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Notes on the Vermilion Iron Range, Minnesota: [specimens] 27179-27199, 27700-27756. No. 304 1897

Clements, J. Morgan (Julius Morgan), 1869-
[s.l.]: [s.n.], 1897

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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 $2 \times 2\frac{1}{2} \times \frac{1}{4}$ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of $3 \times 4 \times 1$ inches, must be selected, in accordance with 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.

No. 3

Sec. No 27179 - 27199 incl.

27700 - 27756.

Book 304

Notes
on the
Vermilion Iron Range,
Minnesota.

J. Morgan Clements
1897.

S. 35/34 T. 63

R. 13

Cor.

✓

Cor.

6-717

5(2)

H. si

H. Di. Se

H. S. W. si

H. si

3.6

H. si

H. si

H. si

H. si

27179

H. Di. Se

H. Di. Se

H. Di. Se

Cor.

36

21

21

21

21

27179

N1300 W 0 Sec. 35-63-13

Running N. on Sec. line
between 35/34 have frayed several
outcrops of massive and schistose
dolomite. Schistose form is intricately
mixed with massive that can't
tell relations accurately. Apparently
schistose along shearing planes.
Specimen taken at above location

N1875 W 1000 Sec. 35-63-13

In a N-S trench there is exposed
at this place a ledge of ferruginous
chert - not gasper. Not well banded
but exposure - 20 feet S-W - shows
chiefly mass of white chert ferruginous
in patches of irregular outthrust and
distribution

301

27180

N1500 W 280 SE Cor. Sec. 26-63-13

Ledge of greenstone or schistose along
shearing planes.

9.
SW?

27181

N1350 W 1000 Sec. 26-63-13

High ridge of what seems to be a
quartzitic rock. Possibly a fragment
of the U. H.? Schistosity strikes N75°E, dips 60°S.

3

S. 26/25-T. 63

R. 13

Cor

Cor

6-717

Bumtako River

4.50
271204.50
27120

4.50 27151

4.50 27151

4.50 27152

4.50

2.6

Cor

Cor.

6-1
271
5271
271

4

271

Q. P?

27182

N 1170 W 1000 Sec. 26-63-13

Small exposure in S. side of hill of a
quartz porphyry (or quartzite?).

S. side of S.

27183

N 1700 W 1000 SE Cor. Sec. 2-62-13

(a+b)

Large hill, short distance N. of R.R.
track, composed of coarse dolomite
and also fine grained facies with
schistose varieties. Specimen shows
schistose dolomite. The elongated hornblende
areas are especially well shown on
the weathered surface.

S.L.

27184-5

N 1500 W 1000

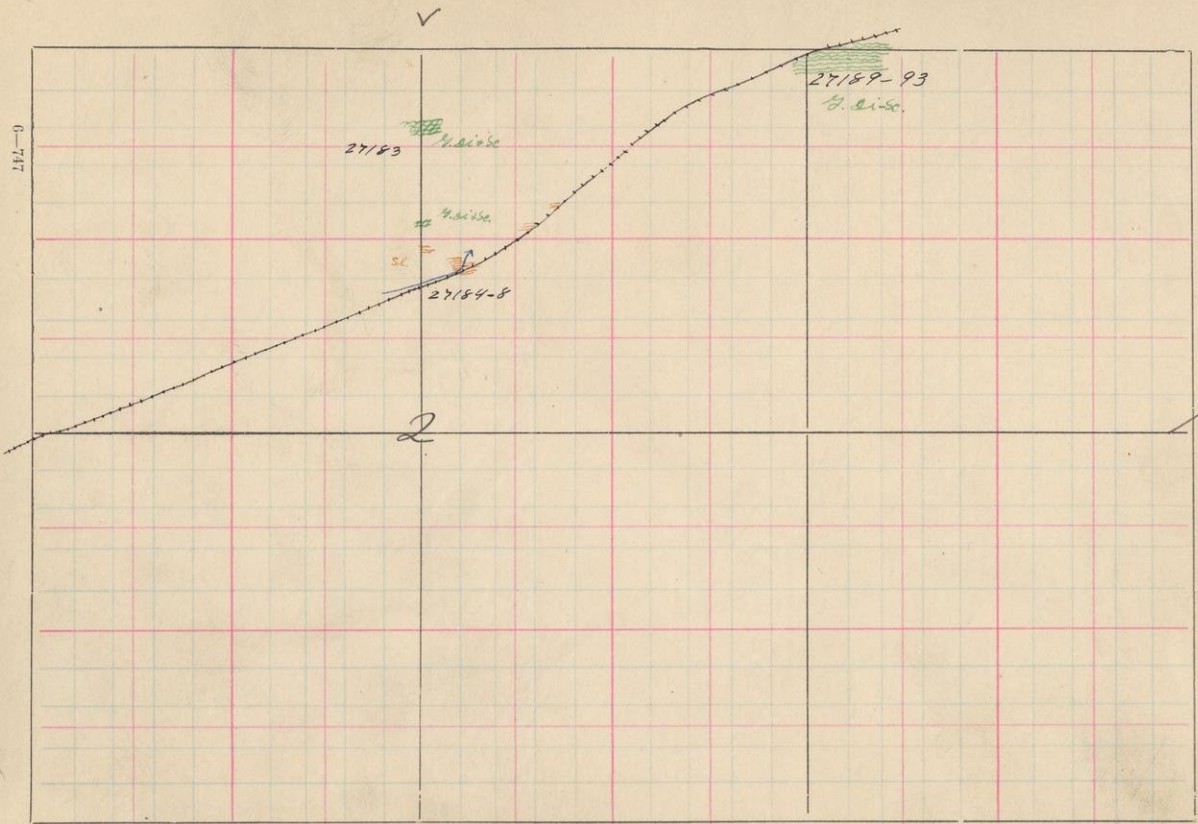
6-7

At foot of hill on which dolomite occurs,
and about 100 paces W. of the R.R.,
there is now a very broken exposure
of E-W striking rock like 27184.

About 100 paces E of this point & to S.
an exposure of interbedded gray slate 27185
and of quartzite 27186 begins. It is
best seen in artificial channel of
small stream near R.R.

Interbedded with the slates there are
thin seams of carbonaceous slate
and very siliceous slaty rock like 27187
Carbonaceous seams usually next to

5-
S. 2/1 T. 62 R. 13



6

the siliceous rock and it can
still be seen on facing spec. 27187
Rocks badly contorted but general
strike is E-W and dip 80°S-90°
Good exposures showing contortions
of bands shown in R.R. cut.
Cross section seen in bank of small
stream N. of R.R.

27188 Abt. N 14²⁵° W 875 - sec. 2-62-13
Near E. end of above R.R. cut there
is found a very peculiar rock
interbedded with the sedimentaries.
It is schistose. Schistosity agrees with
strike of sedimentaries. This rock has
eyes of Chlorite in it and seems
to be perhaps a more altered
phase of dolomite than 27183 is.
Chlorite replacing the hornblende
(uralite) which replaced the augite.

Slates like 27184+5 are exposed
in cuts between above location and
W. end of R.R. bridge.

7

S.

T.

R.

2718.

[illegible]

27189-90-3

N1980-2000 W O. S. E. Co. Sec. 2-62-13

Near the E. end of R. R. bridge just beyond bridge-tenders house there is a R. R. cut in which the rocks represented by the specimens occur.

Blasting operations have exposed very fresh rocks.

The most of the exposure is made up of a rock exactly like 27189 except much fresher. I took several specimens showing slightly different phases 27189-90 and stages of alteration.

This coarse grained rock passes over into a schistose chlorite schist variety 27191 which is in places along exclusively foliated 27192.

There is a banding to these rocks which strikes $N70^{\circ}E$ and is on edge. 27193 is a specimen of a band which is perhaps but a phase of 27189 intermediate in alteration between 27189 + 27192.

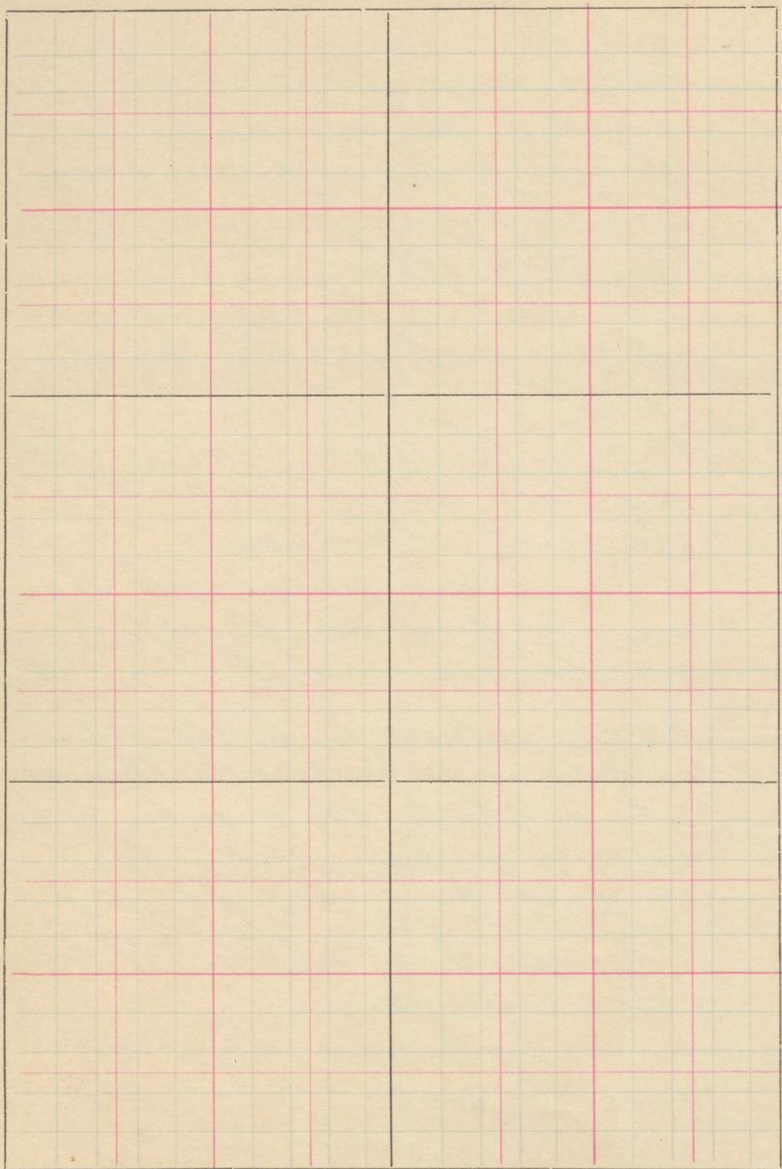
These rocks especially 27189 resemble quite a great deal the rocks seen some time ago in the R. R. cut near Murray.

