was reached I could not distinguish between them. They may be phases of the same thing.

At 640 N. the material seems undoubtedly to be a greenstone, and is similar to 28667

This material continues in very frequent exposure to 1030 N. Here the rock is very fine grained, and in ledge looks undoubtedly like a greenstone. (28668.

28668. Greenstone. Could discover no dominant schistosity, although the ledge has a general trend N. 70° E.

This material, principally like 68, but occasionally showing phases like 66, continues in almost continuous exposure to 950 N.

The country is heavily wooded ~~and the~~ but exposures are plenty. For the most part there is no controlling direction to the schistosity, although all the ledges break along rectangular directions. However, the general direction of the ledges is N. 70 to 80 E., until we reach 900 N. Here the ledge has a pronounced schistosity striking N. 70° W.

Continues to 1100 N. Here for the first time is greenstone conglomerate. I can see no characters different from thoe of the typical conglomerate seen last week to the west on Moose. The conglomerate is here very massive, and has no visible strike.

Continues to 1300 N.

Here is a large e ledge of material like 68, showing none of the conglomeratic forms. But a few paces beyond the conglomeratic characters again appear, and continue to 1475 N. The strike is here N. 10° E.

C 28669. At the north line of 13 is a greenstone conglomerate.
This material is immediately followed by what I would call an exceedingly fine grained and schistose greenstone. Strike N. 75° E.

gw 28670. Associated with this conglomerate is a fine grained green schist, evidently forming an integral part of the same ledge. These two rocks associated form a high ridge overlooking the lake, and extend

about 200 N. to the lake.

Offset west 1000 paces. For the first 400 paces followed the high ridge overlooking the lake, and saw only the same two rocks. Then strike tamarack swamp with no exposure.

560 W. strike banded material, slate and graywacke, striking N. 50° E. Small exposure uncovered by fallen tree, but there can be no doubt as to the character.

At 1000 W. 2000 N. in 13, ran south. At 280 S. is greenstone conglomerate. It is here rather schistose. The ledge is so moss covered that I could not get strike, but the entire ledge has a trend exactly E and W.

This rock forms the hill which continues to 430 S. Here the rock strikes N. 65 E.

28671. 600 S. The rock is here a greenstone?

670 S. Greenstone conglomerate again. Strike N. 30° E. Continues to 875 S.

At 915 S. is a moss covered ledge of rock like 668. Here, however, it reminds me of the banded material, although I can actually see no banding. A little farther on

close examination shows the material to be the true banded material, . Exposure too poor to afford strike.
The rock seems to have two sets of structures, about equally prominent, one of which strikes N. 70 W. and the other N. 20° E. The banding strikes N. 20 E. These observations obtained a few paces farther on.

The rock continues to 1000 S.

At 1220 S. is material like 671.

At 1360 S. Fine grained massive greenstone like 67.

At 1870 S. is a huge ledge by the side of a little lake in a swamp. This is the typical banded graywacke and slate. The strike is N. 10° E. The dip is 10° E.

This is followed in continuous exposure to the line, 2000 S.

At 50 S., 1000 W. in 24 is the banded material. No strike.

At 200 S. we again strike the banded material, striking N. 10° E.

28672. At 480 S., 1000 W. in 24, is a ledge of greenstone breccia or tuff. This is followed immediately by an exceedingly fine grained green schist or schistose graywacke, like 67.

At 600 S. is material the same as 28666, graywacke?

At 780 S. is fine grained material which I think is the banded material.

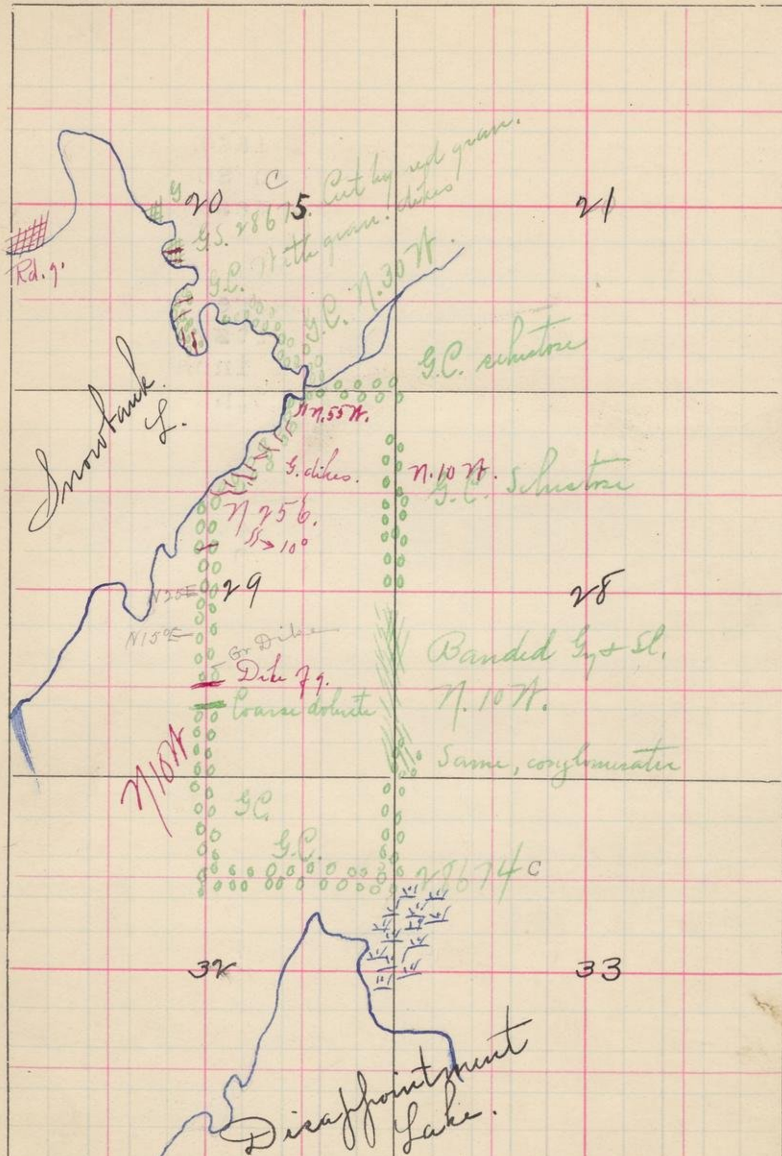
28673. It is very fine grained and slaty, and the banding very slight. The strike of the banding and schistosity is N. 25 E.

At 900 S. appears the same thing.

At 1125 S. is some of the graywacke-like material, like 28666.

At 1225 S. at the lake shore, the same thing is found.

S. T. 64 R. 8



20
5
21
Snowbank L.
G.C. schistose
N.55 W.
G. dikes.
N.10 W.
N 75 E.
29
28
Banded Gy & Sl.
N. 10 W.
Same, conglomerate
Dike 7 9.
Coarse dolerite
G.C.
G.C.
32
33
Disappointment Lake.

Snowbank Aug. 2.

Ran east from ~~SAugbank~~ lake to the NE corner of 29-64-8, and then south to Disappointment lake. Then west 1000 paces, and north to Snowbank.

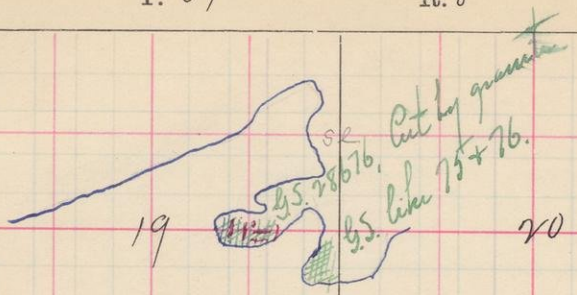
On the Snowbank lake shore is schistose greenstone conglomerate in its typical form, with bowlders several inches across. The strike is N. 55 W. Continues for 300 paces.

The greenstone conglomerate comences at 280 S. and runs to the quarter line. At 430 S. the strike is N. 10 W. On the north end there are several areas of red granite associated with the conglomerate. I could not make out the relations. They are three or feet long, and look as though squeezed in the conglomerates. They may have been dikes.

