Vermilion district: [specimens] 28717-28800, 29900-29917. No. 316 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 ... least two places upon the inclosing paper or cloth bags. Specimens may be p... ently marked in camp by painting the numbers upon them in white upon a bla... ckground, using Silver White and Ivory Black oil tubes for color, with turp... as a diluent.

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

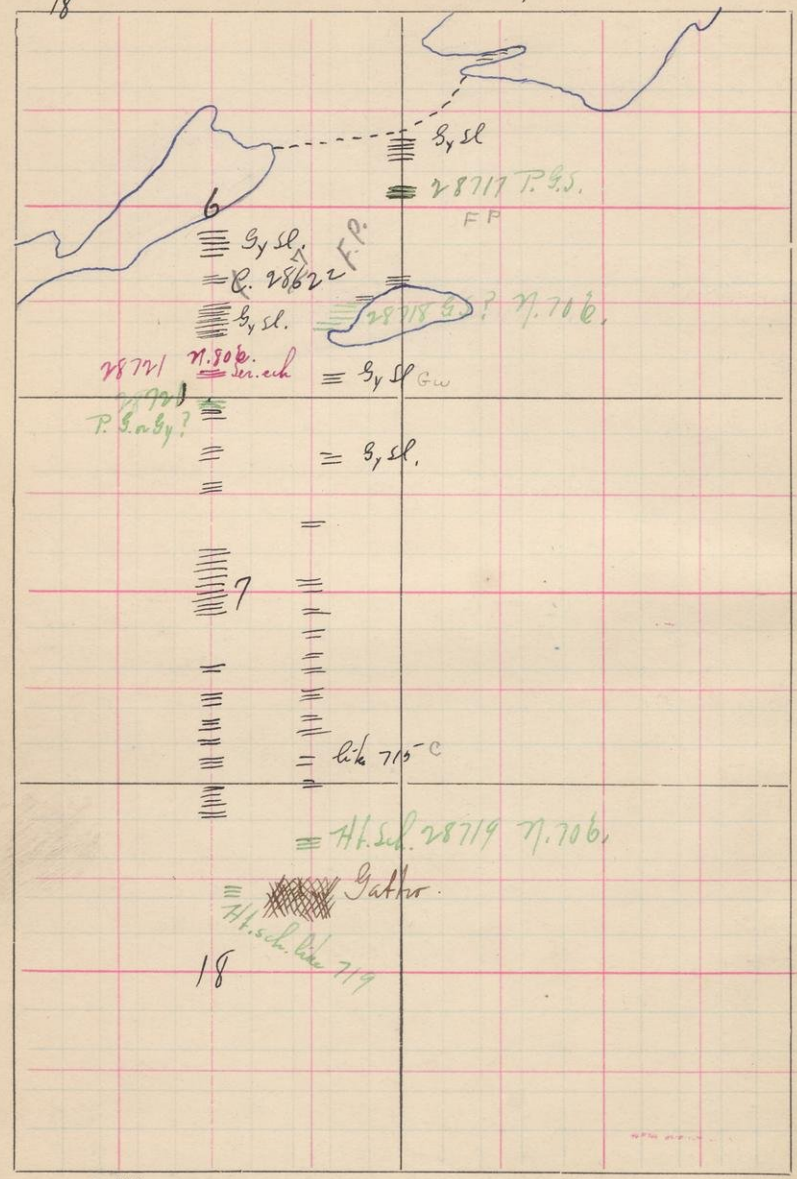
5. Forwa... is note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. G... gist, Madison, Wis.

27717-27800
27900-27917
Notebook 316.
Cont. from 315

Vermilion district
Summer of 1898
C. K. Leith

Ira Nelson
Compassman

S. 6 / 7 / 18 T. 64 R. 7



6—747

Hade given instead of dip. C.

Aug. 17.

Ran south on the east line of 6, 7, and 18-64-7, from portage trail between little lakes, to the gabbro, and back on the quarter line.

Trail is 600 S. in 6.

690 S. is typical graywacke-slate.

790 S. same thing.

F.P 28717. At 850 S. 0 W. in 6-64-7. Porphyritic green schist. This is similar to the Endeavor rock. Exposure low, moss covered, and rotten.

970 S. material like 28717. Not quite so coarse grained.

1400 S., 100 W. in 6 is exceedingly rotten sericite schist, like 28721. So rotten that a single hand specimen is hard to obtain. Strike is N. 80 W.

Strike little lake at 1400 S., and offset west around it.

28718. 1680 S., 480 W. in 6. This is typical of the material occurring in large and massive exposure at the east end of the lake. Strike N. 70 E.

This rock may be a graywacke, but would call it a greenstone.

1950 S., 400 W., typical banded graywacke slate like 28712.

300 S., 400 W. in 7. Typical graywacke slate like 28712. Strike N. 70 E.

660 S., 400 W. Graywacke-slate. N. 60 W. Notice change in strike. Fairly good exposure, but still this may be a minor turn. Dip is vertical. Strike is always schistosity.

925 S., is typic l graywacke slate like 28712. Strike N. 80 E. In large exposure.

1000 S. and 1090 S. same thing with same strike.

1200 and 1310 S. Strike N. 80 E. Dip 20 S.

1500 S. and 1740 S. typical graywacke slate.

At 1830 S. is material similar to 28715, collected yesterday. This rock, however, is graywacke, slightly veined and broken up

2000 S. is typical graywacke.

in 18
28719. 380 S. is black hornblende schist. Strike N. 70 E. Continues 25 paces.

550 S. is massive gabbro in large and typical exposure. The strike of the rudge is N. 50 E.

Offset west. Gabbro continues to 543 W.

810 W. 550 S. is material like 28719.

Ran north on the quarter line.

120 to 80 S. 1000 W. in 18 is graywacke slate. Strike N. 70 E.

50 N. in 7 same thing, with same strike. Very fine grained and approaches 28707.

170 N.
250 to 300 N. Typical graywacke slate.
430 N. Uniform strike of N.80 E.

590 and 900 N. Typical graywacke-slate. Strike N. 80 E.

1015 N., and 1125 to 1230 N., Exposures of the typical graywacke slate, with same strike.

1520, 1760, 1860, and 1910, same thing.

28720. 1975 N., porphyritic greenstone or graywacke. In Sec. 7, 1000 W.

28721. 90 N. 1000 W. in 6. Sericite-schist. Strike N. 80 E.

300, 400-500 N., typical graywacke-slate same strike.

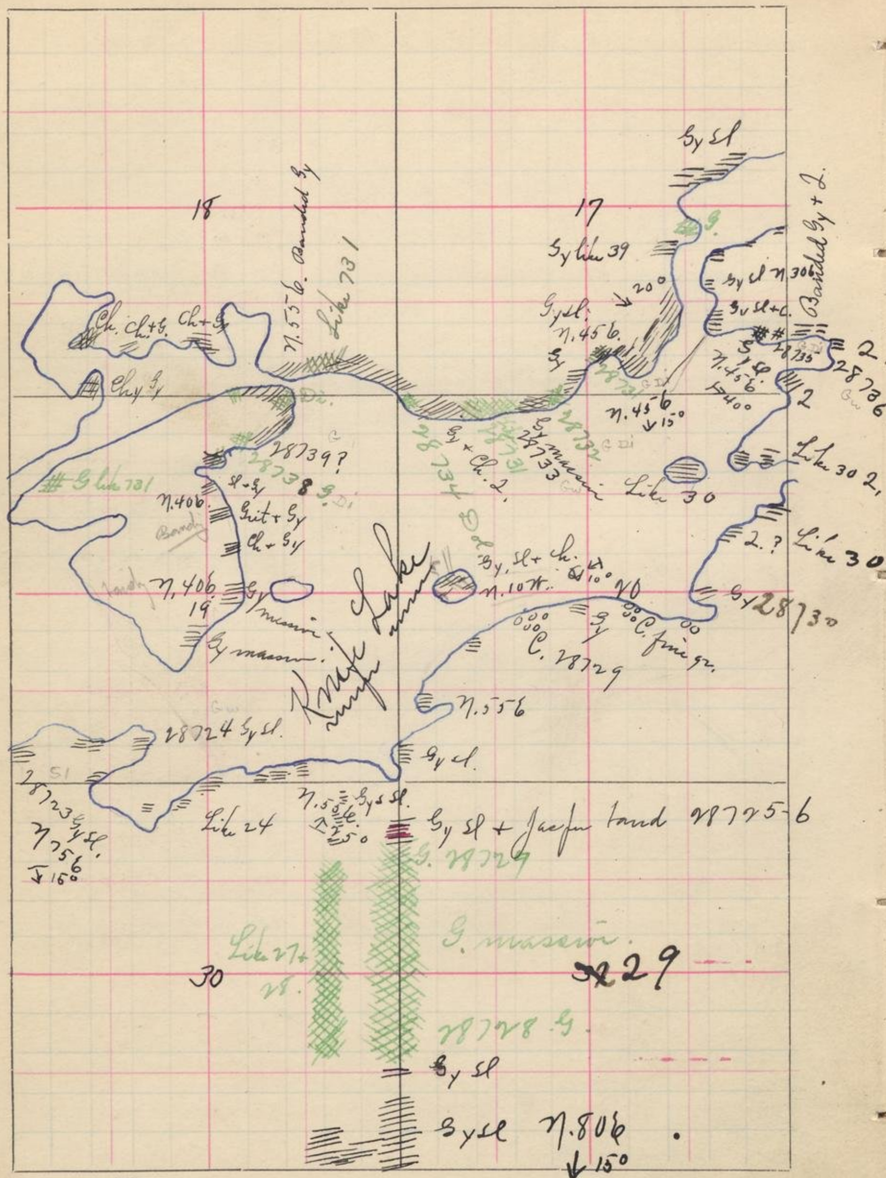
560 N., same thing.

28722. 620 N., 1000 W. in 6. Fine grained conglomerate. Greenstone conglomerate?

720 N. typical graywacke. Usual strike. Continues to 820 N.

Strike lake at 950 N.

S. T. 65 R. 6


18
17
19
30
29
Knife Lake
Gy Sl
Gy like 39
Like 731
Like 30
Like 24
28724 Gy Sl.
28729
G. massive.
28728 G.
Gy Sl
Gy Sl + Jasper band 28725-6

Aug. 18.

Worked shores of Knife lake in 17, 18, 19, 30 and 20. Results on opposite plat.

28723. Just east of the range line found a great variety of material, varying from coarse grawkcke with rough weathered surface down to flinty slate in minor quantity, and almost pure chert, 28723. The strike of the banding is N. 75 E. The dip is 15 S.

28724. Along this point is an almost continuous exposure of the typical graywack slate material which predominates at the western end of the lake. Same strike and dip as above.

Ran south from Knife lake to Lake Kekequabic, on the east line of 30.

200 S. is a high ridge of graywacke and slate, like 28723-4. The finer materia seems to grade right into a jasperized banded rock, 28725, which is peculiar.

28725. The dip is 15 S., and the strike is N. 80 W.

28726 another specimen. The rock seems to be to be a jasperized form of the cherty phase of the graywacke-slate series. It undoubtedly grades into the typical banded

graywacke and slate, both north and south. The layers are very much contorted in a minor way.

The banded graywacke slate continues to 275 S. The highest part of the hill is 300 S. The rock forming this highest part is
28727, which I think is greenstone. Very massive. This material continues in huge massive exposures, forming knobs 50 feet high, to 880 S. In many places it has a pitted weathered surface, as though scoriaceous.

Continues to 1340 S. Here is a lense of the typical graywacke slate in the very massive greenstone. Can distinguish no sharp contact, but has the general appearance of a lense.

28728. The greenstone is here very coarse grained.

1500 S. appears typical graywacke, very fine grained, striking N. 65 E. and dipping vertically. Strike is schistosity.

1630 S. to Kekequabic lake, 1950 S. is typical graywacke slate, like 28724 and others collected on Knife lake. Strike N. 80 E., dip 15 S.

At 1900 S. it forms a high bold knob.

Offset west, and returned to Knife Lake

Typical graywacke slate continues to 250 paces, in places banded. The banding has the strike above given for the schistosity.