9

S.

T.

R.

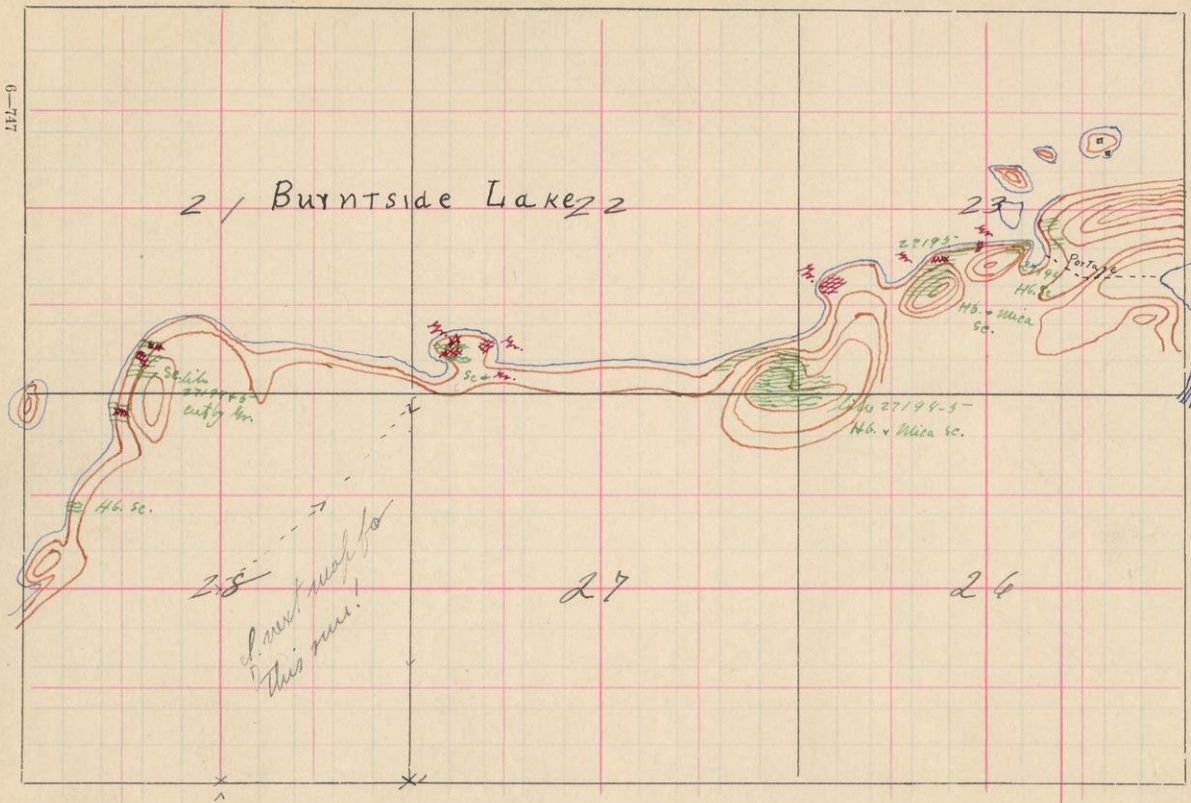


10

Compare those specimens No. 27143-
with No. 27189-93.

These should all be studied
with spec. 27183 and 88 which
may show extreme sclerotic phases.

11 S. T. 63 R. 13



6-7417

27 Hb

27 Hb

Began this morning to study the S. shore of Burnside lake west of portage into the lake from Burnside river. Locations of specimens taken can be seen from accompanying map.

Hb.S.
27194

At end of portage, and also forming 1st point west of portage, the rock is a coarse grained hornblende schist 27194 varying into more massive doleritic facies.

Hb.M.S.
27195

At 2nd point west of portage ~~end~~. a mica-hornblende schist 27195 begins. Schistosity strikes N80°W + dips 50°S. Imperfect banding of rock is shown by its ridgy weathering. These bands strike in agreement with schistosity. Rock cut by ~~dikes~~ of medium grained granite and traversed also by veins of quartz.

As we go west the two schists 27194 + 5 are found intimately associated so that I can't tell where one ends and other begins. Upon examination of more

14

exposures it seems to me that 27194 & 5 - grade into one another and both of them are probably derived from basic igneous rocks.

All along the shore the schists are cut by granite dykes.

Upon reaching the N. cor. Secs. 28/27, which is on the lake shore, I left the canoe and ran south along the section line for a mile - very nearly to Burnside river that is down to the swamp which borders it.

Just after leaving the lake shore we ascended a hill with numerous exposures on it of schists like 27194-5 -

At

S.S.
27196

N 1675 W O SE. cor. Sec. 28-63-13
we come to exposure of coarse schistose dolomite.

Small exposures of rocks like 27194 & 6 are very common. There is then outcrop of 27195, the fine grained schist.

N 700 W O Sec. 28-63-13

Here one can see that 27196 is

intrusive in the schists.

South of this last outcrop we find no more rock in situ but cross unmistakable drift hills and continue on down to corner on edge of swamp N. of Bemtids river. Ran W., chiefly through swamp, for $\frac{1}{2}$ mile then N. Going N. we pass over very many outcrop of schists like 28194-5. From center of Sec. 28 ran NE back to starting point crossing exposures chiefly of schists like 28194-5 with occasionally one of 28196.

The last two miles of the run were made in a drenching rain.

On reaching our canoe we continue coasting W. along the south shore and pass exposures of the schists cut by granite dykes.

Near $\frac{1}{4}$ point between Sec. 28 & 28.63-13 there is a very good exposure on the shore where one can get the strike of the schists; $N 80^{\circ} W$, dip schistosity $50^{\circ} S$. Cut by numerous granite dykes.

It is to be noticed that but one

17

S.

T.

R.

[illegible]

granite dyke was seen on the
run across section 28-6319.
This was due partly perhaps to
fragmentary character of exposures
but perhaps more to their
actual scarcity. I believe this
last to be true and to be due
perhaps to the increasing distance
from the contact between the
schists and a mass of granite
which probably lies to the north
of us. Lake shore (S.) probably near contact line.

Encamped for the night
on pine covered island N.W. of
N. Cor. 28-29. Rained nearly all
night.

Continued my studies of the S. & W
shore this morning. Exposures are
of the same schists 27194 & 5 as
those seen yesterday.

Hb. Sc.
27197

Specimen taken just before reaching
outlet of lake, Brumby's river. Rock
appears to be same kind of schist
as those farther E.

Em.
27198

Specimen of medium grained granite
which cuts the hornblende schists.

19

22.

T.

R.

[illegible]

The finer grained form of schist 22195 seems to be the most common form & the granite occurs chiefly in it.

Wherever it was possible to get the strike of the schistosity along the S. shore it was about S.W. (N 80° W).

As soon as we turn to go N. along west end of the lake the strike is found to be chiefly S.W.-N.E. even to S of S.W. Dip is 70°-80° N.

As we go N. ^{along W. shore} the granite becomes for more common than it was on S. shore and usually forms the salients (schist not exposed - perhaps forms the reentrants).

Schist is completely cut up by granite and as we run along NW part of this west end ^{Co.} of lake it ^{granite} becomes to predominate over the schist. Schist included in the granite is in angular fragments most in round cornered resorbed pieces. The dykes of granite vary very much in size. The granite varies also in color from white to pink and reddish. It may be

21 S. T. 63 R. 13

14

13

Burntside Lake

2

24

sc. lib. 27194
cut by gr. lib. 27198

portage

that there are granite dykes in the complex of different ages but I obtained no proof of this.

Sunshine and showers have attenuated thus far this forenoon. We now return to the portage and coast east of the portage along the lake shore.

Humboldt schist ^(i.e. slope of) lies 22194+5- are exposed near portage and are cut by granite ²²¹⁹⁸.

Soon however the schist disappears and granite is the only rock exposed along the shore.

We return to the portage and are caught in the rain before we make the portage into Buntrock river. Going down the river we enter Long Lake, cross it and return to main camp on R.R. 2 mi. west of Ely.

23

S. 31/32 T. 63

R. 12

Cor.

Cor.

6-2717

31

32

Δ Δ K.S.G.S.
 Δ Δ Camp

H. di.

H. di.

Cor.

Cor.

Running S. through
Section 31, as indicated,
we pass over knobs, on edge and
top of hills, of a fine grained
greenstone intersected by quartz
and epidote veins.