At 1100 S. the banded material begins to appear, and at 1200 S. this has completely taken the place of the conglomerate. Where we first strike it is interbanded with conglomeratic layers, and of course is clearly a continuation of the same formation. It is what we have called the banded slate and graywacke. The strike is N. 10 W.

This continues in continuous exposure and typical development to 1975 S. Here in the coarser bands conglomeratic characters are

S. T. 64 R. 8



Innutauk Lake.

seen.

The greenstone conglomerate with same strike continues to the edge of the marsh running to Disappointment lake, 500 S. in 32. Some of the fragments of the conglomerate reach a size of 12 inches. Some of the weathered surfaces of the bowlders look decidedly granitic.

28674, taken from 500 S., shows such a surface.

From Snowbank to Disappointment on this run there is beautiful exposure of the conglomerate and banded material. There is no underbrush or timber, and the rock surfaces stand out bare and smooth for the entire distance.

On the line 500 S. offset west 1000 paces. Greenstone conglomerate continues in frequent exposure for the entire distance, and to 400 N. in 29.

Here is a coarse dolerite intrusive in the conglomerate.

The conglomerate strikes uniformly N. 10 W. It is more massive and less well developed than the one to the east, perhaps because of poorer exposure.

The greenstone conglomerate begins at 500 N. again, where it is clearly cut by a long wide dike of red granite. The conglomerate continues to 730 N.

At 600 N. is another large dike of red granite.

At 730 N. the greenstone conglomerate strikes N. 15 E.

Continues to 975 N. For this distance there are numerous large dikes of red granite.

At 750 N. a little of the banded material appears.

At 975 the strike is N. 25 E.

To the north the conglomerate has become very much more schistose, the schistosity striking in approximately the same directio as bedding.

From here on to the lake the conglomerate becomes still more schistose, and more of the slaty phases appear. At the lake the conglomerate is nothing more than a schist, showing little evidence of conglomeratic character, and one working from this end would call the rock a hornblende-schist. Dr. Clements worked this shore and has specimen.

The strike at the lake is N. 25 E., a

and the dip 10° SE.

Strike lake at 1500 N.

From here followed lake shore NE to where canoe was left. All the way crossed greenstone conglomerate schist, associated in places with layers of banded material, and all cut by innumerable dikes of red granite.

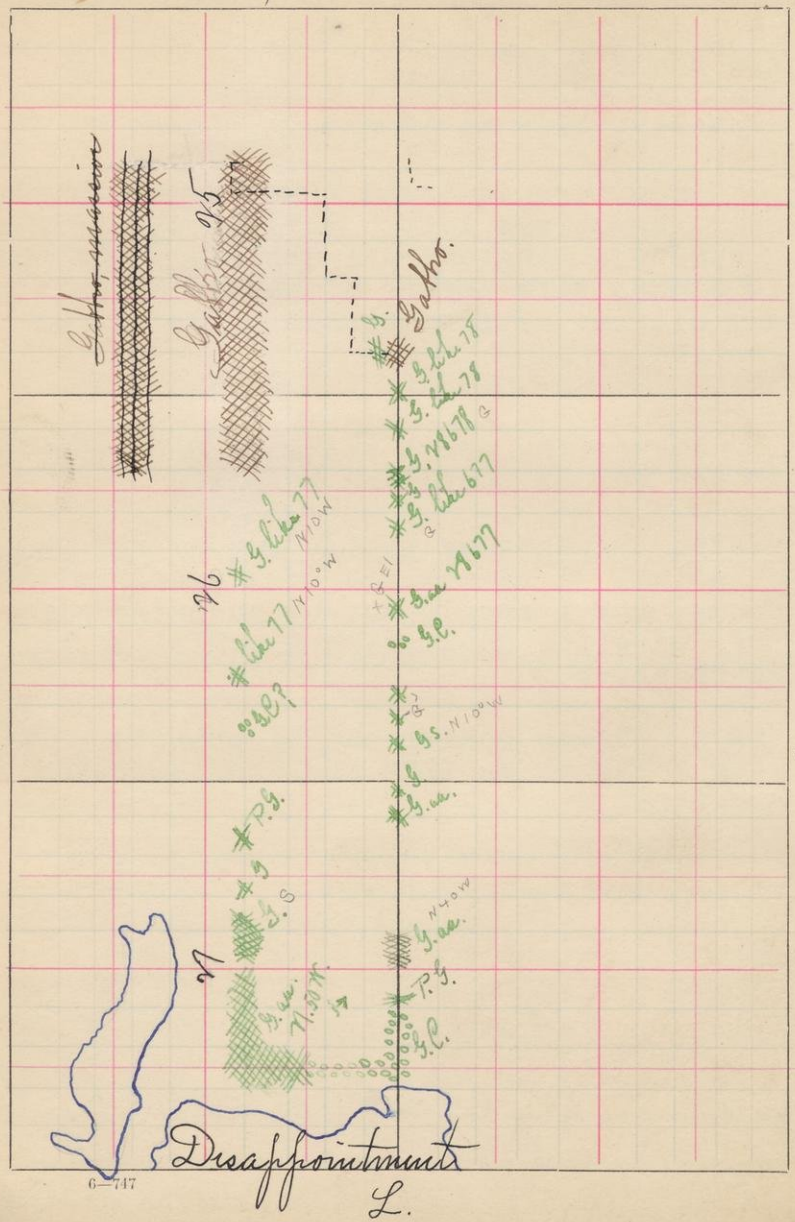
Worked the north shore of Snowbank in 20 and 19, as indicated on plat.

28675. Greenstone schist cut by red granit on point. I cannot see conglomeratic forms, but I should not be surprised if this were the conglomerate schist of the south shore.

28676. Green schist cut by granite. This rock looks to me like the conglomeratic material.

~~Aug. 3.~~

S. T. 64 R. 8



6—747

Aug. 3.

Ran east on the south line of 27, 26, and 25, on t from Disappointment lake, to find boundary of gabbro, offset north , and back to the lake.

From the lake to 460 E. is ordinary greenstone conglomerate.

At 460 E. is greenstone which is only very slightly conglomeratic, and takes on a porphyritic form, the phenocrysts being large crystals of feldspar.

At 635 is greenstone showing typical aa forms, however, rather schistose. This rock is slightly brecciated, and might resemble a conglomerate. Strikes N. 40 W.

Continues 100 paces.

After this there is no exposure for some distance. The top of the ridge is c covered with drift and heavy underbrush, until 1350 E. of the lake was reached. Here massive greenstone is seen, with traces of the aa structure.

At 1600 E. is a moss covered ledge of massive greenstone. Could see no aa or conglomeratic forms.

At 1615 east of the lake strike the SE corner of 27.

At 200 E. in 26 is a very fine grained

green schist. Could observe no conglomeratic forms. Strike is 10° W of N.

At 350 E. is massive greenstone.

At 490 E. is a bare flat exposure of massive greenstone. I could here see clearly that it was not a conglomerate. It is a true massive fine grained greenstone.

At 775 E. the conglomerate was again struck. This is a very poor exposure, and the pebbles are not distinctly visible. However, some are, and the coarse granitic looking surface is that of the conglomerate.

At 976 E. 100 N. in 26 is typical aa greenstone. However, the rock shows a peculiar mottling, which puzzles me. 28677. Mottled aa greenstone.

1300 E. is massive greenstone, which on the fresh surface looks like the fresh surface of 28677. Could see no structure.

At 1490 E. is typical greenstone breccia Cemented with white siliceous material.

At 1525 E. in 26 is the same thing. Here however, it somewhat resembles a conglomerate on weathered surface. 28678, a specimen of this rock.

At 2000 E. is the same thing.

At 180 E. of the line in 25 we find gabbro in a small and poor exposure.
Ran north 100 paces, and again struck the greenstone, so again ran east to strike gabbro.

Zigzagged east and north to 825 N., 660 E., before we found the gabbro again. Here the gabbro is in large a typical exposure.

From this point 825 N., 1340 W. in 25, ran west to Disappointment lake. A drizzling rain has now set in, and two and a half miles of brush before us.

The gabbro continues in good exposure to 400 W. in 26. There is thus evidently a bay in the gabbro where I struck it to the south.

At 900 W. in 26 is greenstone like 77 Strike is 10° W. of N.

At 1480 W. in 26 is another exposure of the same thing. Strike N. 10 W. Moss covered and could make little out of it.