At 1900 S., and 250 W. in 30, ran north.

Graywacke continues to 250 N.

At 590 N. of the line is the massive greenstone again.

This continues in practically continuous exposure over the ridge to 1600 N

At 1750 N. appears typical banded graywacke and slate and chert. Very much contorted, but in general striking N. 55 E.

Continues to Knife lake, 1850 N.

Attention should be called to the fact that on both south and north runs the typical banded material is found very much contorted just north of the massive greenstone. Also at several places in the greenstone on the north run I thought I could distinguish small patches of the

graywacke two or three inches across, but the exposure was uniformly so massive that I was unable to secure a decent specimen to show this. The fresh surface shows nothing, pointing to the complete alteration of the supposed inclusion. In general the greenstone has every appearance of being a fresh massive eruptive, cutting the graywacke-slate series.

In running north, the jasperized phase of the chert was not seen.

28729. From shore of Knife lake in 20. The rock is very massive, and there is no prominent structure.

28730. Light gray graywacke or quartzite. Very massive, and thus differs from the graywacke to the east. Affords no strike.

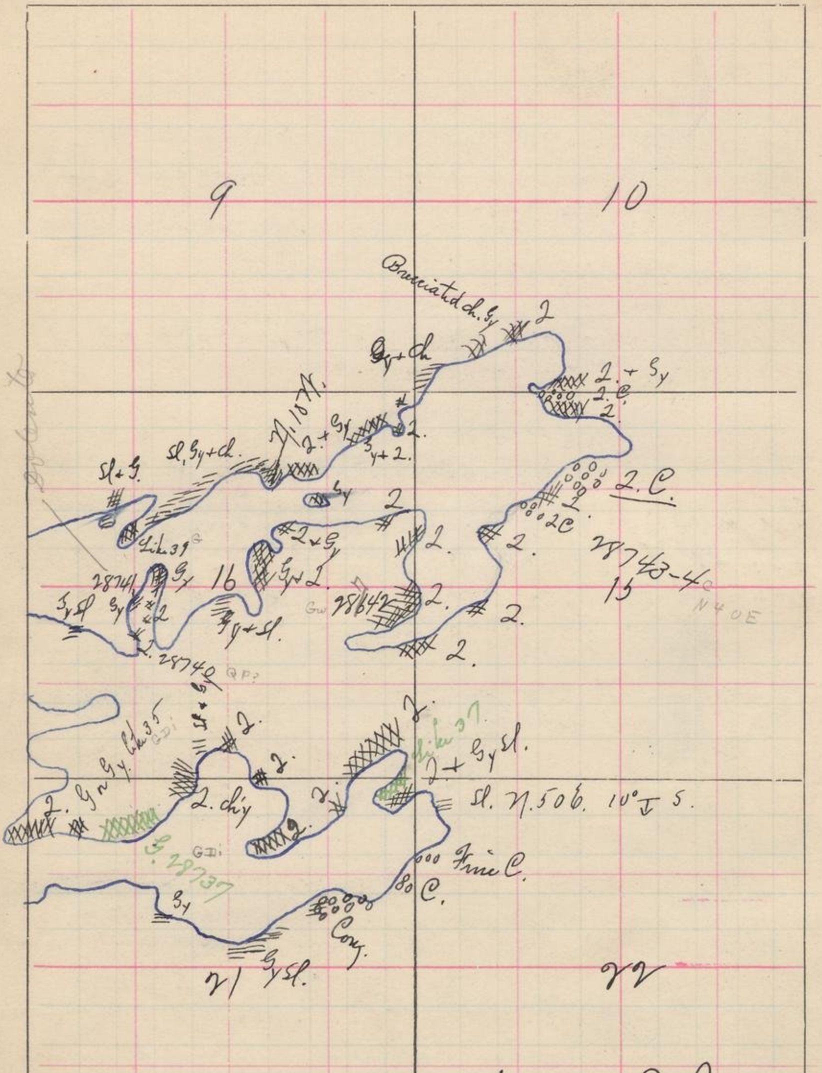
28731. Massive dolerite. No strike. Knife lake shore in 17.

28732. Massive greenstone. Knife lake shore in 17.

28733. Knife lake shore in 30. Impure quartzite?

28734. Knife lake shore. Very coarse and massive diabase.

S. T. 65 R. 6



Eastern arms of Knife Lake

Aug. 20. Worked east arms of Knife lake.

Results on plat.

28735. Rather massive fine grained greenstone? Or graywacke?

28736. Quartzite. Vitreous. As shown on the plat, the quartzite here occupies rather a wide belt. I could find no bedding. It is cut by fracture planes in several sets, but I could not see that any one set was dominant. The quartzite has a peculiar greenish weathering.

28737. Massive greenstone, diabase. This is a coarser phase of 28735 This greenstone can be detected on weathered surface by the shimmer of the amphibole fibers on the surface.

28738. Fine grained massive greenstone.

28739. Fine grained greenstone or cherty graywacke. A little farther on I find similar material which is slightly conglomeratic.

28740. Quartzite. Resembles the white-eyed porphyry.

28741. Graywacke.

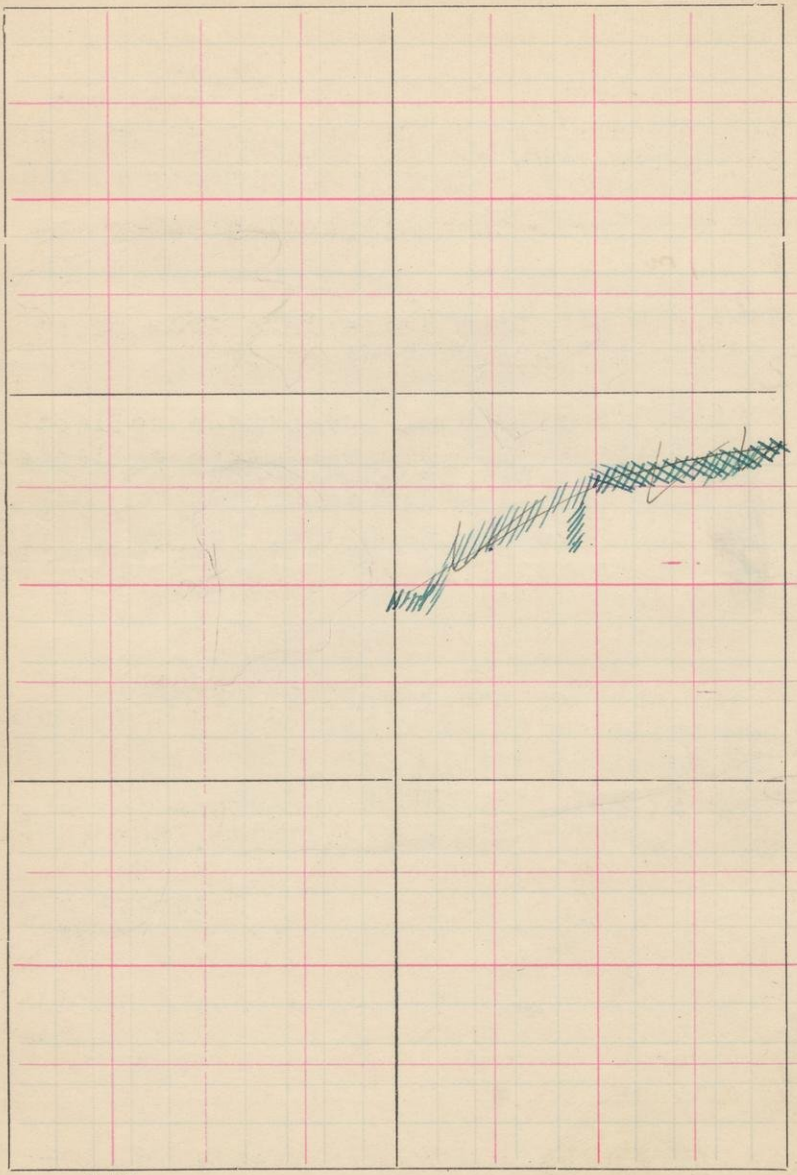
28742. Quartzite. Resembles white-eyed porphyry. This is interbanded with the graywacke and slate.

28743 and 28744. Quartzite-conglomerate. Strike N. 40 E.

A little farther on, see map, the same conglomerate occurs in beautiful high exposures, rising from the water's edge. The bowlders run up to 5 inches in diameter, and will average about two. Many have been broken out by the waves, and now lap the shore. The conglomerate is as a whole very massive, but in places a schistosity may be seen agreeing with the general strike of the exposure, N. 40 E.

The pebbles are almost entirely of quartzite, with an occasional graywacke and doubtful greenstone. Specimens 43-4 will decide the greenstone question.

S. T. R.



6—747

Started at Knife lake to trace out the boundaries of the greenstone mass in 31, between Knife and Kekequabic.

The course taken is indicated on the plat, on following page

Ran south from Knife lake from point 150 W. of the east line of 30.

Where first struck greenstone collected no specimens, as specimens were collected on run of previous days.

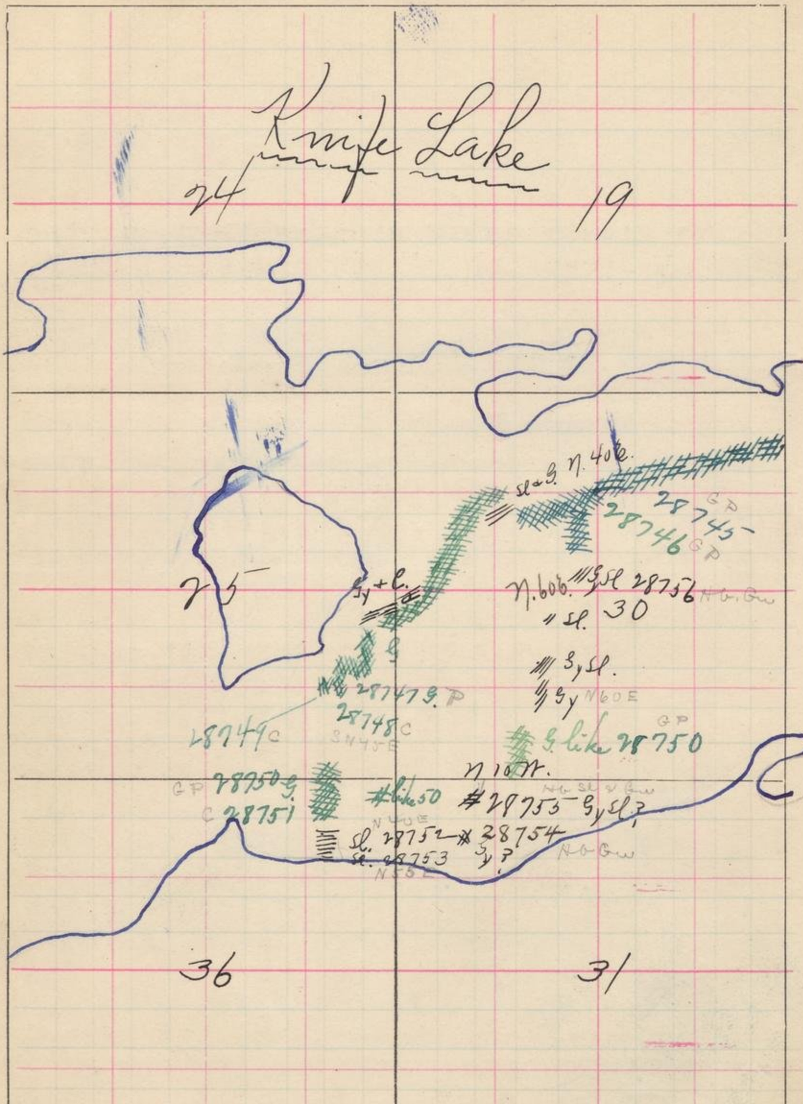
G.P. 28745. See plat. Here the greenstone takes on a coarse tuffaceous aspect on the weathered surface.

G.P. 28746. Fine grained massive phase, 1000 W., 600 S from the line and lake respectiv ly.