M.S.
27701

N 45° W 20 Sec. 6-62-12

Small surface exposure of exceedingly sheared and plicated greenstone tuff (?).

sl. exp.
27702-3 N 98° W ¹⁹⁷⁵~~26~~ Sec. ⁵~~8~~-62-12

Small exposure of a banded rock 27702 interbedded with greenstone tuff 27703. 27703 is probably but a coarser phase of tuff than 27702. This fine grained slaty facies is much plicated.

General strike N 75° E, dip 75° S.

Axes of plication strike about N 45° E and plunge at angle of about 50° some to SW other NE.

Running S. along $\frac{1}{4}$ line Sec. 7
we pass a number of outcrops of
basic enclaves chiefly medium grained
dolerite. In one place the dolerite is cut
by dyke of quartz porphyry.

NO W 960 S. 7-62-12

Small exposure of gneiss with green-
stone lying to S. of it. Strike of gneiss
bands $N70^{\circ}E$, dip $85^{\circ}S$.

We now go around NE end of lake
forming exposures of granite + of
ellipsoidal basalt, last cut by
fine grained granite.

NO W 200 Sec. 7-62-12

Gneiss striking $N70^{\circ}E$, dipping $80^{\circ}S-90^{\circ}$
Cut by parallel injections of granite
along bands. Gneiss plicated. Axes of plications
strike about $N45^{\circ}E$ + plunge NE + SW at 50° .

S.S.

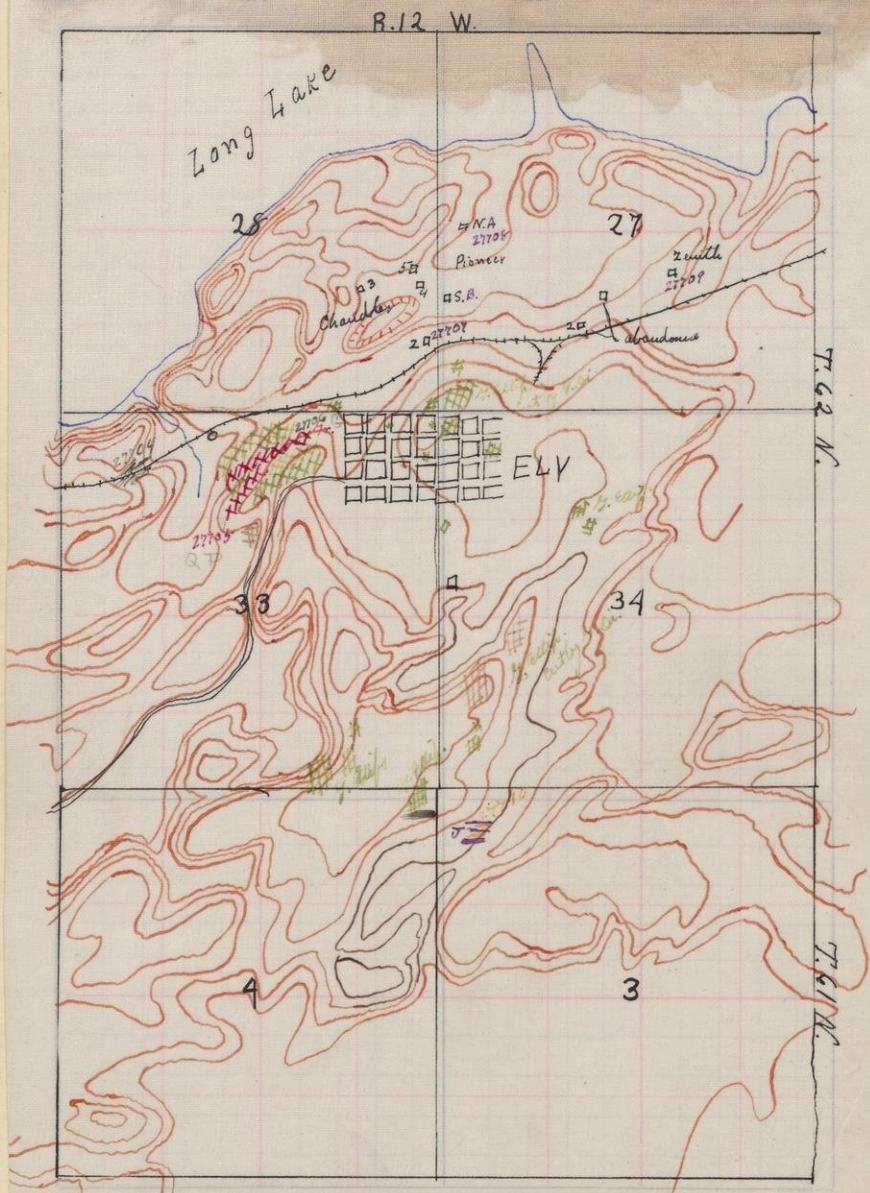
27199+

27700

NO W 0 SE. Cor. Sec. 7-62-12.

Corner is on ledge of fine gr. ²⁷¹⁹⁹gneiss.
Has band of rock running through it (NE-W)
which is about 18 inches wide + weathers
like a fragment of 27700. Strike $N70^{\circ}E$.

29



Was sent out this morning
to study the country in vicinity
of Ely and to the S. of the R.R.
track. Also to collect typical
specimens of ore from the various
mines at Ely.

S.A.

27704

Just W. of the water tank the
R.R. is in a cut in a schistose
greenstone (graywacke?) followed
to E + SE by medium to fine
grained basalt.

After passing the tank
I go south and study the
low hills which lie W. of Ely.

The predominant rock in the
exposures is an ellipsoidal
basalt with well characterized
ellipsoids & marked amygdaloidal
character. Especially on N
flank of hill schistose phases
of basalt are seen. Strike of
schistosity NE-SW. Ellipsoidal
basalt has brownish weathering
crust and a rough sandy surface.

Near the top of the hill
a medium to fine grained dolerite.

Blank Odd Pages

31-41

Skipped

Q.P.

27705

S. of
Robinson

cuts the ellipsoidal basalt and is in its turn cut by a white weathering quartz porphyry (granite) 27705. This is the same kind of granite as that seen very frequently on the ridge west of Ben cutting the greenstones and commonly associated with a pinkish weathering granite in large masses of which the white dykes seem to be offshoots.

h.
27706

In one place between the dolomite and ellipsoidal basalt a rock was seen 27706 which on surface seems conglomeratic. Rock is schistose, schistosity strikes NE-SW, and contains small rounded pieces up to 4" diameter of amygdaloidal basalt. Long direction of the pieces agrees with strike of schistosity. Probably is a bed of tuff associated with the ellipsoidal lava flow.

The various kinds of rock could only be mapped in detail on very large scale. Relations between them are clear and seem to be as follows.

Lava flows of ellipsoidal basalt accompanied by some tuff were produced. They were marked and schistosity was produced along certain lines, especially in the tuff beds, that is along lines of weakness. The volcanics were intruded by a dolomite which was in its turn cut by a granite.

Relations between the dolomite and the ellipsoidal lavas can be best seen on vacant lots back of church near corner between Secs. ^{28/27} 33/34

The ellipsoidal basalt was studied with view to determining the origin of the ellipsoids. These ellipsoids show more or less marked peripheral irregularities but show oval character very generally. I can find no evidence that the ellipsoids were here have been produced by shearing hexagonal columns (cf. G. A. Smith).

The amygdalae are in some cases

scattered all through the body of the ellipsoidal ~~quartz~~ ^{concomitant} they are confined chiefly to continuous zones around outside of ellipsoids. First appearance might be produced by tangential sections through amygdaloidal periphery of ellipsoids.

On the terrace at foot of steep incline leading up to cemetery and to clay pigeon shooting stand the relation between the ordinary non-ellipsoidal and ellipsoidal basalt is very clearly shown. Going south across a surface exposure the following succession N-S. is noted: Ellipsoidal basalt, ^(15 feet N-S.) ~~discontinuity~~ non-ellipsoidal then ellipsoidal basalt again.

But for the ellipsoidal parting the rocks are the same.

Contact between the rocks trends about NE. and long direction of ellipsoids agrees with this. The contact line is wavy and amygdaloids are collected on the

edges of the rock waves. In the ellipsoids the amygdulæ are around the edges.

It looks to me as though we have here the fringe of a dense massive basalt ^{flow} ~~fract~~ are ellipsoidal basalt both above and below.

The non ellipsoidal basalt is not a dyke but apparently is exactly the same as the ellipsoidal facies N + S. of it

The following sketch represents the appearance of the surface exposure in a schematic way.



At edge of  massive flow it looks as though the blocks were only half formed remaining attached to the lava stream by the remaining half.

1.0.

27707

Are from stock pile of Chandler mine shaft No. 2. Are from Nos. 3 + 4 is exactly the same in physical character. All show in places brecciation and

cementation of fragments
but no conglomeratic pieces
were seen.

I.O.
27708

Ore from Pioneer mine N. or A.
shaft. Ore for B. or S. shaft is
same. Ore from old abandoned
shaft was also same except that
it contained rather more rock
when ready for shipment and
therefore ran higher in Si & Al. and
lower in Fe. This due to fact
that in old mine ore was present
in small bodies & rock was mixed
with it in mining.

Ore from all of the mines has
a more or less drusy character.

I.O.
27709

Ore from Zenith mine.

The ores from all of the Ely
mines are just about the
same.

Run south along section line
from cor. Secs. $\frac{28-27}{33-34}$. Exposures of
basalt (sillifoidal) cut by dolerite

are common near the corner and then disappear when we cross the low ground. They appear again near the corner one mile south.

R.S.

27710

about

N 165° W 185° SE. Cor. Sec. 3-6 2-12

There is an exposure of banded, schistose rock 27710 just before swamp is reached. An old wood road crosses near it. Strike of bands about S-W (no sure), dip 80°.