A few paces farther on I imagined I co

could see pebble like forms in the rock, and it may be that we have here the conglomerate, but of this I could not be sure. A hand specimen would show nothing.

At 1725 W. is what I think is the undoubted greenstone conglomerate, although I am not quite satisfied of this. The rock resembles 28677.

At 300 W. in 27 is the porphyritic greenstone.

At 550 W. is massive greenstone. No structure.

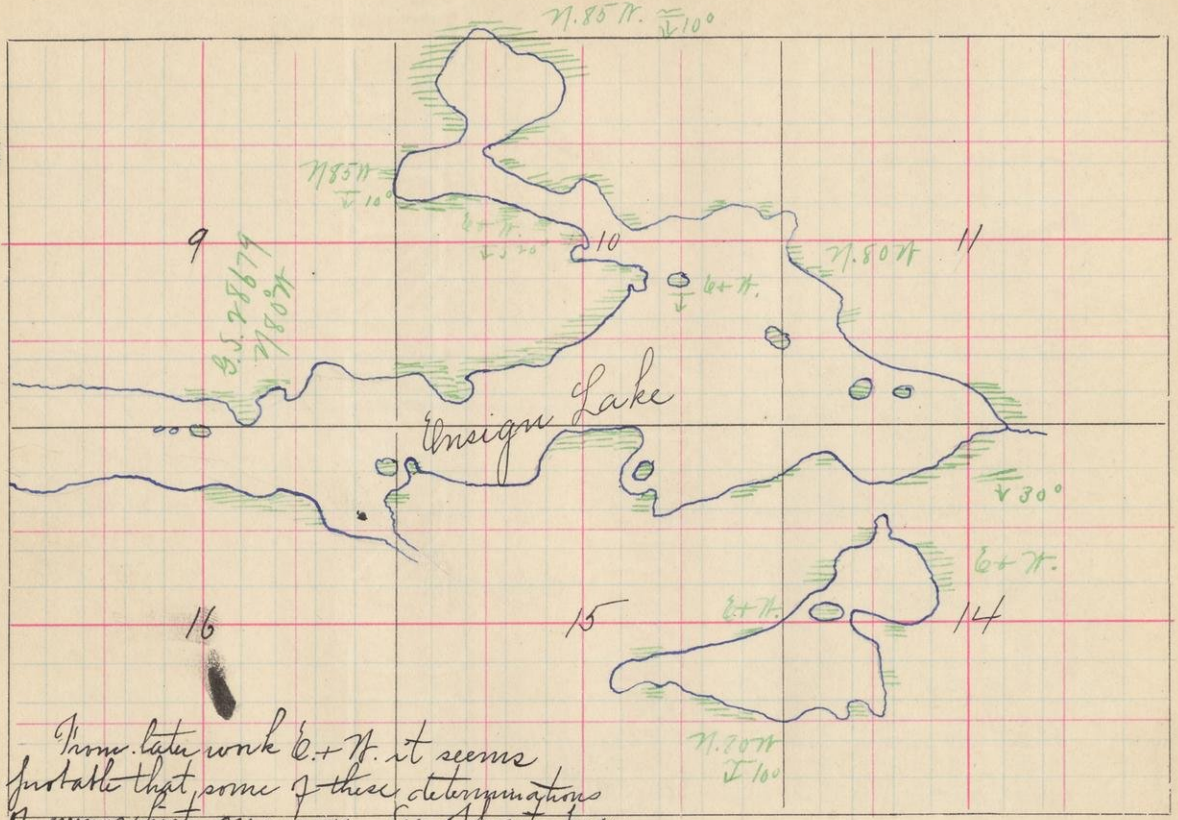
At 730 W. is schistose greenstone, which continues to 900 W. No other structure.

At 1050 W. and a little south of the course is typical aa greenstone, which is apparently but a continuation of the green schist just crossed.

Greenstone, in places showing the aa forms, and sometimes not, continues to 1500 W. All of this greenstone is rather schistose, and should properly be called a green schist. The strike is N. 50 W., and dip very steep to the SE.

Ran south parallel with the shore, and about 200 paces from the shore.

The green schist, in places exceedingly fissile, continues to 350 S. Here for the first time pebbles appear, and they are in identically the same greenstone. It seems as if no one could doubt in passing from the aa greenstone to the greenstone conglomerate, that the latter is a fragmental form of the former, as there is no change in the character of the material. It would look like the nearly contemporaneous working over of the lava flow at the time of its extrusion.



S. T. 64 R. 8

Trans. later work E. + W. it seems
probable that some of these determinations
of grain circuits are wrong. See opposite page

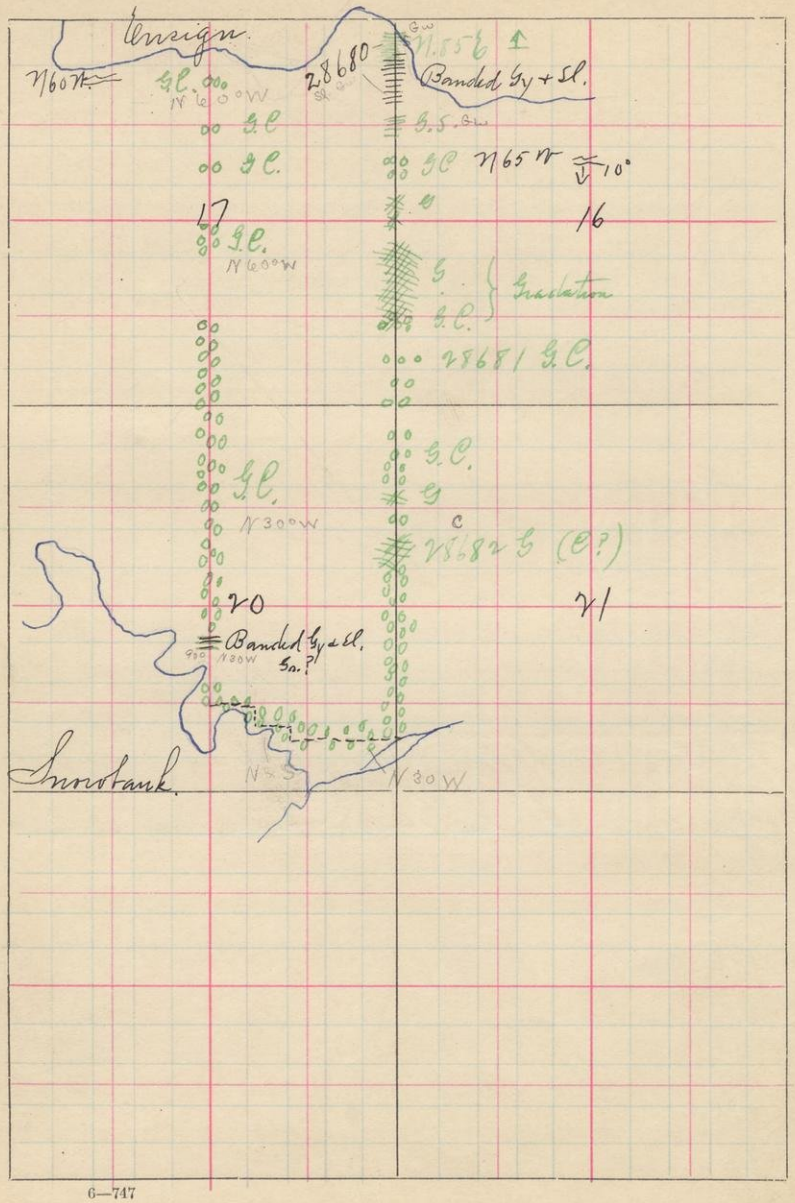
Aug. 4.

Worked shores of Ensign lake east of the camp, which was directly north of the end of the river from Snowbank. Results on opposite plat.

28679 is green schist. Striking N. 80 W Dip practically vertical, but perhaps a trifle to the south.

The rocks about the lake are all exceedingly fissile, and looked to me identical with 28679. However, on following days, in crossing good exposures on a run east of the lake, along the strike of the schists exposed at the lake shore I found the rock in places conglomeratic. These conglomeratic layers probably extend west through the lake, and so my determinations will need to be modified in accordance with the work east and west along the strike.