1130 W. 750 S. the greenstone is coarser and more tuffaceous than 28745, but is the same thing. It appears here decidedly like a tuff. The point of interest here is that it contains large fragments of typical banded graywacke and slate. One in particular, two feet across, with good banding, is seen caught in by the diabase with sharp contact. No question as to relations.

The greenstone varies widely in short distances, here it is a coarse tuff, and

S. T. 65 R. 7 & 6



Knife Lake
24
19
25
sl & g. N. 40 E.
28745
28746
GP
Gy + l.
N. 60 E. g sl 28756
sl. 30
g
g y sl.
g y
N 60 E
28747 g. P
28748 C
28749 C
g. like 28750
N 10 W.
GP 28750 g.
C 28751
like 50
28755 g y sl ?
sl. 28752
28754
sl. 28753
g y ?
36
31

there it is very schistose. Where schistose the schistosity strikes in about the general direction of the ridge, N. 80 E.

28747 is the fine grained greenstone. It might here be confused with the graywack Taken from 300 W. and ~~200~~ 1500 S.

But a few paces south the rock takes on a rough tuffaceous surface, 28648.
28648.

The greenstone all along here is slightly schistose, the schistosity striking N. 45E.

28649. Gives an idea of the coarseness of the brecciation in places. From 1470 S. of lake, 400 W. of line.

28750. Greenstone from 70 S. of line in 31. For the most part exposure shows tuffaceous form. Is this Bayley's volcanic ash?

28751. 100 S. of the line the same rock shows a tuffaceous surface. In places fragments are two inches across. This is the same material that I have seen associated with the coarse diabase farther back. Specimen shows surface.

28752. Slate. Strike N. 40 E.

28753. Slate, strike N. 55 E.

28754. 200 S. 300 E. in 31. Graywacke? Or greenstone?

28755. 50 S. 300 E. in 31. Here the same material is seen interbanded with fine slate. It looks to be like slate and graywacke, although the graywacke looks something like a greenstone. Banding strik N. 10 W.

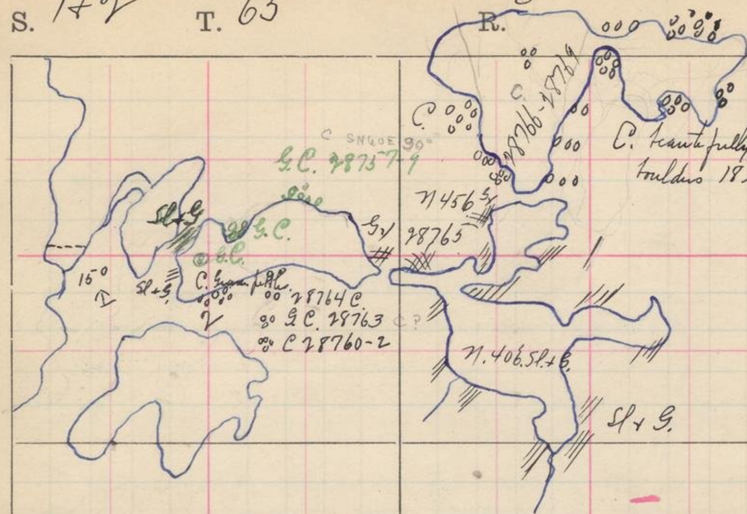
450 N. of the line, 750 E. is typical banded graywacke and chert, striking N. 60 E.

From here to 700 N is frequent exposure of the typical graywacke and slate.

At 700 N., is a beautiful large and typical exposure of banded chert and grayacke and slate. No doubtabout it. Strike N. 60 E.

28756. 900 E., 1020 N., Graywacke.

S. 142 T. 65 R. 6



C. beautifully developed, boulders 18 inches.

11

12

Worked little lakes in Secs. 1, 2, and 3, and 10, 11, and 12, T. 65, R. 6.

See opposite plat. The township plats were found to be faulty with regard to these lakes. On the plats they were neither the righ shape nor in the right place, so that it was necessary practically to meander each lake.

28757-8-9. Greenstone conglomerate. The bowlders vary from small size to those six inches in diameter. Of this size there are a good many. In places the bowlders are drawn out into lenses, and in cases would hardly be recognized as bowlder if found alone. The rock is squeezed. The schistosity strikes N. 60 E. Dip is practically vertical, perhaps a trifle to the south

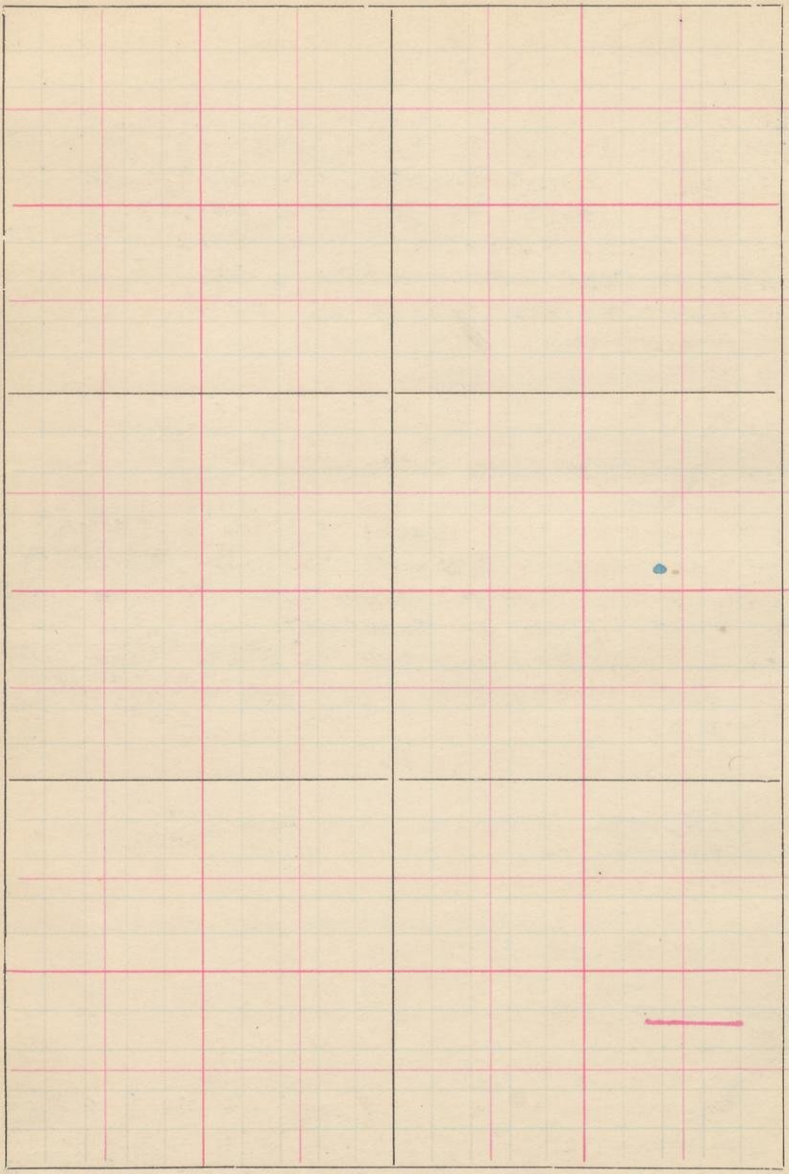
A little farther south I find the same thing. Pebbles here are entirely greenstone.

From the little lake on the north line of 11, ran south to the next little lake in 11, about on the quarter line. Strike lake at 290 S.

On way back collected specimens.

~~28760~~

S. T. R.



6—747

28760
28761 At 120 N. is a large exposure of
28762. conglomerate, containing fragments of granite, porphyritic greenstone, slate, and graywacke. Granite pebbles were seen running up to 10 inches in diameter and perfectly rounded. Rock very massive.

At 180 N. of the lake is another ridge of conglomerate, but this is greenstone conglomerate like 28757-9.

28763 shows the nature of the weathered surface and is typical, but the bowlders here are on the average much larger, runnin up to 3 inches in diameter. In general aspect on the weathered surface this rock in places reminded me of the spheroidal parting in the greenstone. Strike of the ridge is N. 60 E.

28764. At 225 N. is a conglomerate, containing many pebbles like 28764. 28764. Granite?

280 N. same thing.

28765. Graywacke? Could determine no strike.

Just across the portage, what I think is the same rock is seen to have conglomeratic characters. Pebbles appear which on weathered surface look like graywacke, but

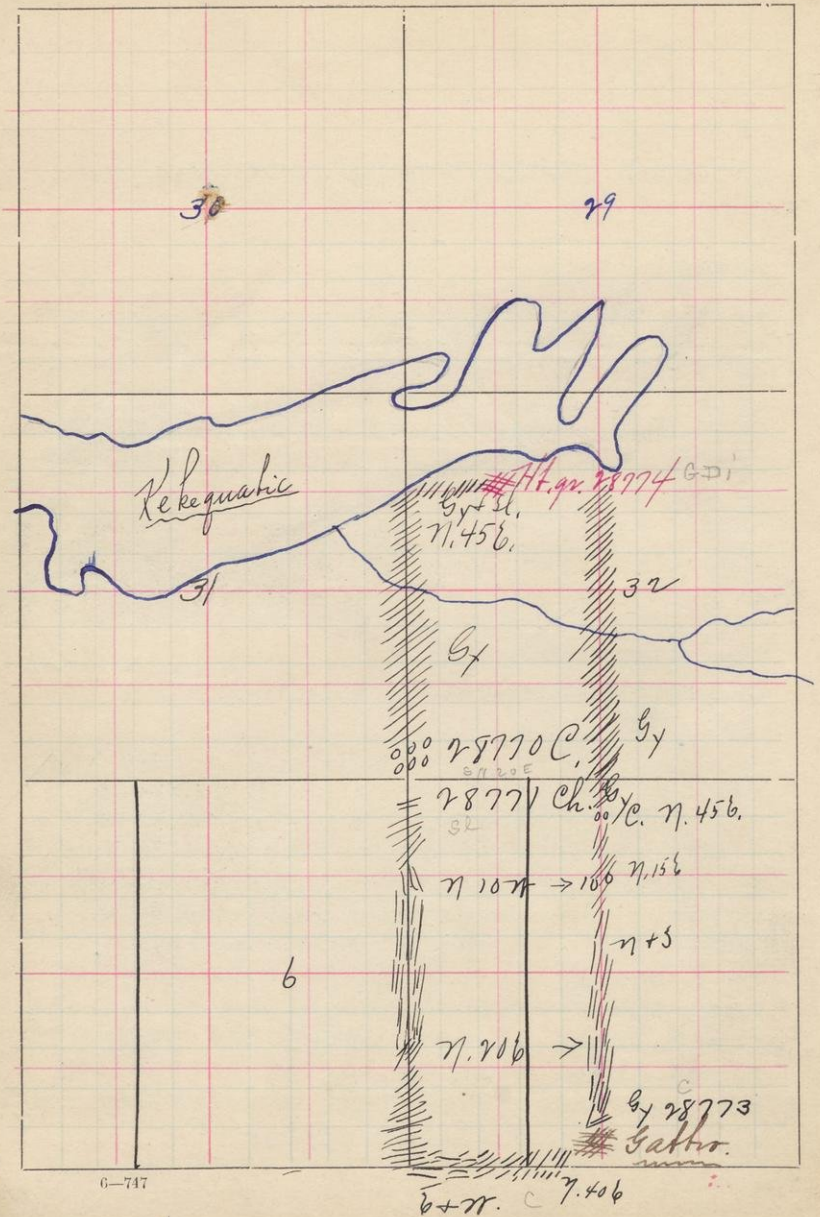
on fresh fracture they seem to be the same as the rest of the rock.

28766
28767 Beautiful basal conglomerate.
28768 This is the best exposure I
28769 have seen about here. Granite, or rather granite porphyry, is particularly abundant. Many of the granite bowlders are 6 or 8 inches in diameter, and one well rounded one is 20 inches in diameter. The other varieties of pebbles are in all cases smaller. The pebbles consist, besides the granite, of greenstone, graywacke-slate, and jasper. The granite is identical with the Saganaga granite.

The rock is massive, no strike.