Schistosity agrees with banding. This is cut by a coarse dolomite dyke. About 20 paces across schist exposure.

This schist is followed to the S. by banded gneiss. Contact is covered.

Strike of bands same as schist dips 70° N. Gneiss exposed for 25 paces N.S. About 20 feet of schist like 27710 comes next and is followed by small gneiss exposure.

Rain began to fall heavily and not being able to get rain to aid in the gneiss area I quit work and went back to camp.

43 S. 21/22 T. 63 R. 12

Cor.

Cor.

Cor.

4. Si. Coars

4. Si. Coars

4. Si. med. fine

4. Ell. s. r. Var.

4. Si. Coars

4. Ellip. + var.

4. Ellip.

4. dense

4. Ellip. + variegatic

4. Ellip. + var.

4. Ellip. + var.

4. Ellip. + var.

27711-2

4. Si. Coars

4. Se.

4. Se.

4. Tuff. = Se. N 75° E

27716- N 75° E

Long Lake

Cor.

6-717

21

Began work on N.
shore of Long lake. Ran N.
along section line between
secs. 21/22.

N660W0 Sec. 21-63-12

Ascend s-w ridge of schistose greenstone
(tuff?). Schistosity strikes N75°E, dip 90°.

b.c.l.g.

Cross valley and at

27711-2 N1075W0 Sec. 21-63-12

reach foot of cliff with talus.

Cliff formed of dense ellipsoidal
greenstone ranging to rock like

27711. In places it is variolitic
as shown in specimen. A small

27712

(camptonite) dyke 3 inches wide 27712
cuts the variolite.

In some of the ellipsoids the variolite
occur all over the ellipsoid although
most commonly they are confined
to a peripheral zone. Are not
the first kind merely tangential
sections through the normal
ellipsoid with peripheral variolite?

The variolite continues in discon-
nected exposures for some distance. At about
N1400W0 variolite were seen 1" in diameter

Cor.

4. Si coarse

4. Si

Q.R.

2. dense cut by Q.P.

4. Si fine cut by 4. Si coarse

4. Si coarse

4. Si coarse

4. Si coarse

C. Silica 2743

4. Si coarse

4. Si coarse

Q.P.

4. Si coarse

2773C

4. Si coarse

Cor.

1

V

4. Si coarse

4. Si fine to med.

4. Si coarse

4. Si coarse

4. Si fine

4. Si var.
Sp.

4. Si coarse

4. Si coarse

45-
S. 16/15-
T. 63

R. 12

Cor.

N1600 W 0 Sec. 21-63-12

Here begins an exposure of coarse grained dolomite which continues to valley at about N1800.

N1880 W 0 Sec. 21-63-12

Come to wall on N. side of narrow valley of fine to ^{coarse} medium grained dolomite which grades as we go W. into a coarse dolomite. Is the fine grained rock a sandstone? Valley then probably represents line of contact but with what? Dolomite that occurs to S. or does valley mark position of some easily eroded sediment or other kind of rock? Cf. traverse to W.

b.c.

27713

N225 W 0 Sec. 16-63-12

Beginning of exposure of ^{quartz} coarse glomerate or of an ^{acid} tuffaceous rock. Pebbles are small and are of a white weathery flinty looking rock probably a quartz porphyry.

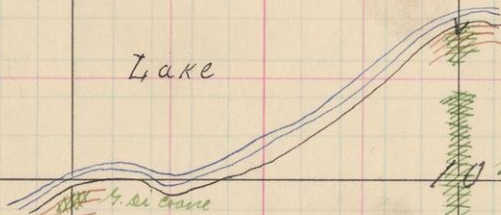
Pieces of chert also occur, one piece 4 inches long & 1 inch wide. Long direction of fragments E-W.

Cor.

6-1717

9

Lake



Cor.

41
Cor. S 9/10 T. 63 R. 12

38

4. di.
cone

4. di.
cone cut by R.P.

like
27713

N 1080 W 0 Sec. 16-63-12

Exposure of conglomerate like 27713
occurs here.

h. gl. sp.

27714a

h. c. d. e.

N 350 W 0 Sec 9-63-12

At this point on south
side of a prominent nearly low
hill there begins an exposure of
a moderately fine ellipsoidal
and variolitic dolomite like 27711.
This grades up into a true
coarse grained dolomite which
occupies the top of the hill and
is ellipsoidal and variolitic.
Schistose material between the
ellipsoids has in places a
more or less brecciated appearance.
Schistose portion from 1-3 inches
wide. It seems from this
outcrop that the largest variols
are near the centres of the ellipsoids
and the smallest ones on the
periphery. Specimens numbered
27714 illustrate matrix and
variolitic ellipsoids.

49
Cor. S. 27/26 T. 63

12
R.

Co.

Cor.
v

Cor.

6—747

27

26

4. Ellip.

G. ellipt.

G. Ellip. 

~~1111~~ 4. 21. 11.

Y. Ellis.

~~1881~~ G. Ellip.

Y. si. card
1848

27715

N700 W 1000 Sec. 22-63-12

Exposure of a green schist showing imperfect banding striking N75°E, dipping 90°. Streaks of bands agree with streaks of schistosity.

Began at S.W. cor. Sec. ^{63/12} 26 to run south. N + W of this point is Sec. 27. There are exposures of ellipsoidal basalt with some medium grained dolomite.

A N-S. traverse through Sec. 26 and along 1/4 line shows the ellipsoidal basalt to be the prominent rocks south of the R.R. track, at least, where I ended my traverse.

Going S. along sec. line
between 34/35 we pass several
exposures of ellipsoidal basalt &
dolomite and in one place there
is an exposure of greenstone tuff.

Exposures are more common
along sec. line between 3/2-62-12

1, 5

27716 N 1900 W 75- Sec. 3-62-12

Pit in Jasper. Ledge of jasper
exposed just to S. of pit. Strata of
bands N 80° W, dip 80° N. There are thin
chloritic layer 27716 alternating
with the jasper bands. Entire
exposure about 30 feet across N-S.

B.S.

27717 N 1740 W 225 Sec. 3-62-12

S. W. banded rock like specimen.
Probably same kind of rock as
that found associated with jasper
west of here cf. spec. 27710. Tuff?

B.S.

27718-9 N 1570 W 0 - Sec. 3-62-12

Free (sedimentary?) rock cut by 27718
dark green enigmatic 27719. Can't be sure
of bedding in 27718. Seems somewhat
tufaceous. 27719 covered with projecting mag. str.

From about N 400 on down along section line to 1/4 P. there are numerous exposures of dark grey to green rock with irregular schlieren & bands, flowage lines, and usually with more or less perfectly preserved amygdaloidal and ellipsoidal structure. This is one of the best places I have seen in which to note the volcanic character of these rocks which are now more or less completely schistose and have been called hornblende & mica schists. These schistose volcanics are cut by dykes which vary in size from very small ones, usually white, to those much larger which are pink or reddish.

Hb. S.

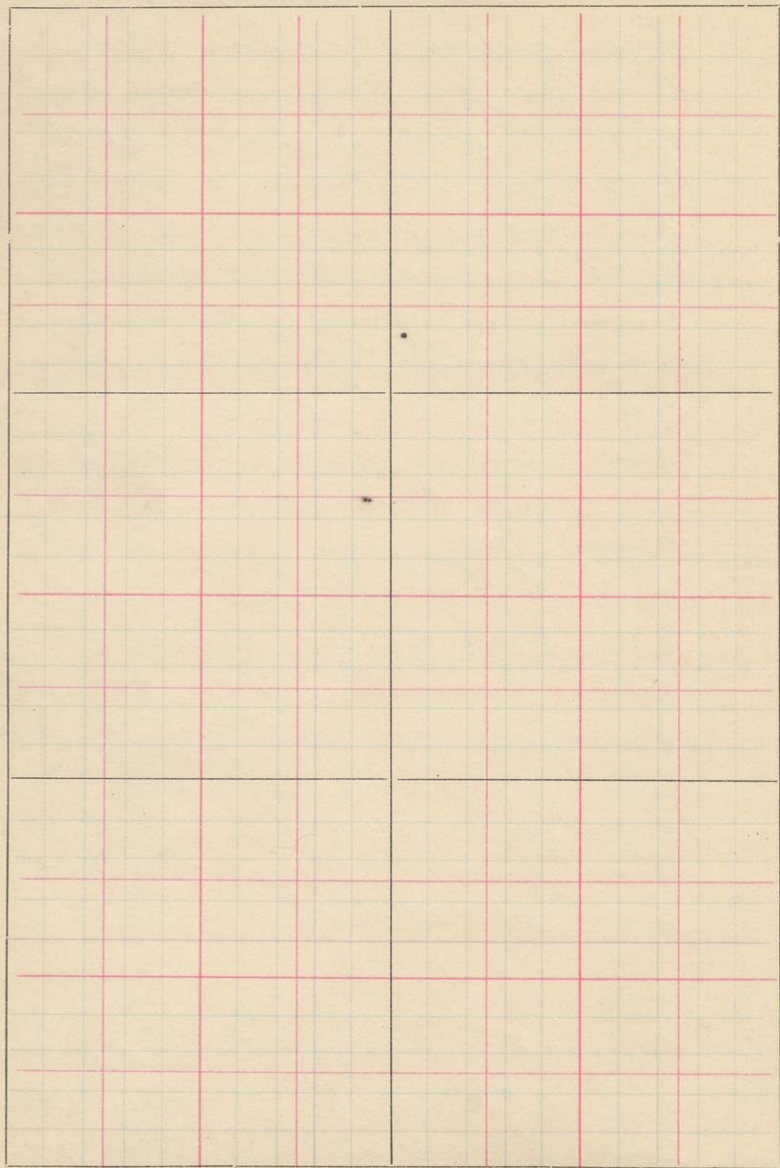
27720 N 280 W O.