S. T. 64 R. 8


Ensign.
N60W
gl.
N60°W
28680
Banded Gy + Sl.
N65W
10°
17
16
Graduation
28681 G.C.
N30°W
N30W
70
71
Banded Gy + Sl.
Sandstone?
Snowbank.
N30W

6—747

Aug. 8.

Ran south from Ensign lake on the east line of 17 and 20 to Snowbank, and back on the quarter line.

At 50 from the lake is typical green schist, like that seen on the shores of the lake, like 28679. Here somewhat crumpled. Strike N. 85 E. Dip steep to north.

At 125 S. this green schist seems to grade into the typical banded graywacke and slate, 28680.

28680.

This material continues to 200 S.

At 400 S. the rock again takes on the appearance of the typical green schist with the same strike and dip. However, I am not satisfied that ti is not the banded material. The two appear so nearly alike except on weathered surfaces that I cannot tell them in all cases. This continues in frequent exposure to 550 S.

At 690 S. is the first exposure of the greenstone conglomerate. It is here very schistose, and there may be some doubt as to its character, i. e., it may be a schistose greenstone tuff. Not probable, however. Strike is N. 65 W. The dip is now 10 S. Continues 50 paces.

At 900 S. is green schist showing scoriaceous weathered surface. No structures.

At 1000 S. same thing.

1050 to 1115 S. is rather massive greenstone, showing scoriaceous weathered surface. Very slightly schistose.

This massive greenstone, with some variations in texture, porphyritic, coarse and medium grained, continues to 1540 S. Here on the weathered surface I think outlines of pebbles can be seen, but of this I am not sure. In genera, the rock is a massive greenstone, with the texture of a fine grained diabase.

28681. At 1750 S. of the lake is a very fine grained conglomerate. Poor exposure, affording no strike nor dip.

A little farther on it becomes coarser grained. Here it shows quartzite, slate, and greenstone pebbles, all of them well rounded.

1840 S. is the same thing.

1950 S. is the same thing.

At 175 S. in Sec. 20, struck a huge ridge of greenstone, which is as a whole very massive, but which when examined is s seen to contain fine pebbles of the same material. It is indeed, but a form of the

typical greenstone conglomerate. Exposure runs 100 paces N and S. Cannot determine strike.

Continues to 400 S.

At 470 S. is a peculiar kind of porphyry so often seen in the district. White small phenocrysts. However, think it is the same greenstone that shows the conglomeratic forms, for the reason that as 535 S. the same material shows very slight traces of pebble outlines. A cursory examination would indicate the rock to be a massive greenstone, but closer examination reveals the outlines.

From here to 800 S. is massive greenstone, which in places seems to be very slightly conglomeratic. But of this I coul not be sure.

28682 a specimen of this.

From 900 to 1700 are very frequent exposures of massive greenstone conglomerate. At first glance the exposures look like massive greenstone, but in every case somewhere on the ledges could be seen conglomeratic forms. However, in only a few places were the pebbles large and the conglomeratic aspect striking.

Struck the creek at 1750 S., and offset west on a line 1700 S.

At 1700 S., 180 W. the conglomerate is in typical development and exposure. Pebvles are 3 inches across. Here for the first time a good strike obtainable . N. 30 W. However, even here the rock is still very massive, and it is only in certain places that I could get the strike.

1700 S. 700 W. we strike an arm of Snowbank lake. The greenstone conglomerate here strikes almost exactly N. and S.

Offset along shore. At 1000 W., 1200 S. is typical banded material. Strike N. 30 W. Dip vertical.

From here to 500 N. in 17, on the quarter line, are frequent exposures of greenstone conglomerate, striking uniformly N. 30 W. In places it is possible that some of the banded material comes in, but it was not observed.

At 890 N. in 17, same material appears again. Strike is here N. 60 W. Thus showing that the conglomerate is swinging around. Here may be seen also a little of the banded material associated with the conglomerate.

Continues to 1000 N.

At 1260 N. same thing.

1470 N. Typical greenstone conglomerate.

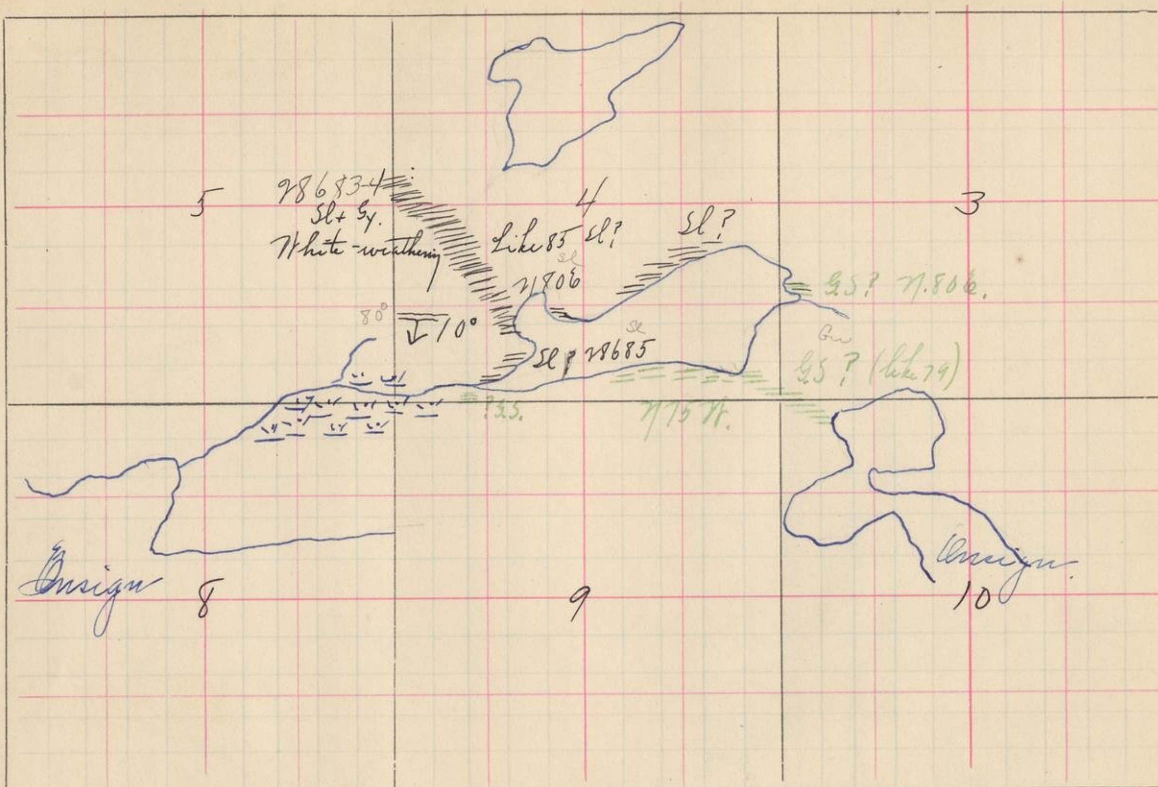
Small exposure.

At 1750 N., greenstone-conglomerate. Rather schistose. Strikes N. 60 W.

Strike Ensign lake at 1930 N.

2

6—747



S. T. 64 R. 8

Aug. 10.

Started out to work the two little lakes in Sec. 4 north of Ensign lake. These lakes are located on the township plat. However, found only one of them, and covered enough ground to know definitely that the other lake does not occur ~~within a radius of a mile from where it is marked.~~ where indicated on the township plat. From the topographic map it now appears that we ran west of the northern lake.

The shore of the lake found are occupied by green schist, like 28679.

Ran southeast to NE arm of Ensign, to see if lake could be cut off in that direction. Same green schist the entire distance.

Then from the NW shore of the little lake in 4 ran northwest to locate the other lake platted on township plat. Ran 800 paces in a direction NW, ~~with a good view on the hills of country a half mile to each side,~~ and at 800 paces NW., could see ~~fully a~~ ½ mile beyond, with no lake.

For the first 500 paces NW is green schist like 28685, striking N. 80 E.

At 500 NW is a white weathering cherty slate. Some of the more siliceous phases have a greenish tinge, and may be altered green schist.