On the portage between the two lakes on the west line of Section 1, I hunted for the contact of the graywacke and slate and the conglomerate. I ran from one on to the other, without discovering any break. The conglomerate is evidently the lower part of the graywacke-slate series. In a number of cases where we have crossed from the graywacke and slate to the conglomerate today, I have found the conglomerate first to be similar to the greenstone conglomerate 28758-7-9, and farther north the granite bowlders appear.

S. T. 64+65 R. 6



6—747

Aug. 28. Sunday, and wet.

Ran south from Kekequabic lake on the west line of 32 to the gabbro, and back on the quarter line.

At the shore is typical banded graywacke and slate, striking N. 45 E.

Continues to 850 S. Here the banding and schistosity have different strikes. The banding is N. 45 E., and the schistosity N. 80 W.

Continues to 1980 S.

28770. Here is a fairly fine grained conglomerate. Principally greenstone fragments. This rock has numerous white feldspars, both in fragments and in matrix giving it the appearance of a porphyrite, and it is just possible that the rock is a tuff. The rock is rather massive, though a schistosity is present striking N. 20 E.

This rock gives way at 150 S. of the line to the typical black cherty graywacke

28771. It weathers is an uneven manner.

Ramifying through it are numerous-ramif- yellowish stringers, which look like alterations along fracture planes.

At 560 S. is typical banded material, graywacke and slate, which strikes N. 10 W. Dip 10 E.

To 1400 S. this material strikes almost north and south, varying but a few degrees east and west of this direction.

At 1400 S. the material strikes N. 20 E. The dip is slightly to the east.

At 1840 S. Same material.. Here the strike is E and W.

Graywacke and slate continue to 350 S. in 7.

At 375, on the shore of the small lake, is massive coarse gabbro, in large exposure.

28772. This is a specimen of the graywacke from the exposure next to the gabbro, 25 paces. Could make out no strike. The rock has the general aspect of the graywackes just crossed, especially the protruding ridges on the weathered surface.

Ran back on the section line to offset lake. and then east 1000 paces.

Ramifying through it are numerous-ramif- yellowish stringers, which look like alterations along fracture planes.

At 560 S. is typical banded material, graywacke and slate, which strikes N. 10 W. Dip 10 E.

To 1400 S. this material strikes almost north and south, varying but a few degrees east and west of this direction.

At 1400 S. the material strikes N. 20 E. The dip is slightly to the east.

At 1840 S. Same material.. Here the strike is E and W.

Graywacke and slate continue to 350 S. in 7.

At 375, on the shore of the small lake, is massive coarse gabbro, in large exposure.

28772. This is a specimen of the graywacke from the exposure next to the gabbro, 25 paces. Could make out no strike. The rock has the general aspect of the graywackes just crossed, especially the protruding ridges on the weathered surface.

Ran back on the section line to offset lake. and then east 1000 paces.

In the eastern run did not strike the gabbro again. Frequent exposures of graywacke with the ramifying areas on weathered surface appear. At 675 E. the rock is a true conglomerate, but evidently only a phase of the same material. This continues to 800 E. The strike varies from east and west at the starting point of the offset, to N. 40 E. at 800 E.

Ran north. At 90 N. is graywacke, very massive. Here, however, it is distinctly conglomeratic, though this does not appear on fresh fracture. 28773.

Banded graywacke and slate continues in frequent exposure to 1900 N. The strike is N and S. However, at 1500 N. itswings a little, striking N. 15 E.

1900 N. Conglomerate similar to 28770. Strike N. 45 E.

The banded graywacke was followed to 1500 N. in 32. To the north it is more massive, and less banded, the slaty phase disappearing.

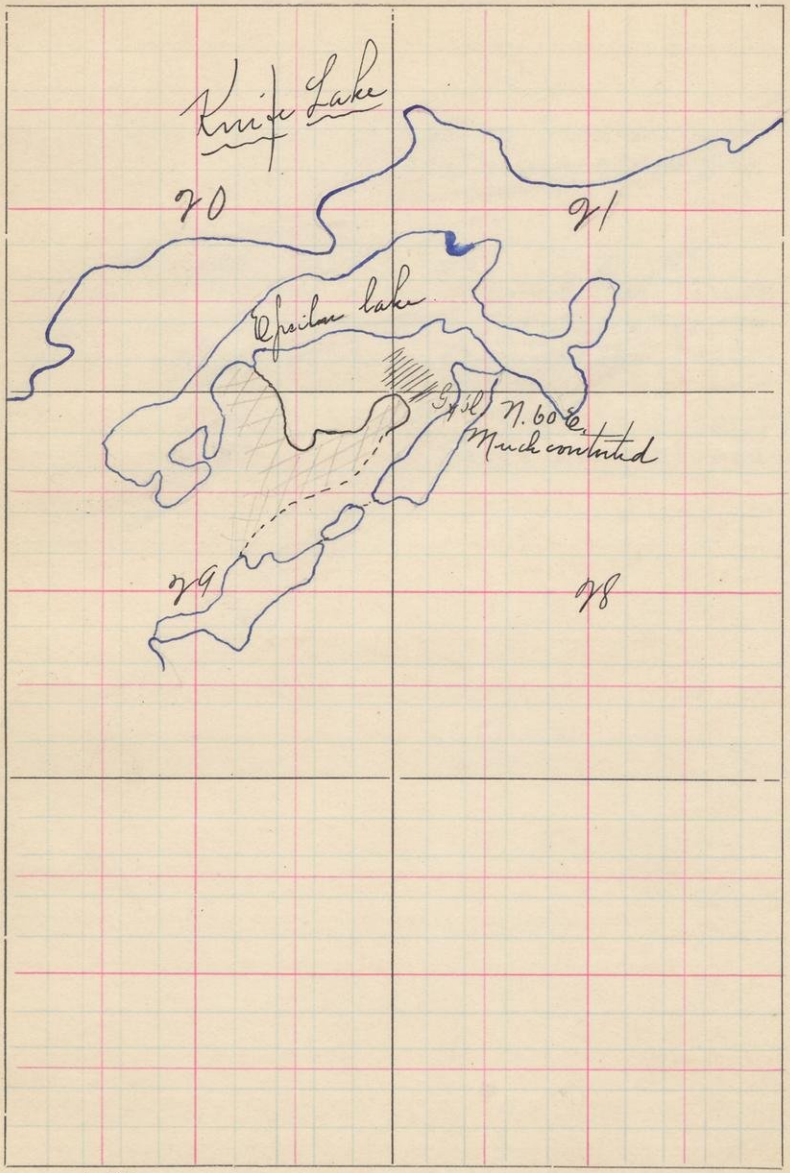
At 1500 N. in 32, offset west to the canoe.

28774. At 500 W. is a large massive exposure of hornblende granite. Probably a diabase on closer examination.

From here on to the canoe, 1000 W. is graywacke and slate.

Forestry. For entire day ran in small but thick popple and birch in about equal quantity, with a large amount of hazel, alder, etc. At the south end of the run was a little larger timber. Few traces of fire. Ground fairly clean. Little down stuff.

S. T. 65 R. 6



6—747

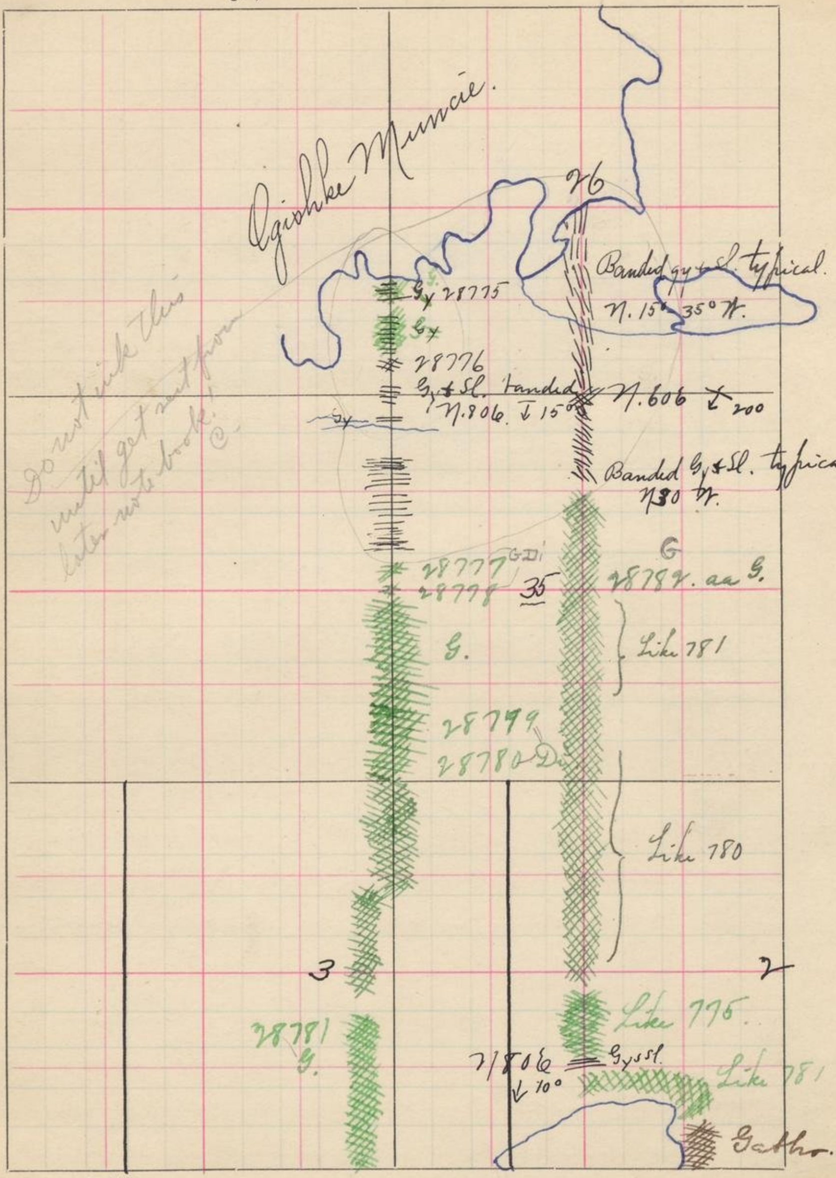
Aug. 29.

Traced out the boundary of the greenstone south of Epsilon lake. Result shown on plat.

This is the eastern end of the great mass of porphyrite S. of ~~Kekequabic~~ Knife Lake.

Solid black line is contact actually traced. Dotted line is probable southern limit as determined by outcrops on little lakes to the S.

S. T. 65/64 R. 6



6—747

Aug. 30, 1898.

Ran south from Ogiske Muncie on the west line of 26 and 35, 3 and 2, to the gabbro.

28775 At the shore is ~~graywacke~~ greenstone, rather massive. No strike. Continues to 200 S., becoming slightly conglomeratic.