Was covered and poorly exposed of fine 27720 & coarse grained hornblende schist. Resembles schists on Brunts lake spec. 27194-5

55 S.

T.

R.



Several exposures of hornblende schist occur along section line down to cor.

All through this last 1/2 mile character of country has been rather peculiar. It is almost level, even the exposures show scarcely any relief. Almost flat, but with surface and usually moss grown. At

N 80 W O. 3-6 2-12

there are a large number of granite boulders but could not be sure they were in situ though the hornblende schist is.

As we go east along section line we pass over hornblende schist exposure. Hbl. schist is cut by dykes of pink granite. It is probable that a large mass of granite - of which these dykes are offshoots - will be found farther south and that the metamorphism of the basic volcanics to form the hornblende schists is partly due to contact metamorphism of the granite.

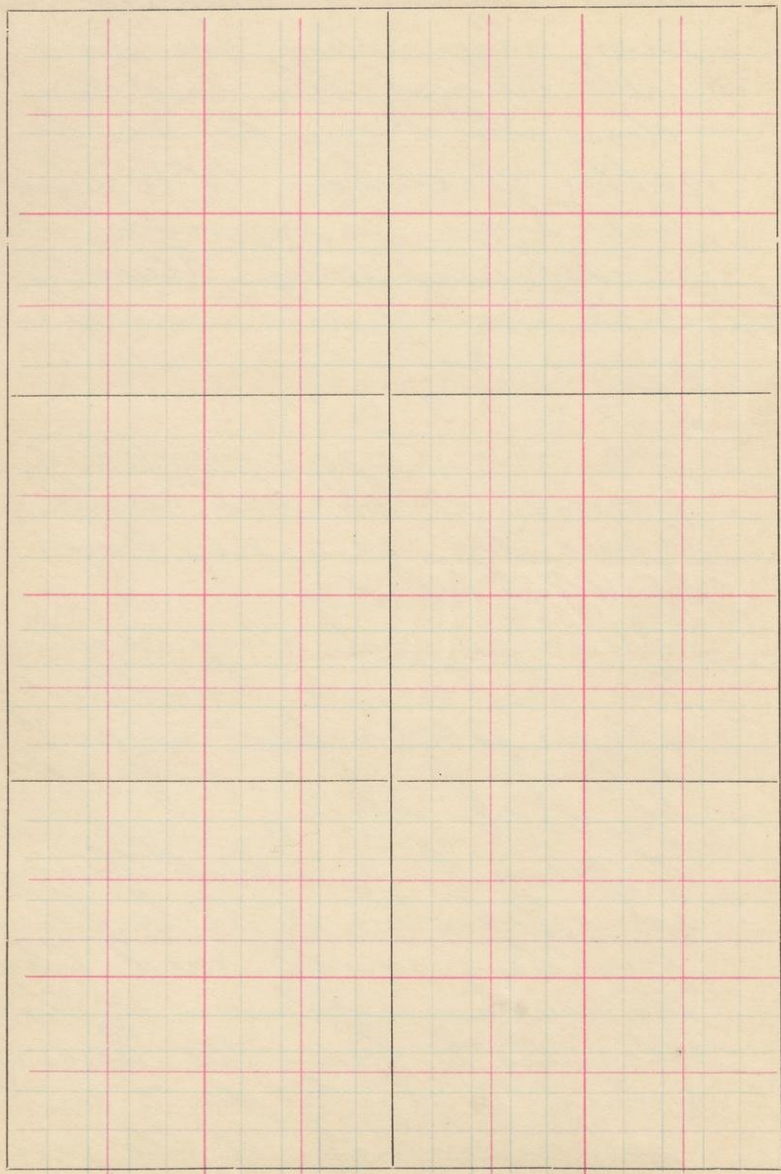
Running north on 1/4 line

57

S.

T.

R.

h
22

through 2-62-12 and 35-63-12
we pass over similar exposures
of hornblende schist above and
cut by granite.

The northern portion of Sec. 2 &
southern portion of Sec. 35 are
covered by swamp and through
it a very strong influence was exerted
on the magnetic needle. This
area is in eastward line of
continuation of small body
of gneiss found 1/2 mile west
where also an attraction was
noted. Probably similar band
of gneiss underlies part of swamp.

N. S. A

27721A N320 W1000 Sec. 35-63-12.

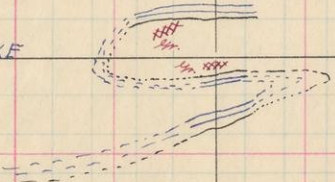
Specimen of ellipsoidal,
amygdaloidal basalt.

59

S. 36/31 T. 62

R. 13/12

31



36

LAKE

Aug. 24, - 97.

This morning left the main camp at Spalding at head of Fall lake and with a party, consisting of Leith and two companions, in two canoes ascended Fall river and entered White Iron lake.

Crossing this we went up stream entering the lake from S.W. and camped on granite point in small lake in Sec. 33-62-12. Granite is exposed along W. shore of White Iron lake and in rapids in inlet.

Aug. 25, - 97

After coasting around N. shore of lake on whose shore we camped last night we portaged into and camped on small lake in Sec. 31-62-12. Leaving two men to make camp Iron south on sec. line between $\frac{36}{1} \times \frac{31}{6}$ to outlet of Bear Island lake then $\frac{1}{2}$ mile west and north to lake. Country passed over

61 S. 1/6 T. 61

R. 13/12

✓

25

✓ Cor.

Cor,

chiefly drift ridges with
intervening flooded swamps.
Saw few outcrops of pink
granite as plotted.

63 S. 25/30 T. 14 62

R. 13/12
Cor.

25

30

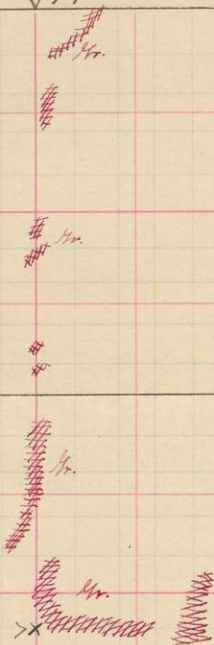
14

Cor.

36

31

14



Aug. 26, 97.

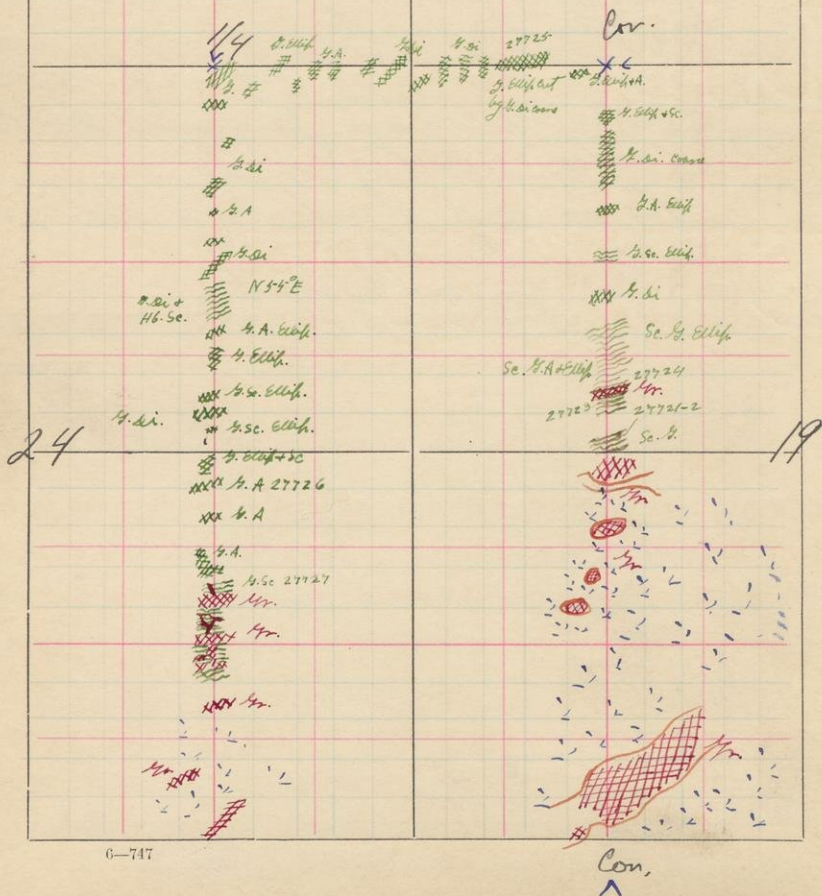
Starting at lake shore ran ^N₂₅ ^W₃₀
along section line between 36/37
as indicated. Passed over
numerous outcrops of medium
grained red granite. Exposures
occur most commonly on small
jack pine covered knolls surrounded
by open swamp.

Same kind of granite occurs
across section $\frac{1}{2}$ mile west
of the section line.

Rain and clouds have delayed
us considerably.

65 S. 24/19 T. 62

R. 13/12



Red granite similar to that in Secs. 25/30 occurs in southern half of traverse between 24/19.

L.S.

27721B-22 N1025 W 0 SE. Cor. Sec. 24-62-13³

Just after leaving last granite outcrop but not in contact with it there is exposed a large mass of interbedded dense light green rock 27721B and a darker green more schistose rock 27722 (ubld. schist).

Banding strikes N55°E, dip 85°N. Agrees in general with schistosity. Compare 27721A with these rocks

S.A.