Sl 28683-4 are specimens of the material from

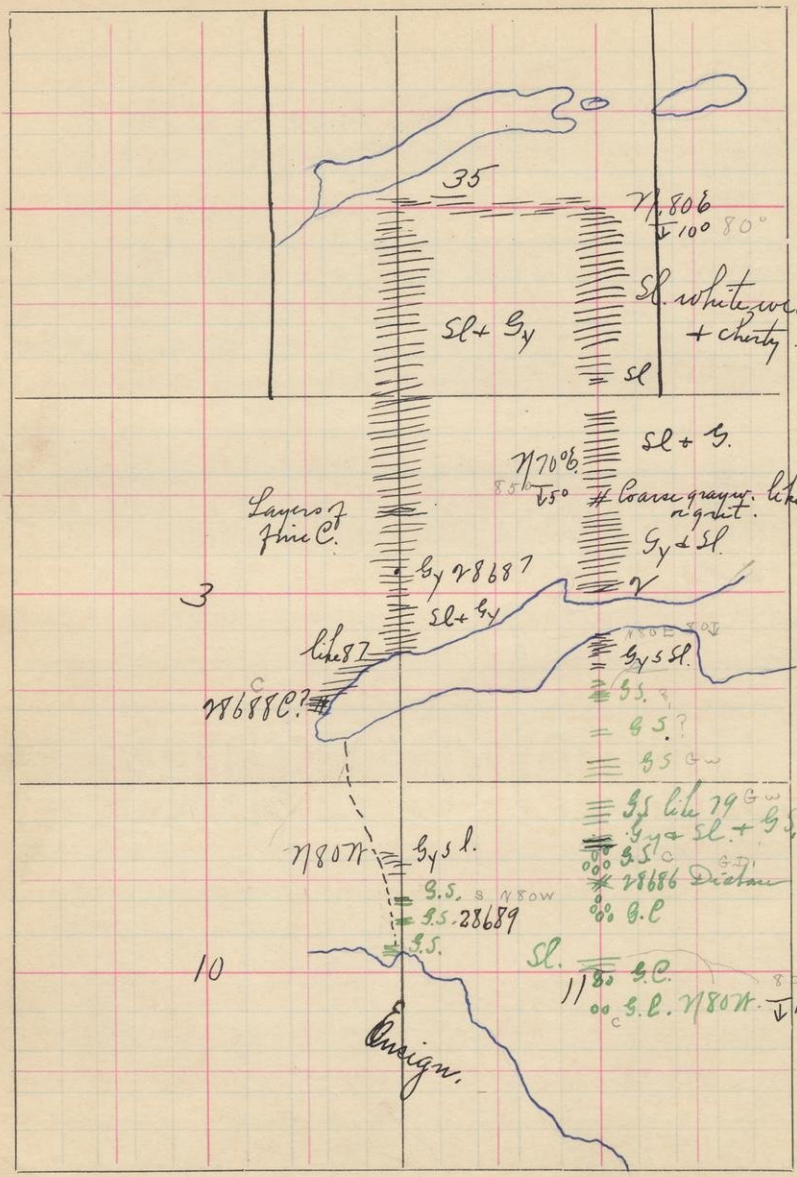
the same ledge. They seem to grade into each other, and apparently had no regular distribution.

In general it looks as though there were here originally a fissile slaty material, perhaps partly a green schist, which has become greatly silicified. How much is a true slate and how much a green schist I could not tell.

The dip is uniformly 10° S.

28685 is a specimen of what I would call a slate, taken from the shore of the little lake, in place indicated on plat.

S. T. 65/64 R. 8



6—747

Aug. 11.

Ran north on the quarter line of 11, 2, and 35, fron Ensign lake, to the quarter line of 35, offset west 1000 paces, and back.

At 775 N. of the south line of 11 1000 W. is typical greenstone conglomerate. Rather schistose, and not to be distinguished on edge, as it appears on the lake shore to the west, but clearly visible on weathered surface. Strike N. 80 W., and dip 10° S.

875 N. same thing.

940 N., typical black slate. Same strike and dip

At 1215 N. is schistose greenstone conglomerate, and continues to 1400 N. Typical.

At 1350 the conglomerate is decidedly porphyritic throughout, as has before been noted in the district.

28686. At 1400 N. is a large knob of massive diabase.

This is followed at 1480 N. by more of the typical green conglomerate, large bowlders.

At 1680 N. is typical banded graywacke and slate, interbanded with a schist identical with 679. I could not tell where one begins and the other leaves off. Would appear to be phases of the same thing

Typical green schist, like 28679, bright green, continues to 1800 N.

Strike quarter post at 80 N. Locations to south are corrected accordingly.

Here the typical green schist like 28679 again appears, and continues to 120 N. in 2.

At 260 N. in 2, and again at 440 N., are large exposures of typical bright green schist.

At 475 N. layers of the slate were seen interbanded with material like 28679.

The typical green schist continues to 650 N. Here there appears typical banded graywacke slate. The strike is N. 80 E. and the dip is 10° S.

Continues to lake, 900 N. However, there is little of the slate, most of the material being a rather coarse graywack

Crossed lake in canoe with packers, who were waiting for us, and continued north on the quarter line.

North shore of lake is about 1000 paces north. From here to 1480 N. the graywacke and slate series continues, the coarser phases predominating.

At 1480 N. the rock gets to be rather, coarse and is distinctly a fragmental, of the nature of a coarse grit.

After this fine grained slate and graywacke, interbanded, come in and continue to 1780 N. Here is a particularly beautiful exposure of the typical banded material. The strike is N. 70 E., and the dip 5° S.

Continues to 1900 N.

At 30 N. in 35 we find a typical fine grained slate, weathering pure white, showing its cherty character. This is very similar to the material found yesterday north of Ensign lake, Specimen 28684.
This white weathering cherty black slate continues to 1000 N. in 35. The strike at the northernmost point is N. 80 E., and the dip 10 S.

Continues west along the offset, and south to 660 S. in Sec. 2 Here again the slate is interbanded with layers of grit.

28687. At 915 S. in 2 took specimen of coarser graywacke or grit phase.

This continues to 1100 S., and then becomes interbanded with slate. The shore is reached at 1300 S., and here the slate predominates.

Offset west around end of lake.
For 100 paces west along the shore is slate, and then comes in material like 28687, graywacke. About 500 paces southwest along the shore, is a peculiar rock which I cannot classify.
28688. Looks like a schistose slate conglomerate. A little farther on this appears like a true conglomerate. Both fragments and matrix are slate, and so sheared as to make the character obscure.

Reaching portage trail on the southwest shore, worked this south to Ensign lake.

At 650 S. of the north end is typical banded graywacke and slate. The graywacke is very coarse and resembles grit. Continues to 700S. The strike is nearly E. and W. Compassmen measures it N. 80 W., but poor exposure.