375 S. of lake is ~~graywacke~~ greenstone?. Continues to 520 S.

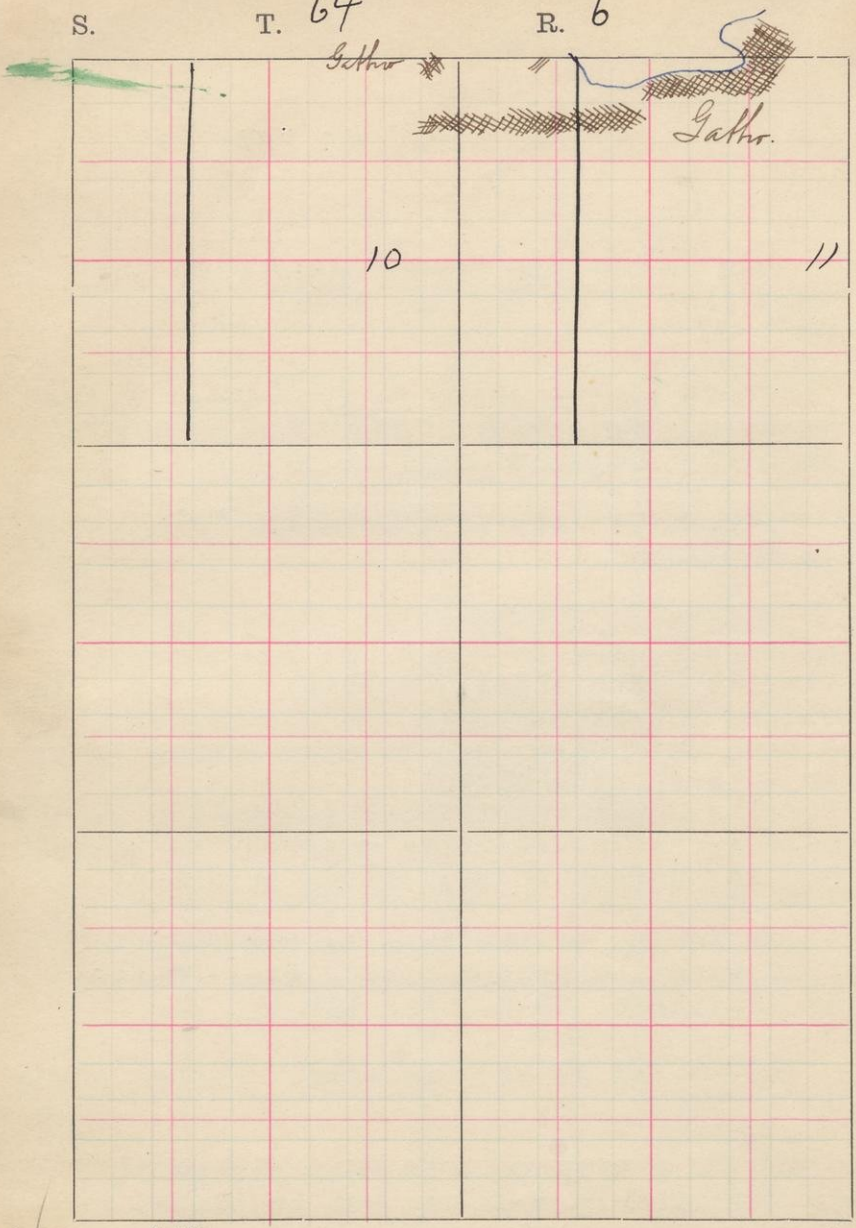
At 475 S. the material begins to be schistose, and at 520 S. it exceedingly fissile. Schistosity strikes N. 55 E. In places the exposure is little more than a mass of rubble, and in most places it is an altered rock like
28776 a dense cherty rock weathering reddish yellow. In places this material is so broken up that no strike can be obtained.

At 640 S. of the lake is the first true banded graywacke and slate. Strike of banding N. 80 E., dip 15° S.

100 S. in 35 is graywacke. Rather chert no strike.

350 S. graywacke. In most places it is exceedingly massive, but in places it is schistose, and rarely shows a banding. Continues to 800 S.

S. T. 64 R. 6



6—747

28777. 850 S. in 35 is a very massive greenstone

28778. 950 to 1000 S. is fine grained greenstone or graywacke. Very massive. Continues to 1210 S. Here the rock is the same thing as nearly as I can judge.

Same rock continues to 1780 S. in 35. Here I collected another specimen,

28779, which I think is more nearly typical of the crest of the ridge. This is an exceedingly high and long ridge, formed entirely of this material, so far as I have covered it.

28780. At 1870 S. in 35. A coarse and massive diabase.

The greenstone continues to 100 S. in 3. It is for the most part the fine grained phase like 28779, but occasionally phases like 28780 appear. At the southern extremity the hill breaks off sharply.

Continuing greenstone, the fine grained phase, is found to 1200 S.

28781. 1400 S. is ~~graywacke~~ greenstone? The rock is broken up and contorted, and in places apparently contains chert fragments. But these seem to be only discolored fragments of the same rock.

Continues to the south line of 3.

At 50 S. of the line in Sec. 10 gabbro appears. However, poor exposure, so continued south to 250 S. in 10 and struck it again.

Offset east 1000 paces, and then north to Ogiske Muncie on the quarter line of 26 and 3, but west of it in 2 and 10 on account of the jog.

In running north struck lake on the south line of 2, and offset around it as indicated on the plat. At the east end of the lake, gabbro continues to 200 N.

Then appears material like 28781, which I think is ~~graywacke~~ greenstone.

At 450 N. of the line in 2 is what ~~I would call~~ apparently the same material, but here it is banded and contorted, the banding in general striking N. 80 E. Dip is S. 10 °.

This is undoubted banded graywacke and slate.

From here to 850 N. in 3 is exceedingly massive material which is identical with 28775, as nearly as I can tell by comparing the two. However, there is no banding here, and the exposure as a whole has the massive aspect of the greenstone.

At 950 N. in 3 is out and out massive greenstone. Here similar to 28780 but finer grained.

The greenstone continues to 1000 N. in

35. To 200N. in 35 the rock is almost entirely the very coarse phase like 28780. From here to 500 N., it is the fine grained form like 28781.

At 1000 N. the greenstone is a beautifully developed spheroidal parting in the greenstone. The spheroids are 6 to 10 inches in diameter, and are most beautifully developed. There can be no doubt about it. The greenstone is very fine grained

28782, and is evidently the same as the fine grained forms which I have collected during the day, and called doubtfully graywacke or fine grained greenstone.

The greenstone continues to 1500 N. in 35, though it does not show the aa forms.

At 1650 N. is typical banded graywacke and slate, very cherty. The banding strikes N. 30 W. It is cut by several planes of schistosity which make the exposure weather very roughly.

From here to 2000 N. the banding strikes N. 25 to 30 W., and dips steeply to the east. The schistosity is in many places at right angles to the bedding, striking on an average about N. 60 E.
The chert weathers white.

2000 N. the banding strikes N. 60 E., an the dip is 20° S.

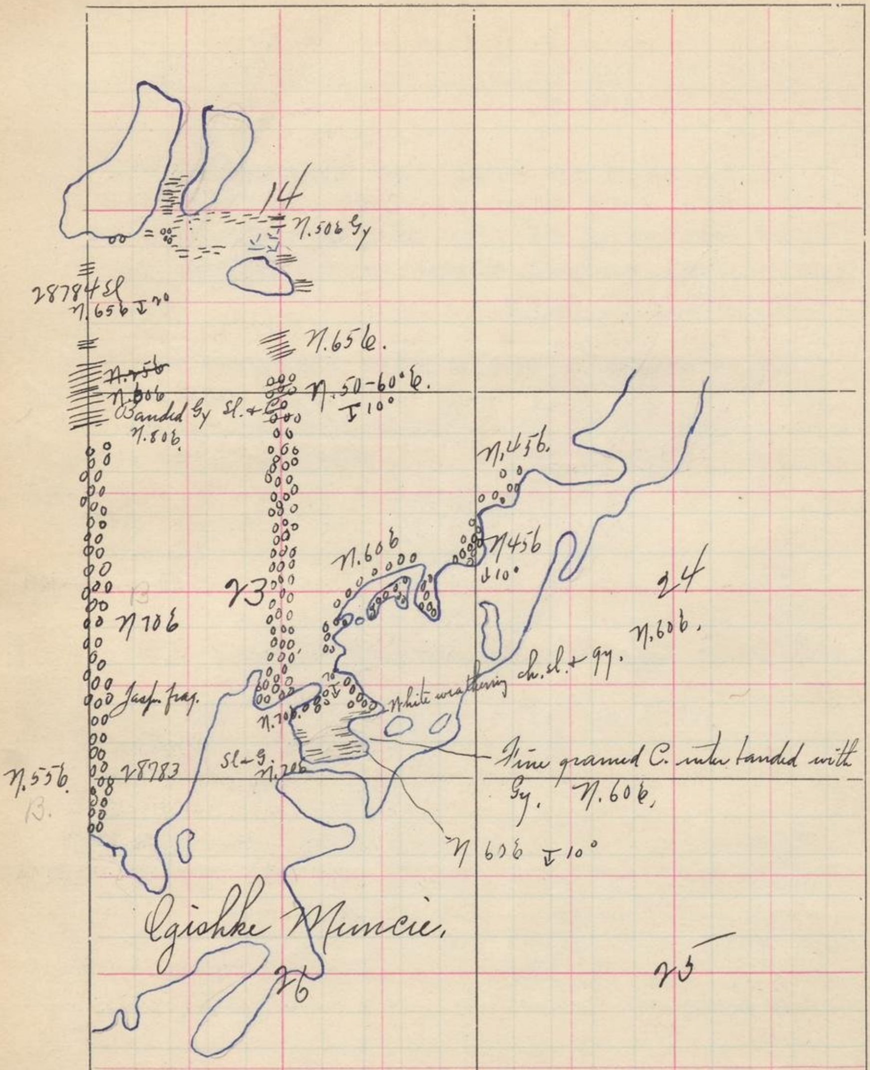
It is evident that the graywacke and slate are very much contorted, from the rapid changing of the strike. Indeed on individual ledges minor contortions may frequently be seen.

The graywacke and slate continue to the lake 1050 N. For the most part the strikes are N. 15 to 35 W. The schistosity is prevailingly N. 60 E. However, in many places the banding strikes E. of N., showig that the rock is greatly contorted. Just before reaching the lake, the banding strikes N and S, perhaps 10° W. of N.
The falls of the river crossed in 26 are over the graywacke and slate.

The folding of the graywacke and slate in this little area near the falls would bear more and closer study.

Forestry. No pine all day. Birch and popple undergrowth, with smaller hazel and other underbrush. The ground was clean, and very evidently burned a great many year ago. The birches and popples were all of fair size.

S. T. 65 R. 6


14
N.50b Gy
28784 Sl
N.65b I 70
N.65b.
N.50-60° b.
I 10°
N.80b
Banded Gy Sl. + Cg.
N.80b.
N.45b.
N45b
I 10°
N.60b
23
24
N 70b
N.60b.
White weathering ch. sl. + gy.
Jasp. frag.
N.70b
Fine grained C. interbanded with Gy. N.60b.
N.55b.
28783
Sl + G.
N.70b
N 60b I 10°
Ogishke Muncie.
26
25

Aug. 31.

Ran north from Ogiske Muncie lake on the west line of 26, 23, and 14, to little lakes, offset east, and back to Ogiske on the quarter line.

At the shore and for 100 paces N. is the Ogiske conglomerate in its usual characters. This has been specimened thoroughly by Dr. Bayley, and by myself NE of Knife lake. The usual pebbles are white-eyed granite, greenstone, chert, and rarely jasper. I was struck here by the abundance of the chert fragments, as compared with the number seen NE of Knife lake

At 230 N. of the lake, the conglomerate strikes N. 55 E and dips 15 S.

28783. Took small piece of a banded cherty fragment here. The conglomerate is here distinctly banded in coarser and finer layers, but even the coarser layers are comparatively fine grained, the pebbles being less than 2 inches across.

From the map we assume that we strike the line at 300 N. of the lake, although no corrections can be found.

At 100 N. in 23 the strike of the conglomerate is N. 70 E. Here somewhat coarser.

At 170 N. the conglomerate is very fine grained, being little more than a coarse grit.

At 400 N. the conglomerate is very coarse, and here there is a great abundance of jasper fragments. Many of the fragments are 6 inches across, and vary from this to disappearance. The average perhaps is 3 inches. Only fairly well rounded. Here also there are large chert fragments reaching five inches in diameter. The granite fragments run up to 12 inches in diameter. The strike is N. 60-70 E.

Beginning at 890 N., the jasper is again abundant, and continues to 1100 N. Much of the jasper is not banded, and is exactly the kind of jasper which I would expect to result from the ferrugination of a chert

At 1300 N., strike N. 40 E.

Same strike to 1775 N.

At 1830 N. is typical banded slate and graywacke, the latter greatly predominating, in large exposure, and running through this is a narrow belt of the typical fine conglomerate identical with that to the south, showing jasper and other fragments, however, very fine grained. Strike is N. 80 E. One and the same series No doubt about it.

1920 N. is graywacke and slate, striking N. 30 E. This is schistosity.

75 N. in 14 is graywacke and a little slate. Strike of banding N. 60 E. Schistosity strikes about N. 25 E.

Continues to 200 N.