27723

N1147 W 0 Sec. 24-62-13³

Ledge consisting chiefly of rock like 27721B+2. Has also in it 27723 which seems to be an altered amygdaloid of Sec. 27721A. Ledge cut by granite dyke 12" wide.

27724

As we go north we pass over frequent but small, disconnected exposures of rock which are more or less schistose

Blank Odd Pages

67-71

Skipped

but which show most clearly the ellipsoidal parting is common in the gneiss of this region. Here and there an exposure of massive dolomite is encountered. It cuts the schistose ellipsoidal basalts.

S. 21.

27724

N 160 W O. Sec. 24-62-13.

Here the character of these green schistose rocks is well shown. They are metamorphosed ellipsoidal flows of basalt. I incline at any rate to believe that the banding in many places - especially where it is very much contorted - is due to flowage. Are the very light colored bands (cf. 27721 B) acid rocks or due to silicification of basic bands.

Spec. 27724 is from an ellipsoid. Possibly the most schistose rocks are the scoriaceous surfaces of the flows or are produced from beds of tuff. The ellipsoidal rocks are still quite dense in many cases.

27724 N 160 W O. Sec. 24-62-13

27726

N 900 W 1000 Sec. 24-62-13

Good exposure of metamorphosed basalt. Surface shows flowage lines and well developed amygdules. Rock is somewhat schistose. Spec. 27726 shows some amygdules but could not get very good specimen.

M.D.

27725

N 2000 W 292 Sec. 24-62-13

Exposure on which ellipsoidal greenstone and coarse dolerite 27725 are associated. This is probably intrusive in the ellipsoidal rock as it (ellipsoidal) is somewhat schistose and the dolerite is apparently massive.

D.A.

27727

N 650 W 1000 Sec. 24-62-13

Here is a contact between the medium grained red granite and the schistose ellipsoidal & amygdaloidal greenstone (basalt). 27727 is a specimen of the amygdaloidal (or porphyritic) schist near contact with the granite. Schistosity in schist follows

line of contact with the granite.
 Granite taken for main mass of
 granite is but a very large
 dyke which has small dykes
 of same kind of granite leaving
 it and penetrating the schist.
 Granite also includes large
 masses of the schist as well
 as sends stringers into it.
 Very large quantity of granite
 mixed here with schist. These
 rocks both sc. + granite in dykes in
 it continue on down to
 N 400 W 1000. Sec. 24-62-13.
 At N 335 W 1000 we come to
 granite ledge without schist
 and from now on to the
 lake we nothing but granite.

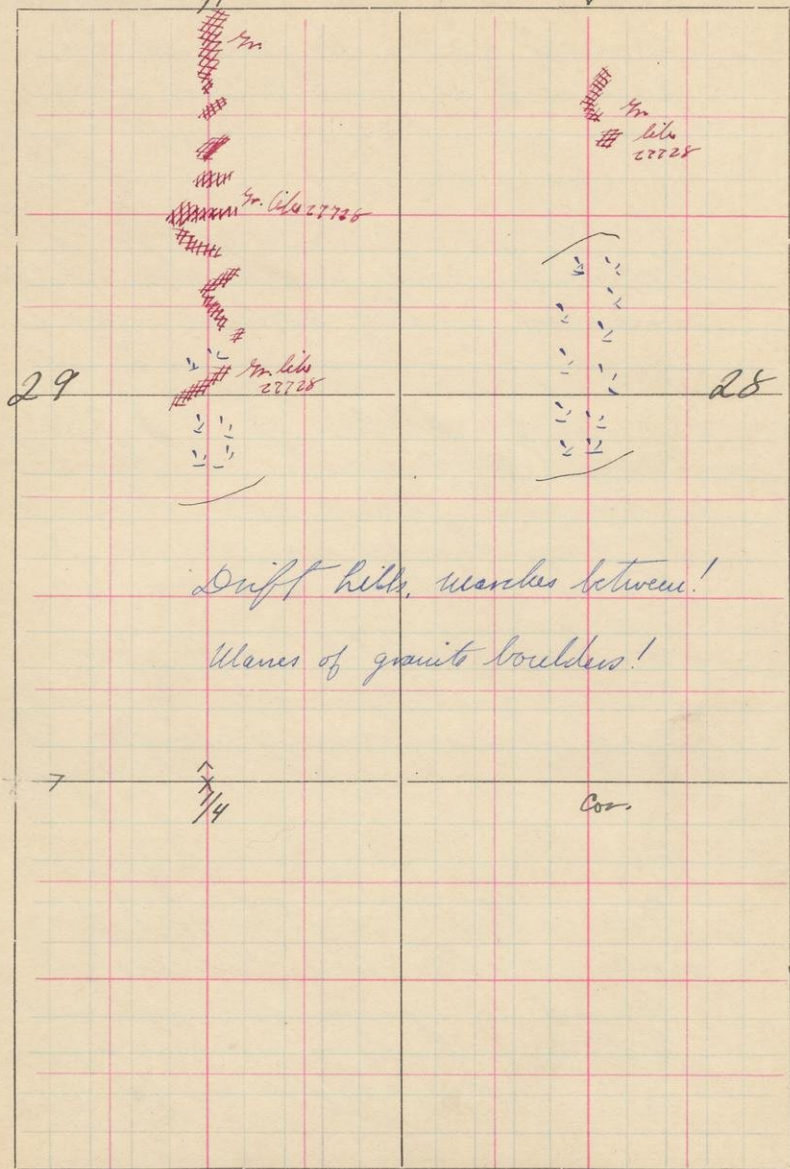
Hb. Gr.

27728

N 1600 W 0 Sec. 36-62-13
 Granite (hornblende) from
 near lake shore. Represents the
 kind of granite exposed
 between lake and volcanic
 greenstone belt to the north.

73 S. 29/28 T. 62

R. 12 ^{Cor.}
V



Aug. 27, - 97.

Started at mesquider tree on lake shore and ran E. along section line between sec. ³⁰ 29 to S $\frac{1}{4}$ fort sec. 29 - 62-12. ³¹ 32

Ran north two miles. Near the lake drift hills are common.

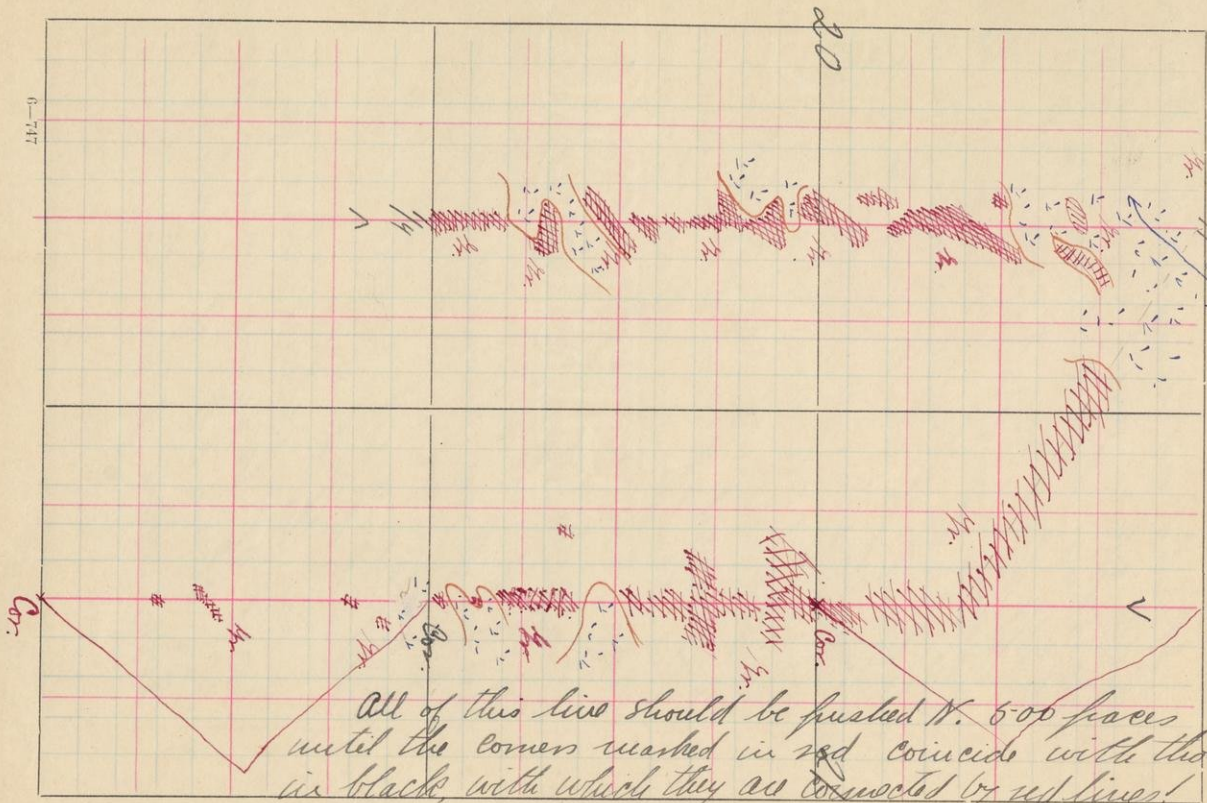
About $\frac{1}{2}$ mile north of lake there begins a level country in which are numerous exposures of red medium grained granite. 27725.

The ledges are slightly rounded and are usually exposed on tops or sides of low mounds covered with jack pine. Between these jack pine mounds tamarack swamps occur. Relief is very slight and looks like a low leveled region.

On the return line $\frac{1}{2}$ mile east of traverse made going N. character of rock is same. Everywhere granite.

75 S. 20/21 T. 62

R. 12 Sec.



all of this line should be pushed N. 50° E. until the corners marked in red coincide with those in black, with which they are connected by red lines!