28689. At 800 S. of the north end of the portage trail is typical green schist. Strike N. 80 W.

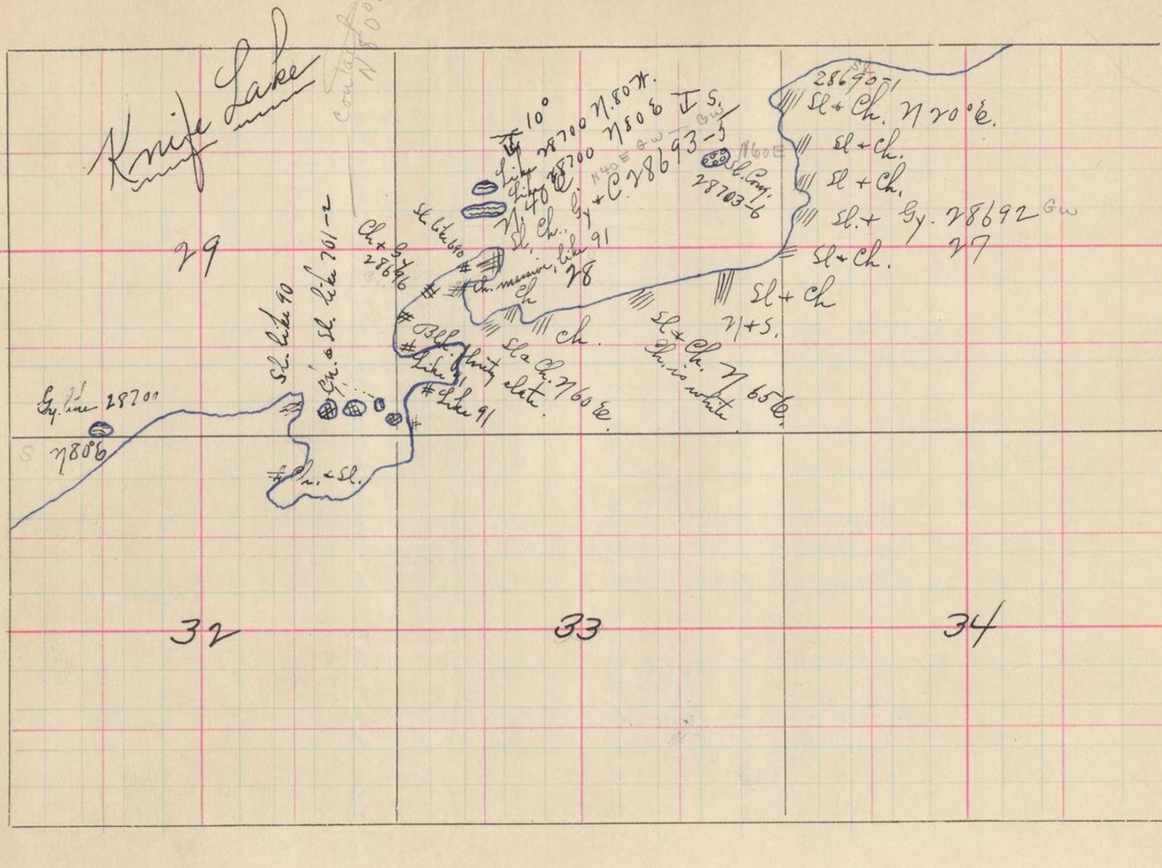
925 S. is material identical with 689.

At 1000 S. is the same thing.
South end of portage trail is 1100 S.

In general from my work on Ensign lake, north of the lake, and east of it, the last few days, it seems that to the south is a series of green schists passing into greenstone conglomerates, and occasionally showing interbanded graywacke and slate phases, the whole, however, presenting the appearance of a single fragmental greenstone series. Essentially the same material appears in all these forms. North of this there appears a sedimentary series of interbanded slate and graywacke, which appear like ordinary sedimentary deposits, and have a different aspect from the fragmental greenstone series to the south. The slate is dense, black, and very cherty, at the north weathering to a nearly pure white. This is characteristic of the Knife lake slates to the NE, and the slates are undoubtedly a continuation of that series. While I was unable to find any break between this cherty slate series on the north and the greenstone conglomerate schist series to the south, I cannot but believe that they are essentially different series. The greenstone fragmental series is similar in every respect to that found to the SW on Snowbank and Moose lakes.

6—747

S. T. 65 R. 7



Knife Lake
29
32
33
34
28
27
Sl + Ch. N 70° E.
Sl + Ch.
Sl + Ch.
Sl. + Gy. 28692
Sl + Ch.
Sl + Ch
N + S.
28690-1
28693-5
28703-6
Sl. Cong.
N 80 E
N 40 E
Sl + Ch. N 65 E.
Ch. is white
Ch.
Sl. like 90
Sl. like 91
Ch + Gy
28696
Gy. like 28700
N 80 E
Like 91
Like 91
Blk cherty slate.
Sl & Ch. N 60 E.
Ch. & Sl.

Aug. 13.

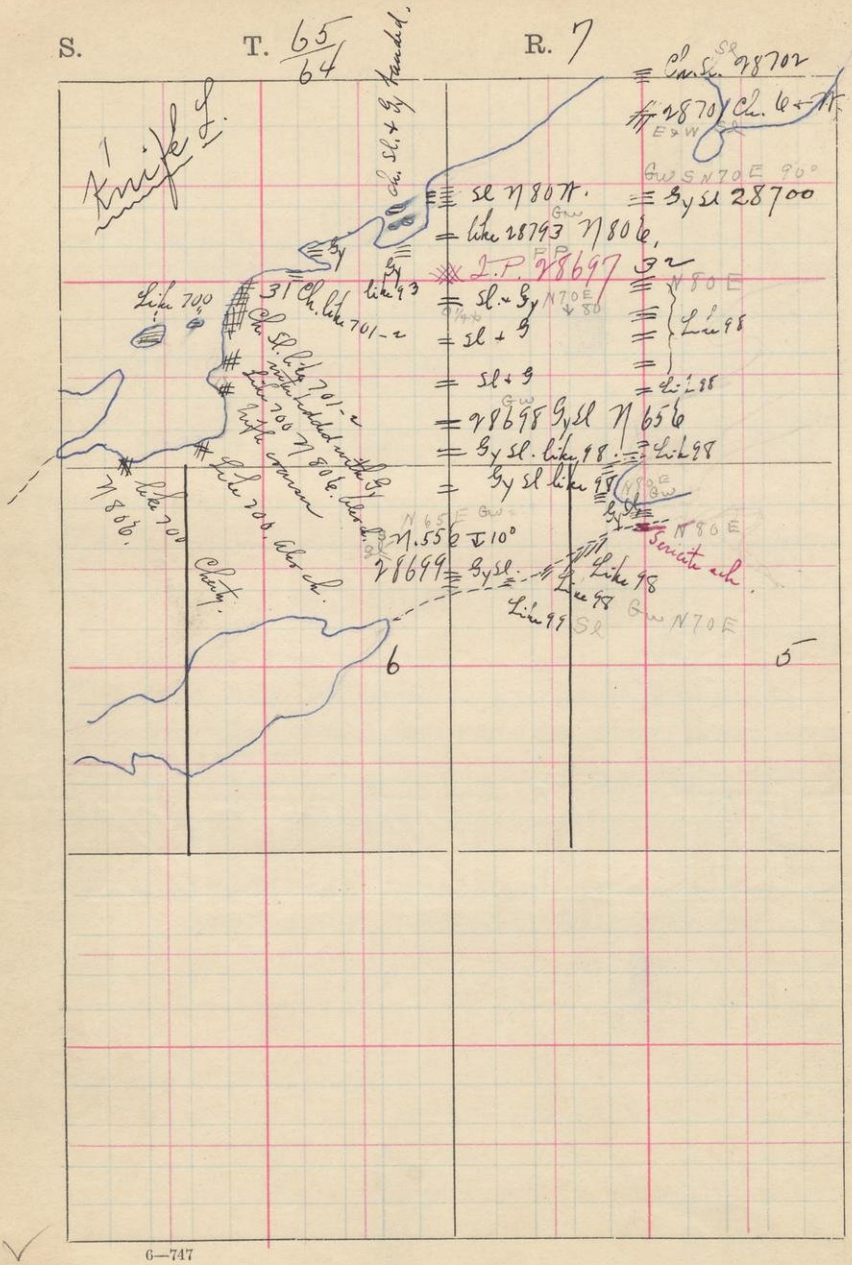
Worked south shore of Knife lake from NW corner of 27 where camp was located, west to the portage trail.

Sl 28690. At the camp is banded slate, and
Sl 28691 black siliceous chert or slate, striking N. 20 E. and appearing rather massive. Strike is banding. There is no predominant schistosity, unless perhaps it is the one striking N. 20 W. However, the rocks are cut in various directions by planes of fracture.

The weathering is white, and there is a distinct banding. Some of the bands are much more siliceous than others. It looks to me as though we had here simply a banded slaty rock, more or less siliceous in alternate layers. However, Prof. Bayley things there are two different rocks. He asked me to note that the cherty layers are more contorted than the others. However, I should not say this was generally true. My observations would not bear out the statement.

Sw 28692. Siliceous graywacke, interbanded with the slate.

Sw 28693
Sw 28694
Sw 28695 At the point where these


S.
T. 65/64
R. 7
Knife R.
Ch. Sl. + Gy Handed.
Ch. Sl. 28702
28701 Ch. 6 + Tk
E & W
Gw S N70E 90°
Sl N 80 W.
Gy Sl 28700
like 28793 N 806.
L.P. 28697
Gr
Like 700
31 Ch. like 701 - 2
like 93
Sl. - Gy
N70E
N80E
Like 98
Sl + G
28698 Gy Sl N 656
Gy Sl. like 98
Like 700 N 806.
like 700 N 806.
N. 556
28699
Gy Sl.
Like 98
Sawcut ch.
Like 98
Like 700
N 806.
Chimney.
6
5
N70E

6—747

are taken is some interesting geology. Here there are interbanded exceedingly dens black chert, like 28691, and slate like 28692, and coarser graywacke and grit, 28693-4-5. In 28693, graywacke, can be seen fine narrow bands of black material which may be slate, and also small lenses of the same resembling pebbles. 28694-5 are from another band in the exposure, which I think are coarser phases of 28693. The strike of the banding is N. 40 E.