350 N. is graywacke-slate, typically banded. Strike of banding is N. 80 E.

Sl 28784. 700 N. in 14 is finely fissile slate, striking N. 65 E., and dipping 20 SE.

Strike lake at 975 N., and offset east 500. This different from topographic map.

70 E. 950 N. in 14 is typical fine grained conglomerate, showing jasper fragments. Moss covered, and no good strike.

~~---950 N., 70 E. ---is typical fine grai-~~

950 N., 300 E. is graywacke.

475 E. Fine grained conglomerate, no strike. Ridge trends N. 20 E.

At 500 E. ran north.

500 E., 1000 N. is a ledge of schistose graywacke. The strike is N. 55 E., and the dip doubtful.

675 E., 1170 N. Strike is N. 80 E. The course is indicated on the map. Strik lake also as indicated. For the entire distance there is rather massive graywacke striking in this direction, which locally becomes a grit or conglomerate. Mostly graywacke, but an occasional band of slate gives the strike.

Continues to the quarter line (See course on map) where we ran south.

At 1000 E., 1600 S. is typical banded graywacke and slate, principally the former, striking N. 65 E.

In general, in the entire northern part of today's run, including the offset, were found frequent exposures of this graywacke. It is a rule fairly massive, though frequently showing schistosity. The dip is uniformly 10° to 15° S.

Continues to 1800 S.

1860 S. is typical conglomerate, rather fine grained, but with typical characters. Here very schistose, with the result that weathering has made a rubble of the weathered surface. Strike of schistosity is N. 55 E., and dip 10 S.

The conglomerate to 300 S. in 23 is fine grained, and in every ledge interbanded with layers of slate and graywacke. Som Some of the ledges present a beautiful banding. The strike is uniformly from 50 to 60 E. of N., and the dip 10° S.

At 300 S. the conglomerate becomes coarser, and here also jasper fragments become plentiful. From here on the conglomerate has less of the interbanded graywacke and slate, and is somewhat coarser as a rule.

The conglomerate continues to 1540 S. The strike is here n. 70 E.

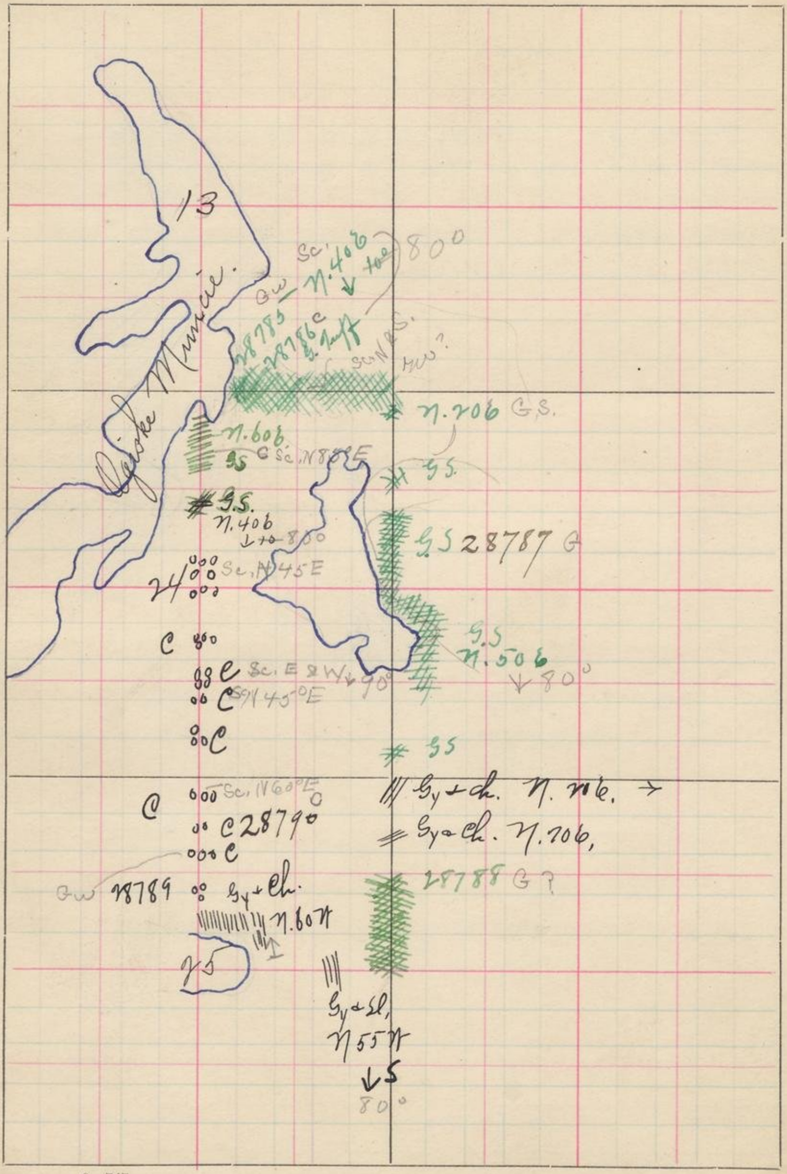
The exposures are not continuous, but are separated by little depressions, mostly marshy. However, the knobs arising from the low ground are so numerous that they must be mapped as continuous.

Continuous to lake, 1600 S.

Reaching lake, worked north shore from quarter line east and northeast to east section line. See plat. The conglomerate continues most of the distance, with uniform strike of N. 45° E to 70 E.m and dip 10° to 15° S. In one place is slate and graywacke, as indicated on map. Same strike.

Forestry. Popple and birch under-growth all day. On the north end of the run was a good deal of small jack pine, ~~rather small~~. Thick alder brush on low ground between knobs.

S. T. 65 R. 6


13
24
25
N.706 G.S.
G.S.
N.606
G.S.
N.406
G.S 28787 G
G.S
N.506
G.S
Sc. E & W
C
C 28790
Gy + Ch. N.706
Gy + Ch. N.706,
28788 G ?
28789
Gy + Ch.
N.60W
Gy + Sl,
N55W
S
80°

Sept. 1, 1898.

Ran east on the north line of 24, from Ogiske Muncie to the northeast corner, then south for 1 1/2 miles.

At the lake is

28785, light green schist, very schistose and very rotten in weathered surface. Strike N. 40 E., dip 10° S.

28786. 150 E. greenstone tuff. Rather massive, but with slight schistosity striking N. 40 E.

Strike the northeast corner of 24 at 950 E. of lake.

Green schist is frequent exposure is crossed for entire distance. However, found no more tuff. The schistosity swings around at 600 E. of the lake, so that it strikes N and S.

120 S. is green schist, striking N. 20 E.

500 S., same thing.

785 S. the greenstone becomes massive, 28787. The ridge has the same general trend.

Strike little lake at 1200 S., and off-

set east 100 paces.

At 1360 S. the strike is N. 50 E., and the dip 10° S. Massive material like 28787.

Continues to 1600 S.

1850 S., same thing. No Strike. Have now gotten back to the line.

At 120 S. in 25 is banded graywacke and black chert, striking n. 20 E. Dip steep to E.

350 S. in 25, same thing, typical. Strike N. 70 E.

28788. 580 S. is a high massive ledge of ~~graywacke or~~ fine-grained greenstone. No strike, but trend of ridge is N. 70 E. This material continues in frequent moss-covered exposures to 1000 S. in 25. Poor exposures. Ledges as a whole are rather massive.

1000 S. in 25, offset west.

1000 S., 50 W., same thing. Strike N. 65 E.

300 W. is typical banded graywacke and chert, no doubt about it. Strike of banding N. 55 W. This rock when compared with

28788 is seen to have more of a gray color. Dip 10° S. The schistosity strikes N. 45 E., therefore across the bedding.

At 1000 S. and 650 W. offset little lake. Typical banded graywacke and chert occupies the shores on east and north. Strike N. 60 W., dip high to N.

Continued west to quarter line, striking it at 1250 N. in 25. Then N. on quarter line.

Same rock continued west to quarter line and then north to 1350 N.

At 1400 N., 1000 W., is conglomerate. Contains so far as I can discover nothing but greenstone(?)fragments. Strike not determinable.
28789 a specimen of this conglomerate.

1600 N. Conglomerate, like 89.

28790. 1700 N., conglomerate. Here, however, there are several kinds of greenstone and also granite(?) pebbles. Looks like the Ogishkie conglomerate. Here, as before, am unable to get strike. It seems to be N. 70 W., from the general [illegible] ridge and from one or two

trend of the ridge, and from one or two doubtful bands.

1940 N., Conglomerate. Strike of schistosity is N. 60 E. Is here very schistose and rotten. Fine grained.

200 N., 1000 W. in 24 is conglomerate, rather fine grained and massive. Same characters.

360 N. 1000 W., same thing. Schistosity strikes N. 45 E.

480 to 530 N., the conglomerate is coarse, the fragments reaching in places six inches in diameter. All greenstone. Could discover no granite fragments. The schistosity strikes approximately east and west. Dip vertical.

750 to 850 N. is typical coarse greenstone conglomerate, no granite. Trend of ridge is N. 30 E. No strike of definite bedding or schistosity.

1060 N., ~~1160~~-- Greenstone conglomerate Schistosity N. 45 E.

1160 N., same thing, with same strike.

1440 N., is green schist, striking N. 40 E. and dipping 10 S. The schist has a rough weathered surface, and looks as though it might be a squeezed greenstone

though it might be a squeezed greenstone conglomerate.

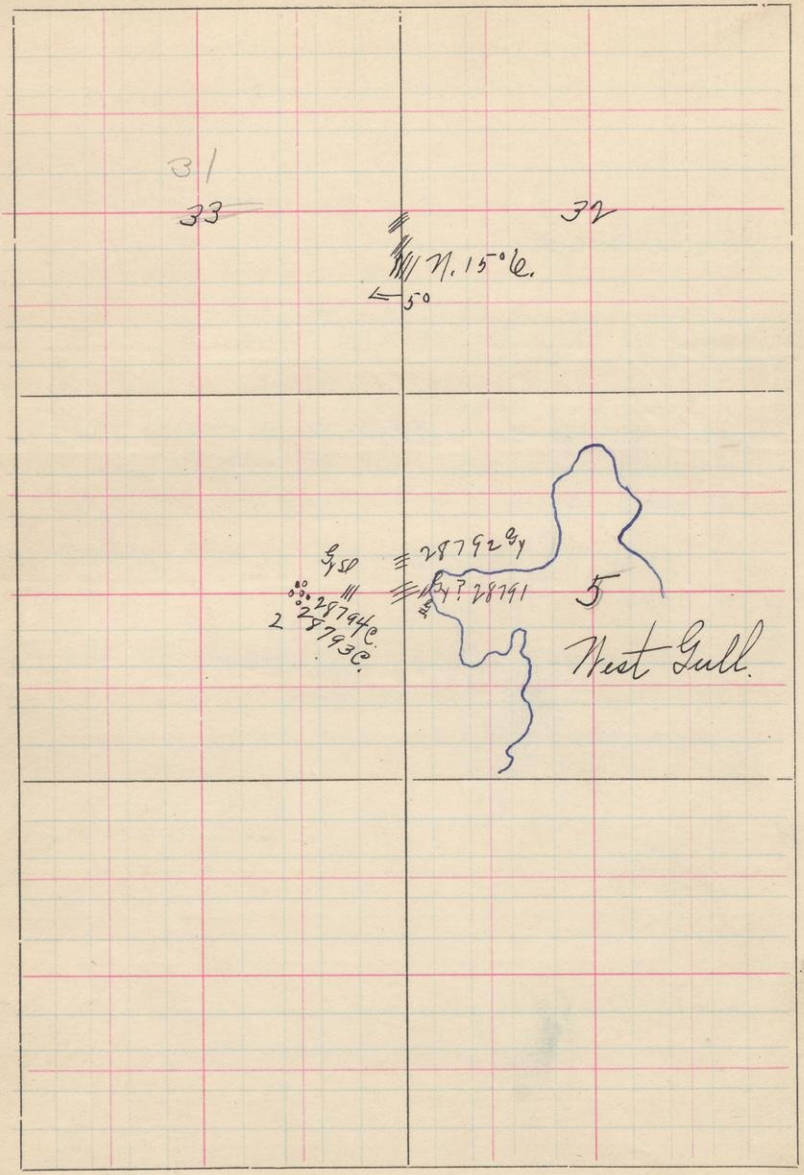
1600 N., is greenstone-schist, more massive than preceding rock.