Aug. 28. 1897.

After a long hard days
saddle we moved up to
our camp on Beaver river
about 2 miles from the lake
at its source. Saw a number
of outcrops of red granite on
shores of Bear Island lake and
in several places along Beaver
river. We are at present camped
among granite exposures. The
line of contact between the granite
and the intruded greenstones,
basaltic lavas, can not be
very far to N. of us.

77 S.

6/5 T. 61

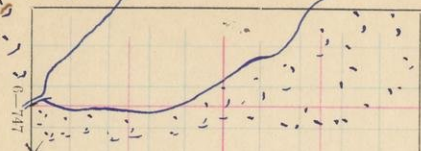
5

R. 13

1/4

Br

Box 22



6

Mineral drift.
Good standing
rice.

#4 lib 27725

lib 27725

Br

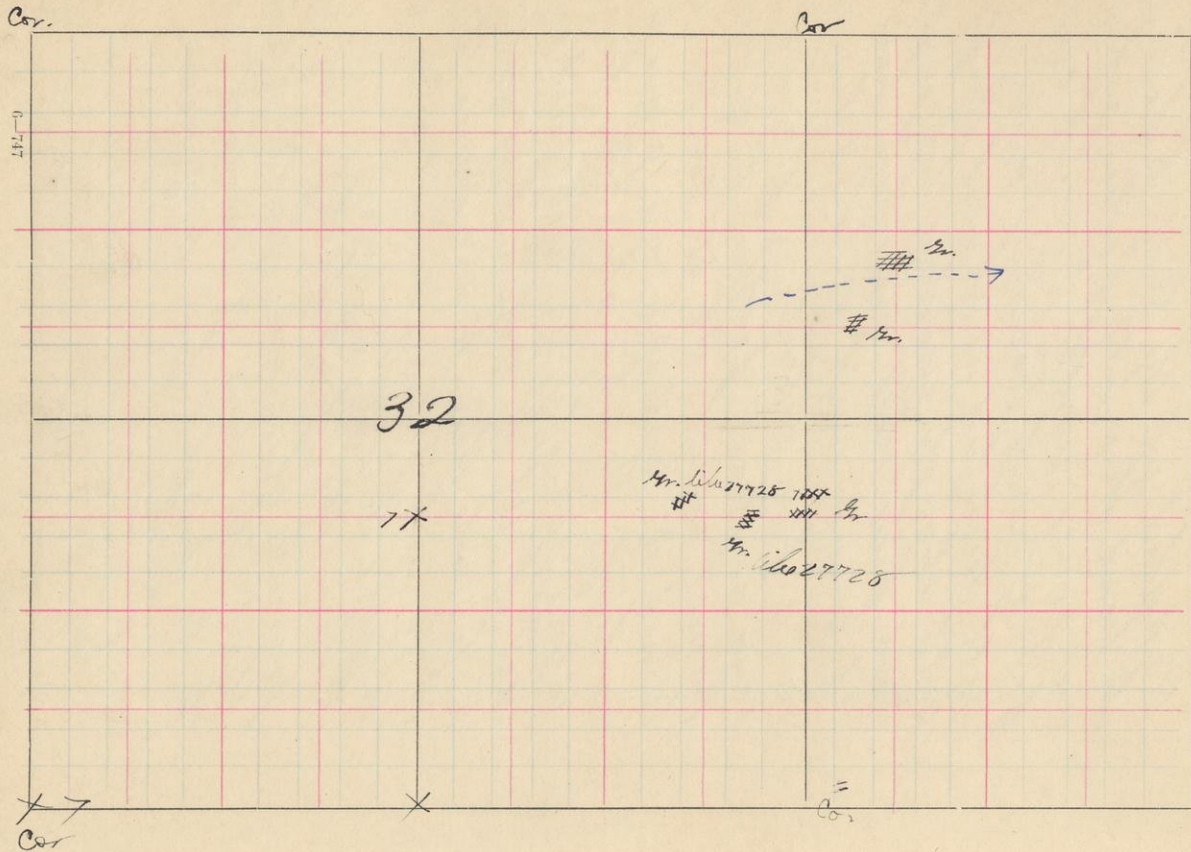
Box

Aug. 29, 1897.

Paddled up the river to lake at its head. Here both parties got out one going north. I went south for a mile traveling over well developed morainal drift with strongly marked topography. Good pine still standing here. At corner went E and finally saw a few outcrops of granite same as that farther E of our present camp. At SE cor. Sec. 6. turned N. and saw one granite outcrop. Country along this line is very swampy, no high land very near it. At N. section line rose E $\frac{1}{2}$ mile then N 75° faces then E $\frac{1}{2}$ mile forming several granite outcrops then N to river.

From the distribution of the granite it seems pretty clear that the line of contact is to be sought for N. of river.

79 S. 32 T. 62 R. 13



81

28/27

II.

62

Co.

Sc. 4.

S. 4. =
Miss M. S.

Sc. Hy. = Hb. Sc.

Cor. 146. So. = altitud. G.
#

Se. 4.

Se. 4

6-747

Cor.

५५

Ex. like 27728
~~XXXXXXXXXXXXXXXXXXXX~~
cut by 27730

27 ~~xxxxxx~~ ^{xxx}
like
27728

$y_{10} = 2729$

287

21

cut by 27730

2

Aug. 30, 1897.

Started in at Eute of Sec. 28
and ran E along south slope
of hills which run down to the
Broad Beaver river swamp.

Dr.

27729

N 105° 0' W 55° 0' SE Cor. Sec. 28-62-13

At this location there is an
exposure trending N of E. of greenstone
with small amt. of gneiss
interbanded in the greenstone.
Greenstone is schistose. Schistosity
trends N of E. agrees with
banding of gneiss. Greenstone
schist and gneiss cut &
thoroughly injected by a grey
granite 27729. Specimen shows
granite including greenstone
altered to mica-billed schist.

This point is apparently near
the contact between the main
red granite mass & the south
and the alluvial lavas to the
north. General strike of gneiss
bands is $N 70^{\circ} E$.

Going E. we pass several small & very
imperfect exposures of greenstone schist.
At N 100° W 200 we reach a large
SE Cor Sec. 28-62-13.

83 S.

T.

R.

[illegible]

outcrop of granite and altered
greenstone like that represented
by spec. 27721+2. Granite is in
considerable quantity and is
redder than 27729, more like 27728.

66
27721

N 1000 W 900 SE Cor. Sec. 27-62-13
Here there is large S-W ledge of
granite like 27728, without any
greenschist. Have we not
passed the contact?

b. di.

27730 N 1000 W 400 SE Cor. Sec. 27-62-13
Here there is a large mass of red
granite like 27728 cut by a number
of dykes of a lamprophyric rock
27730. Dykes range from those
10' wide down to those a few
inches in width and then can
be followed until they disappear.

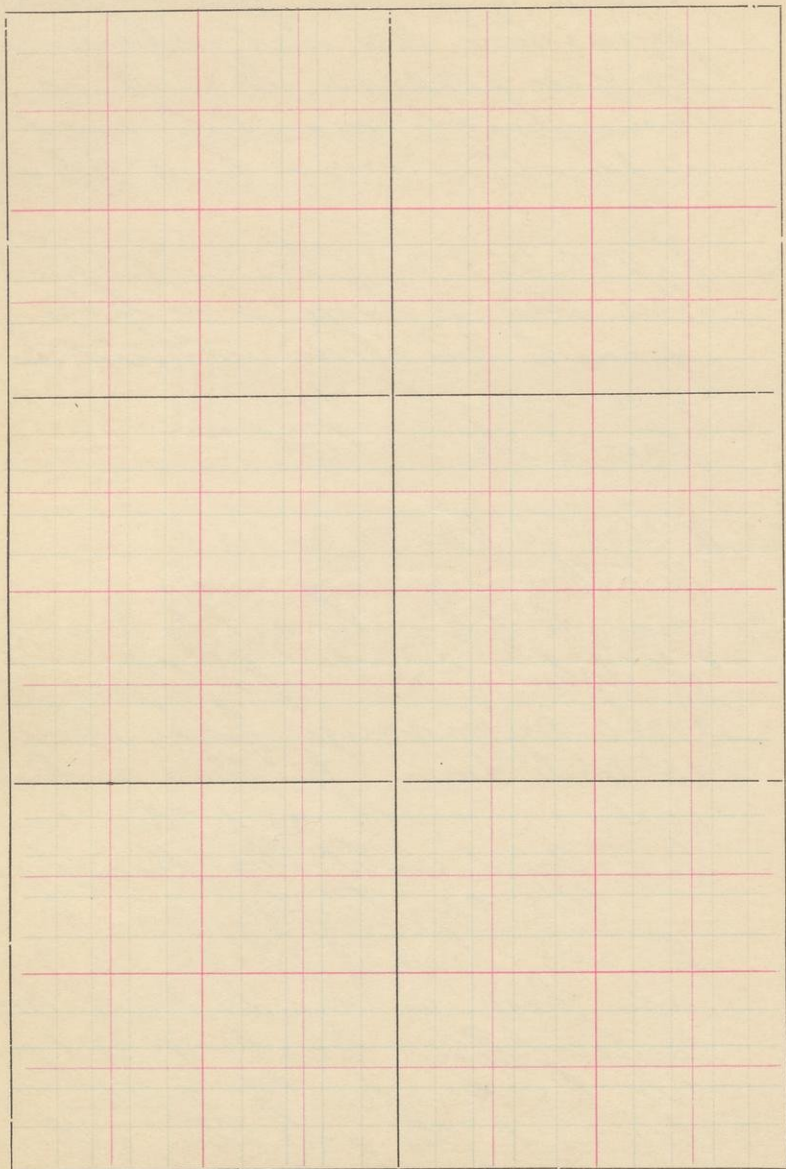
campstone?