The coarser rocks might be called fine grained conglomerates.

28696. Here there is typical chert, lik 28691, and in sharp contact with it is rather coarse gr aywacke, 28696. The contact is a very sharp one, and strikes N. 80 W. However, could follow it but a short distance, as the exposure is so poor. There is absolutely no gradation.

Started from Knife lake, on the west line 32, and ran south to the portage trail in 6, offset east along the trail 1000 paces, and north to Knife lake.

At 185 S. from the lake is white weathering cherty black slate. The strike is N. 80° W.

350 S. is rock identical with 28693, [illegible]. Strike N. 75 E.

graywacke. Strike N. 75 E.

28697. 550 S. of Knife lake, on the west line of 32, is a poor rotten exposure of red quartz porphyry. No structure.

575 S. is banded slate and graywacke, not cherty. Slate like 28690. Graywacke like 28693. Strike N. 70 E. Dip 10 S.

Struck quarter post at 600 S. Locations from now on are from section corner.

At 1090 S. in 32 is typical banded graywacke and slate, the former predominating. This graywacke is rather coarse, and might be called a fine grained conglomerate Is like 28693.

1275 S. is graywacke like 28693. Ledge low and moss covered, no strike.

1550 S. Low moss covered knoll of graywacke and slate.

28698. 1800 S. in 32, is graywacke slate? Strike N. 65 E.

1985 S. same thing.

50 S. in 6 is same thing.

80 S. same thing. This rock has a peculiar greenish and yellowish weathering which leads one to believe that it might be a green schist.

520 S. Graywacke-slate. Here the weathered surface is rather rough, making it look decidedly like a true fragmental.

570 S. is fairly good exposure of the material identical with 28698, forming a part of the typical graywacke and slate. Banding strikes N. 65 E.

Strike trail at 710 S. Just before reaching it is an exposure of

28699, slate. Strike N. 55 E., dip 10° S. Could make out no structure or banding. The strike is only that of schistosity.

Offset east along trail.

At 300 E. along the trail is the same thing.

At 425 E. is rock identical with 28698. Strike N. 70 E.

600 to 650 E. same thing.

At 1000 E. along the trail ran north. See plat.

70 N. from the trail is exceedingly rotten sericite schist, striking N. 80 E. Could make nothing out of it.

240 N. material identical with 28698. Here struck lake this is marked on the map as being 400 paces to the east. Had to offset west around it.

400 N. of the trail, and about 200 west of the quarter line is typical banded graywacke and slate. Here it shows a rather decided banding. Strike is N. 80 E. From here on around the lake is material identical with 28698. Strike N. 80 E.

Found east and west line on north side of lake. S. line of 32.

At 100 N. in 32is material identical with 28698.

400 N. same thing. Here I thought I could see banding in this material.

560 N. same thing.

650 N. same thing.

800 N. same thing.

975 N. same thing. Strike N. 80 E.

28700. At 1450 N. in 32 is more of the material like 28698. However, took specimento be sure. Rock strikes N. 70 E. and dips vertically. I can discover no banding. Strike is of schistosity. Weathered surface shows fragmental character of the rock. During the rest of the afternnon I found a great amount of this material. Always characterized by the rough yellow weathered surface.

28701. 1850 N. in 32 is black cherty slate. Shows a slight banding. Continues for 50 paces. Str ke is E and W.

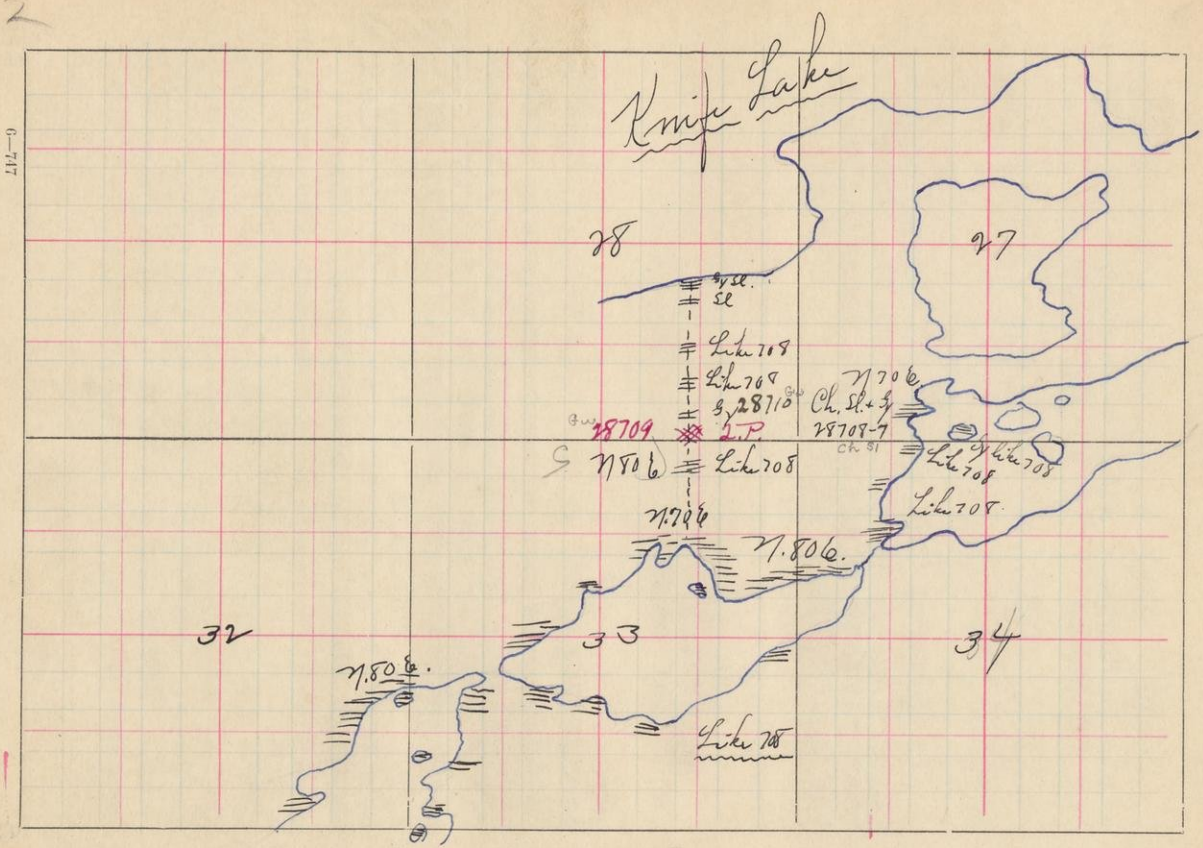
28702. 1970 N. the rock is still finer grained, but the same thing.

this area?

In general for the say, the white weathering slates seem to lie to the north, and the graywackes and banded material to the south, just as I found to be the case north of Ensign and the lake to the east of Ensign.

Returning to camp in canoe, worked island just west of camp. See plat.

28703 On this island is slate conglomerate striking N. 60 E., and dipping 10° S. 28704 28705 28706 rock is now almost completely altered slate, so that on the fresh fracture its character could not be discerned. However on weathered surface it can be well seen. It contains several large pebbles of greenstone, or some scoriaceous material which I would call greenstone. However, it is now so much altered that its original character is difficult to determine. 28703 is a fresh specimen of this conglomerate, showing a little of the weathered surface. 28704-5 show the weathered surface. 28706 is a pebble of the greenstone knocked out of the conglomerate.


Knife Lake
28
27
32
33
34
S.
T.
R.
Sl.
Lake 708
Lake 708
S 28710
28709
L.P.
N 706
Lake 708
N. 706.
Ch. Sl. + S
28708-7
Ch. Sl.
S Lake 708
Lake 708
Lake 708
N. 706.
N. 806.
N. 806.
Lake 708

Worked shores of lake in 27 and 34 west from the portage trail, and the lakes to the west.