1640 N., Greenstone tuff, very schistose. N. 85 E. This is a green schist in hand specimen, but on weathered surface is seen to have a brecciated character.

1740 N., the strike of the green schist is here N. 60 E.

The green schist continues to the lake, 1840 N., 1000 W., in 24.

S. T. 65 R. 5



6—747

Sept. 2.

West Gull lake, with Dr. Clements.

Went to north arm of West Gull lake in 5 and ran west to the quarter post, then north on the east line of 6 and 33 to the quarter post of 33, then west 1000 paces, than south to the center of 6, and east again to canoe.

28791. At the quarter post is green schist. Rather massive, and striking N. 30 E. Dip 10 NW.

28792. 1125 N., 0 W., 6 Cherty green schist or slate, I do not know which. Strike N. 30 E., Dip. 10° NW.

Now no exposure until 700 N., 100 E. in 32, where is typical banded graywacke and slate. The banding strikes N. 15 E., and the dip is practically vertical, perhaps 5° to the west.

800 N., 0 W. in 33, same thing.

850 N., 0 W. in 33, same thing, here interbanded with bands of very fine grained conglomerate.

900 to 925 N., Graywacke. N. 15 E.

Throughout the offset and run to the south no exposure whatever was found. The country is flat and open, best running of season.

Reaching the center of 6, offset east to lake.

At 1500 E., 1000 N., in 6 is a fine grained conglomerate, 28793.

28793. Ledge is poorly exposed, moss-covered, and the rock might easily be mistaken for a greenstone-porphyrite. As nearly as I can judge the strike is N. 15 W. This is schistosity. However, the exposure is so poor that I cannot be sure of this strike.

28794. At 560 E. is apparently the same rock, here more decidedly conglomeratic.

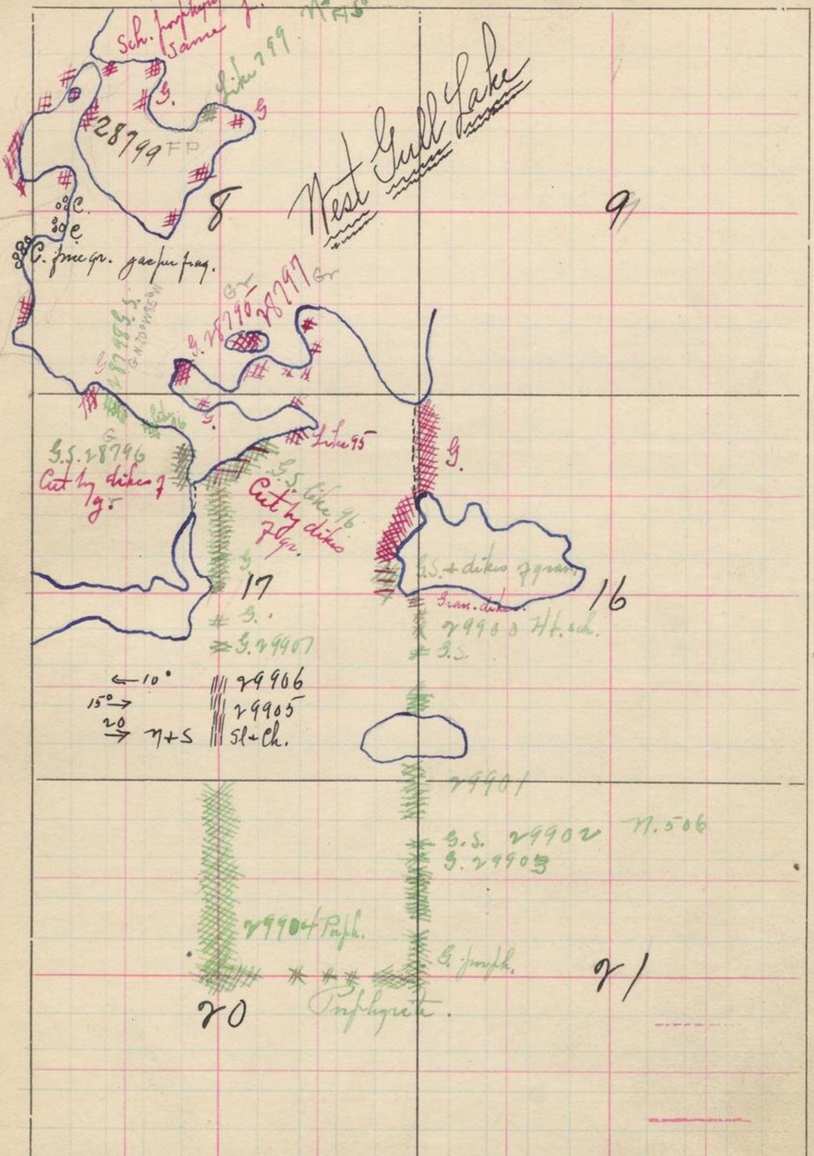
Both of these rocks contain numerous large eyes of quartz.

At 1000 N., 1740 E. is undoubted banded graywacke and chert, white on weathered surface. The banding is somewhat contorted, but in general it strikes N 50 E., and dips 20 S.

At 70 E. of the west quarter post of 5 is a exposure of green schist, like 28791.

Forestry. Small poplar and birch undergrowth and tamarack swamp. No large pine.

S. T. 65 R. 5



Sch. porphyry 28800
Same J.
West Gull Lake
28799 FP
8
9
G.S. 28796
Cut by dikes of gr.
Dike 95
Cut by dikes of gr.
G.S. + dikes of gran.
17
16
Gran. dike
29908 Ht. sch.
G.S. 29907
29906
29905
Sl + Ch.
29901
G.S. 29902
G. 29903
29904 Porph.
G. porph.
20
21
Porphyrite

Sept. 3. Worked part of shore of West Gull lake. See opposite plat.

28795. The typical granite of the lake.

28796. Green schist. In the high ledges overlooking the lake, from the portage trail 100 paces north, is massive greenstone, cut by granite. The greenstone has a slight schistosity striking N and S., and the ridges trend in this direction. In the greenstone are numerous lenses and lenticular layers of granite, similar 28795, and perhaps also dikes. Some of the layers extend for 20 feet and are several feet wide. These are probably dikes, but of this I could not be sure. It looks like a case of intrusion by the granite, and subsequent deformation, resulting in the pinching in of the lense-like areas.

The greenstone varies in amount of schistosity. The dip is practically vertical, ~~and~~- perhaps 5° E.

28797. Granite from the island. Collected by request for Prof. Bayley.

28798. Fine grained green schist. Strike N. 70 W. Dip is 5° W.

28799. A peculiar purplish fine grained rock. This at first glance looks like a porphyry, but on closer examination seems to be fragmental. Some of the dark green areas look like pebbles, but may perfectly well be original.

28800. An altered chloritic schistose porphyry. Strike N. 30 E., and dip 5 W. In going a little farther this rock apparently passes into a grayish and pink granite. Can it be a phase of the granite. Does not seem probable, but I cannot find the break between the two.

Sept. 4.
West Gull lake.

Ran south from the lake on the east line of 17 and 20, 65-5, to the east quarter post of 20, west 1000, and north again to the lake.

From the shore of West Gull lake to the little lake on the east line of 17, is 425 paces, and this distance is entirely granite.

Offset around this little lake. Granite continues until we reach a point 800 S., 175 W. in 17, where green schist is found in a large knob, in about equal quantity with the granite. The granite is in undoubted dikes cutting the greenstone, and is undoubtedly the same granite we have just crossed to the north. No topographic break.

980 S., 0 W. (S. from West Gull lake) is green schist, still containing lenses of the granite. The ledge is moss-covered, so can make little out of it. The strike as nearly as I can judge is E and W.

At 1075 S., 0 W. is green schist containing none of the granite. The rock is cut by several fracture planes. The rock is similar 28796.

1130 S. 0 W. is green schist, striking east and west.

29900. Would call the rock a medium grained hornblende-schist.

200 S. in 20, the same thing.

300 to 370 S., same thing. The strikes as nearly as I can judge are E and W. The dips are practically vertical. The rocks are cut by several fracture planes, with the result that the weathered surfaces are badly broken up.

570 S. same thing. Here strike a creek.

600 to 680 S. is green schist. The rock is rather massive, and is a medium grained ophitic greenstone. Perhaps a dolerite. Similar to, but finer grained than, 29901.

Continues to shore of little lake which is reached at 1770 S.

29901. From the south shore of the little lake in the southeast corner of 17, and to 50 paces south in20. This is a very massive greenstone, similar to the greenstones found south of Knife lake. Ophitic, and shows feldspar reflections.

At 75 S. 0 W. in 20 the greenstone has the pitted weathered surface identical with that of the ridge south of Knife (between Knife and Kekequabic)

At 110 S., the greenstone is porphyritic, with hornblende phnocrysts, identical with the greenstone south of Knife lake.

Continues to 175 S.

B.? 29902. At 290 S. to 325 S., the greenstone is schistose, striking N. 50 E. It is here very rotten and much broken up on weathered surface, indicating that it may be a tuff or a greenstone conglomerate, do not know which Very fine grained.

29903. 400 S. is a fine grained massive greenstone? No strike. Several planes of schistosity.

Continues to 700 S.

765 to 800 S. is a corase porphyritic and ophitic greenstone like 29901, and like the Knife lake greenstone. Continues to the quarter line and to 200 W. on the offset.

For the entire offset there are frequent exposures of the porphyrite, varying only in degree of coarseness. The rock is usually rather massive. It is cut by several planes of schistosity, but I could not determine which was the controlling set

Reaching center of 20, ran north on the quarter line.

The porphyrite continues to 375 N.

29904. Here take a specimen. This is perhaps somewhat finer grained than the average. The porphyritic character is best shown on fresh weathered surface, where moss is torn off.

Material like 29904 continues in very frequent exposure to 2000 N.

At 280 N. in 17 is a moss covered exposure of typical banded graywacke or slate and chert. The strike is exactly N. and s., and the dip is 20 E.

29905. At 325 N. 1000 W. in 17 is the same thing. Same strike, but dip 15 E.

29906. At 485 N. is graywacke-slate? Strike is exactly N and S., and dip 10° W.

Continues to 560 N.

After crossing swamp we reach ridge at 660 N. of

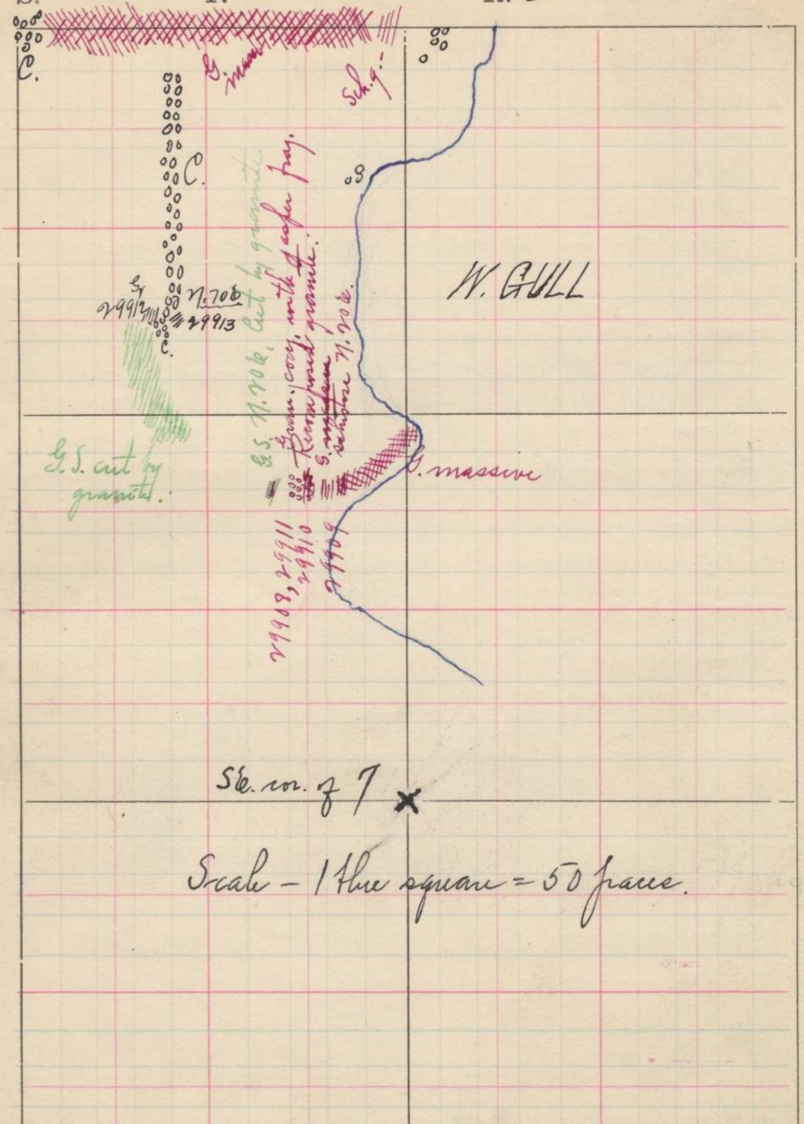
29907. Fine grained greenstone. No strike. Continues to 740 N.

At 900 N. is a small low exposure of greenstone, breaking into rectangular blocks. Similar to 29907.

At 940 N. appears coarse dolerite like that found on the south end of the portage trail near the middle of 17. This material continues to about 1200 N., and commences to take on a schistosity, striking N and S., and from this to N. 30 E. At the shore of West Gull it is the typical green schist like that cut by the granite on the opposite shore. An undoubted gradation from massive to schistose

Strike lake at 1530 N.

S. T. 65 R. 5



Scale 8" = 1 mile

6—747

Sept 4 (Cont)

Went in on point in West Gull where the N and S line between 7 and 8 crosses point (See opposite plat) and ran west.

On the point and for 50 paces inland to the west is the typical granite of the lake. This becomes more schistose, and finally becomes an exceddingly schistose and rotten rock, striking N. 20 E., which continues to 75 paces inland.

Then, within 20 feet, appears recomposed granite, with identically the same strike. This rock has jasper fragments, but it is composed mainly of material derived from the granite, and might on hasty examination be taken for a schistose granite.

Compassman looked up corner, and his pacing places this recomposed material at 100 W., 400 N. of the SE corner of the section.

29909. Specimen of the schistose granite from nearest the contact.

29910. The recomposed material from just the other side of the contact.

29911. Taken within a few inches of 29910, and shows a decided conglomeratic character.

The recomposed rock is mixed with bowlders of material exactly like itself.

29908 is a pebble of what I would call the recomposed material, and also one of slate knocked out of the same rock from which 29910 and 29911 were taken.

15 paces farther west is the typical fine grained conglomerate, like that at camp, with bright red jasper fragments. Dr. Clements has specimen.

This conglomerate is followed to within five paces of the green schist cut by granite, which is struck at 410 N., 170 W. (See plat for course) Strike N. 20 E.

Greenstone cut by granite continues to N as indicated on plat. Course controlled by topography.

At 640 N., 325 W., strike belt of conglomerate again. This conglomerate is coarse grained, and contains a great deal of jasper.

On the western part of this ledge is

29912, graywacke? Relations obscure.

29913, jasper fragments in the conglomerate. Strike is N. 70 E. In going north the conglomerate continues and becomes exceedingly fine grained, resembling re-

composed granite.

The relations of the green schist, conglomerate and 29912, graywacke?, at this point are obscure. The greenstone and conglomerate are separated by a slight depression, but the conglomerate and graywacke are in the same ledge. It is too late in the afternoon to follow the contact of the green schist and the conglomerate any distance. For 150 paces there is this depression.

The conglomerate continues to 850 N., 300 W. , becoming coarser grained, and also becoming interbanded with graywacke and slate. The strike of the banding here strikes N. 25 W.

Continues to 950 N.

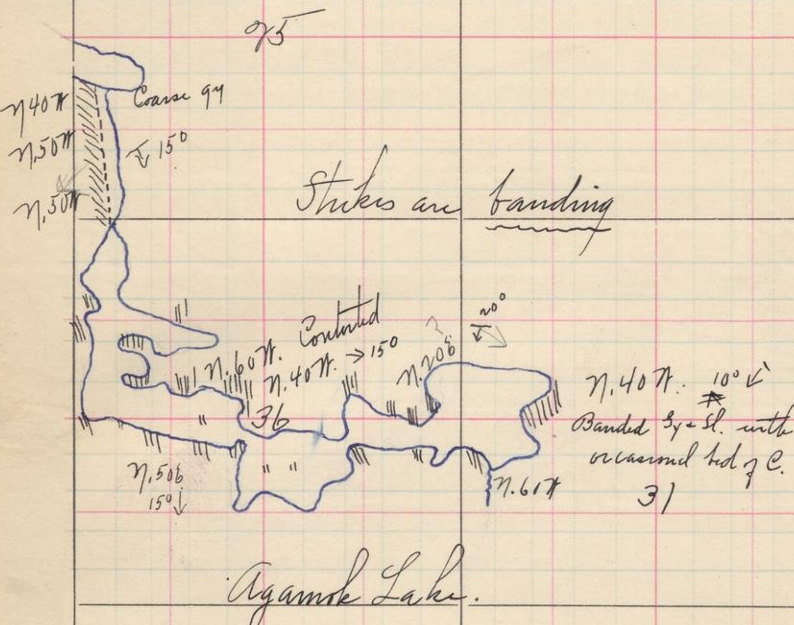
At 1000 N. strike massive granite.

This is a part of the granite tongue swining down from the north (See Clements' map). Ran west to find the western edge of the tongue, and found it at 490 W. of the line, striking conglomerate again at that point.

Now running east to camp of West Gull schistose granite is found following the massive granite just before the east line of the section is reached. Just a few paces beyond the conglomerate is found.

Forestry. All around Gull lake we ran in popple and birch undergrowth. South of the lake about a mile we got into standing jack pine, rather poor.

S. T. 65 R. 6



95
N40W
N.50W
N.50W
Coarse gr
15°
Strikes are banding
N.60W. Contorted
N.40W. → 15°
N.20E
20°
36
N.40W. 10°
Banded Gy + Sl. with occasional bed of C.
N.50E
15°
N.61W
31
Agamok Lake.

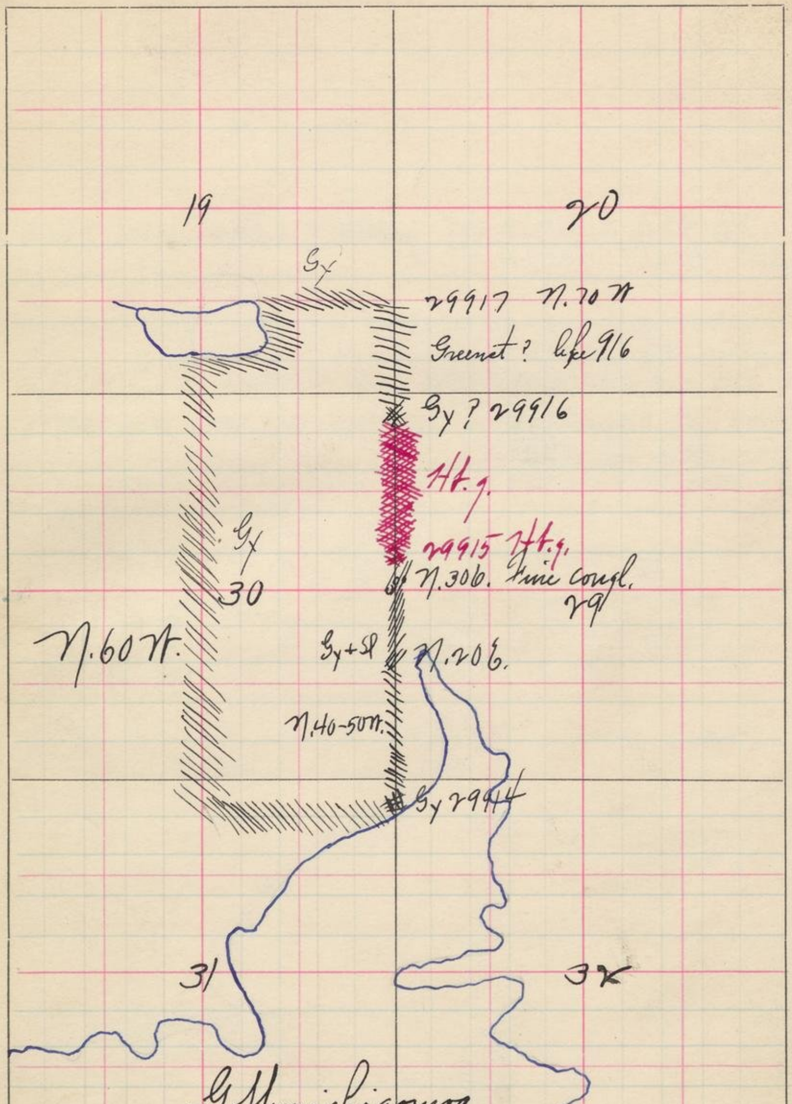
Sept. 7.

Worked shores of Agamok lake, and portage trail north of it.

All shores occupied by typical banded graywacke-slate and chert, striking N. 20 to 60° W. Dip are to southwest from 15 to 20, but in one or two places they are to the E.

Results detailed on opposite plat.

S. T. 65 R. 5



19
20
Gy
29917 N. 70 W
Greenst? like 916
Gy? 29916
Ht. q.
29915 Ht. q.
Gy
N. 30 E. Fine congl.
30
29
N. 60 W.
Gy + Sl
N. 20 E.
N. 40-50 W.
Gy 29914
31
32
Gogomichigomog.

6—747

Sept. 8.

Ran north on the east line of 31, 30, and 19 to the eighth line of 19, then west 1000 paces, and back to the north eighth line of 31.

29914. At the shore is rather massive altered graywacke. Has several planes of schistosity, but none apparently controls.

This material continues N. to 680 N. in 30.

The corner of 30 is found 200 paces N. of the lake.

At about the south line of 30, the graywacke commences to show banding with cherty slate, though very slightly. The strike as far as 600 N. in 30, is N. 40 to 50 W.

At 680 N. the strike is N. 20 E. The dip is W. at steep angle.

Continues to 1030 N , with same strike, N. 20 to 30 E. At 900 it is very coarse and massive.

At 1030 the rock becomes a coarse grit, or fine grained conglomerate, showing usual characters. This interbanded with graywacke. Strike N. 30 E.

This is outlier or loss?

Gab. 29915. At 1100 N. is a massive exposure of hornblende granite. No relations. This material in large massive exposures is followed continuously to 1800 N. The rockis very fresh and massive, and has no planes of fracture. Looks later than other rocks crossed.

Grw 29916. At 1860 N , is fine grained green stone or graywacke, which continues to 1960 N.

At 2000 N. is banded graywacke and slate, striking N. 70 W., and dipping S. The coarser material is similar to 29916. If 29916 is greenstone, then this material is banded coarse and fine greenstone.

Material like 29916, showing even banding, continues to 400 N. in 19.

Sl & grw 29917 . At 470 N. in 19 is what I would call graywacke and slate. Slightly banded, with strike N. 70 W.

Banded graywacke and slate continues W. to the quarter line.

At 750 W. offset lake, to 350 S. of course. At 350 W. the graywacke and slate are typically banded material, striking N 60 W. There can be no doubt as to their character. However, from here on the rock is a very massive one, like 29917.

and it may possibly be a greenstone, though I do not think so.

All the way south on the quarter line to 200 S. in 31, and then east to the lake, is graywacke-slate. To 1000 S. in 30, the material is rarely banded, and is like 29916. From here on to 1500 S., it is a beautifully banded graywacke and slate, typical, striking N. 60 W.

From here to 200 S. in 31, the rock is a graywacke, like 29914, although in places banded so as to show its character.