28707 cherty slate.

28708. Cherty graywacke slate, somewhat coarser, but similar to the graywacke slates seen to the west (28698 and 28700) Strike N. 70 E. The finer grained cherty slate is interbanded with the coarser form, and is evidently the same thing.

I n general on the three lakes the material is not banded, but is like 28708. In one or two places, as indicated on the plat, the rock is banded. Whether banded or not, it always has a schistosity in the direction of banding when present, the schistosity striking very uniformly N. 70-80 E. The dip is uniformly 10 S.

Ran north a little east of the quarter line of 33 and 28 to Knife lake, from little lake in 33.

At 520 N. from the lake is a series of low moss covered exposures of rock similar to 28708.

720 N. is a low moss covered exposure of very much weathered rotten quartz porphyry, 28709.
28709. No relations. Schistosity strikes N. 80 E.

750 N. of the lake is a fine grained massive acid rock, very much iron stained on weathered surface.
28710 A specimen of this rock. Is this a phase of the graywacke slate 28708?

At 925 N. of the lake is graywacke slate identical with 708.

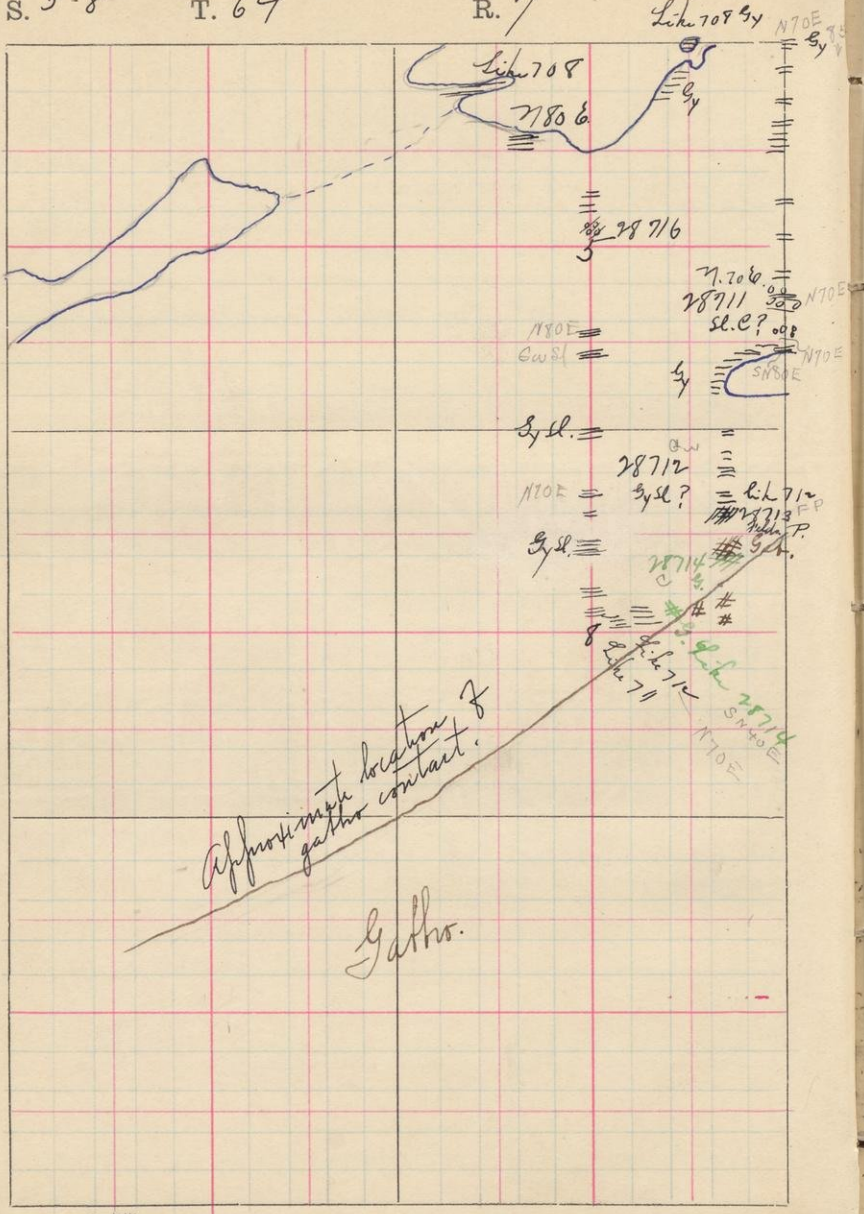
At 1090 N. is the same thing.

At 1500 N. is typical fine grained slate This I suppose is the white weathering material, but exposure is too poor to tell.

Strike Knife lake at 1600 N. At the lake is the typical white weathering chery slate.

Just before reaching the lake found a great deal of debris of slate conglomerate like that found on the island yesterday, but did not find it in place. This would be about along the strike of that on the island.

S. 5-8 T. 64 R. 7



6—747

Aug. 16.

Ran south on the east line of 5 and 8 64-7 and back on the quarter line.

At the NE corner of 5 the rock is typica graywacke slate like 28708. Strike is N. 70 E. Dip 5 S.

90 S. same thing. Continues to 125 S.

230 S.
285 S. Moss covered exposures of the sam
310 S. thing.

460 S.
500 S. Same thing.
800 S.

Low moss covered exposures of the same thing are very frequent to 1100 S.

28711. 1300 S. 0 W. in 5-64-7 Moss covered ledge of slate conglomerate? Strike N. 70 E. Could get no weathered surface, and made out no relations.

1430 S. same thing.

1480 S. is again the graywacke slate material like 28708. Here, however, it

shows a slight banding striking N. 70 E.

1540 S. is large an excellent exposure of graywacke slate like 28708. No banding. Schistisity N 80 E.

At 1650 S. strike little lake, and offset 375 paces west to get around.

Graywacke slate continues for entire distance and south again to 1800 S.

2000 S. 375 W. more of the same thing.

gw 28712. 200 S. 375 W. in 8-64-7 is a schistose greenish rock which may be a graywacke slate, but of this I am not sure. The surface is pitted like a scoriaceous r rock, and the rock does not show the granular brown weathered surface of the graywacke.

300 S. same thing.

F.P 28713. Is a coarse massive feldspar porphyry. 380 S. 375 W. in 8-64-7. This is immediately followed by material like 28712.

At 530 S. is a large exposure of the typical massive gabbro.

C Quart. Sed.

This is followed immediately by

28714, a spotted rock which I presume is a greenstone altered by contact with the gabbro.

At 850 S. gabbro again appears in massive exposure, and again at 900 S.

Offset west 1000 paces.

At 900 S. 425 W. of the line of 8 is gabbro in low moss covered exposure.

At 570 W. is material identical with 28714. Strike is N. 40 E. Schistosity.

640 W., 900 S. is material indetical with 28712, which I presume is graywacke. Could get no strike, but trend of ridge is N. 35 E.

750 W., 900 S. is a more of the material like 28712. Here, however, it has the weathered surface of the graywacke to the north, and is undoubtedky the same rock. Strike is N. 70 E.

Cgl.

28715. 840 W. 900 S. in 8 is a rock similar 28711, which I think is a conglomerate. Strike N. 70 E. On closer examination the rock looks more like a greenstone. On the weathered surface it looks like a breccia, perhaps of graywacke, injected and healed by greenstone.

At 1000 W., 900 S. in 8, ran north on the quarter line.

the quarter line.

At 1165 N., 1000 E. of the SE corner of 8 is typical graywacke slate.

At 1300 N. is the same thing, here veined with vein quartz. This may be a phase of 28715.

1590 N. same thing.

1700 N. Graywacke slate, striking N. 70 E. Like 28712.

1870 N. same thing.

2000 N. same thing.

460 N., 1000 W. in 5 is graywacke slate

550 N. graywacke slate. N. 80 E.

700 N. same thing.

pw 28716. 1010 N. Coarse grit or graywacke This is simply a coarser phase of the graywacke slate. Specimen taken to show weathered surface. No strike.

1140 to 1200 N. typical graywacke slate.

1330 N., same thing.

Strike lake at 1450 N.