We continue on to the
E. sec. line of 27-62-13 and
are here in midst of boldly
outcropping knobs of red granite.
We have evidently gotten well
beyond the greenstone schist-
granite contact. We did

85- S.

T.

R.



not succeed in finding a
connection and turned and
went north. We soon
found the contact between
the greenstone schist (= schistose
lavas + tuffs) and granite.

It evidently trends NE and
connects with the contact
line already determined
farther to the east.

The rest of the run did not
give anything new.

87 S. 19/20 T. 63 R. 11

Fall Lake

Cor.

6-717



H. S. S. S. S.

H. S. S. S. S.

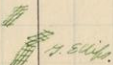
H. S. S. S. S.

H. S. S. S. S.

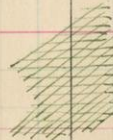
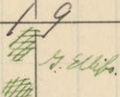
H. S. S. S. S.



H. S. S. S. S.



H. S. S. S. S.



H. S. S. S. S.

H. S. S. S. S.

Cor.

Cor.

Sept. 3, 1897.

Began run to-day at lake shore (Fall lake) just south of N. Cor. Secs. 19/20.

Running south we framed over several poorly exposed ledges of ~~crystalline~~ ^{non-ellip} and ellipsoidal parted greenstone.

N 1125-W 75-SE Cor. Sec. 19-63-11

Here there is a broken ledge of gneiss showing no relations. It is apparently in situ.

From now on exposures are more numerous and better than before. They consist of the ellipsoidal and non-ellipsoidal greenstone as indicated.

On the return run across Sec. 19 $\frac{1}{2}$ mile farther west this same greenstone was found to be the predominant country rock.

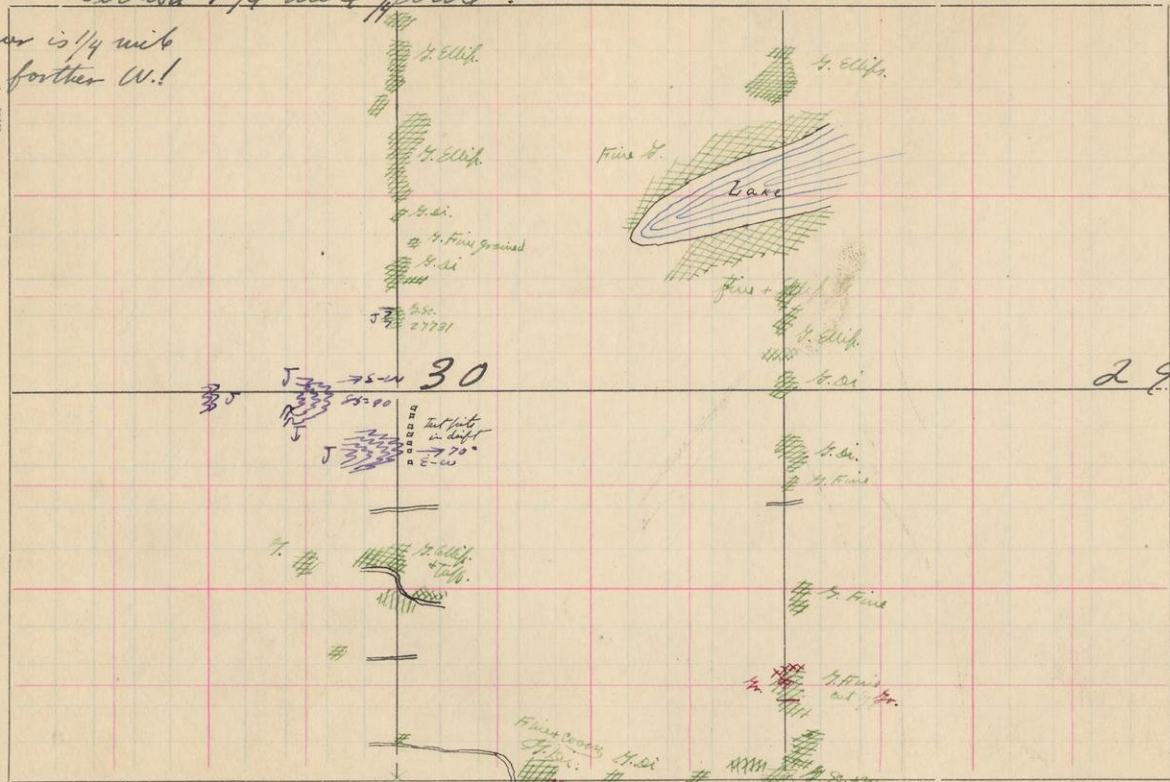
89 S. 30/29 T. 63 R. 11

Cor. Section 1 1/4 mile wide!

Coner is 1/4 mile further W.!

6-717

v Cor.



Cor.

1/4

Cor.

N275 W 0 S. 30-63-11

Dense greenstone cut by light pink granite dykes.

From S. cor. 30/29 overlooking slope leading down to White Iron lake ran W $\frac{1}{2}$ mile, then north. Pass over dense greenstone on S. sec. line + same going north except that a tuffaceous phase was seen about N600 W1000.

N800 W 980 S.E. Cor. Sec. 30-63-11.

First of N-S. row of pits. Nothing shows in this No. 38 or in No. 37.

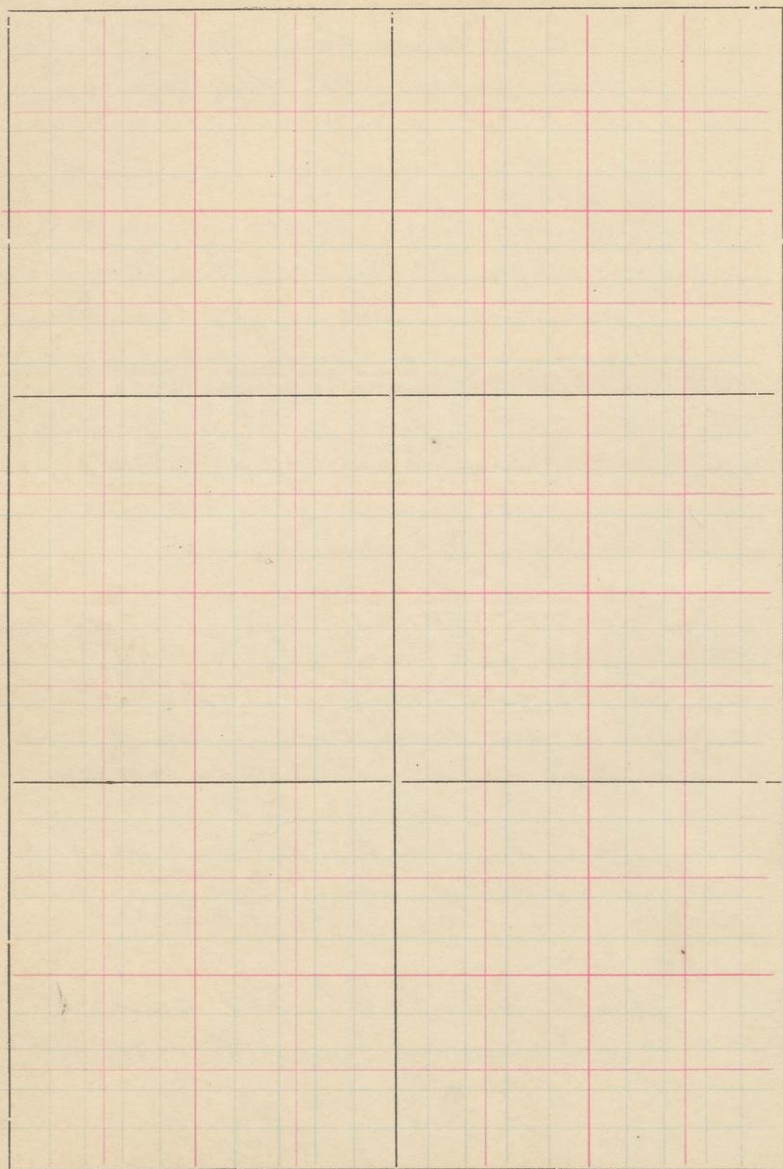
Following row of pits S. and ascending hill covered with vegetation + boulders we pass from pit No. 39-58 etc. all showing nothing but boulders in sides of shafts. Can not determine whether they were bottomed in rock or not.

Just west of the row of pits and forming the crest of the hill there is a mass of crumpled gneiss. I judge the exposure to be near the east end

8. 91 S.

T.

R.



277.

of and eastward plunging
anticlinorium. Axis of folds
strike E-W plunges east 70° .

There also is a second system
of folds, axis strikes $N 20^{\circ} E$ and
dip is $85^{\circ}-90^{\circ}$. This may be
direction of main folds but I
think not. The exposure seems
to be near apex of folds. In one
place the two systems meet and
result in folds as follows:



axis plunging about 90° . For this
see ledge at $N 1000 W 1311$. Sec. 30-63-11

B.S.
27731

$N 1175 W 1050 SE$ Cor. Sec. 30-63-11

Here we find gneiss underlain
by greenschist 27731. Exposure is
not good but it appears that
gneiss is folded in greenschist
or else is in lenses in it.
I think it is folded.

893 S. 16/115-T. 63 F. 11

Cor.
Y

6-747

16

卷之五

15

24. Frio

St. Louis

卷之五

By. Harris

B. Ellis

#27733

Cor.

T.P.¹⁷ in drift.

Co

271

Pas knobs of gneiss in
running S. on Sec. line between 15/16
+ also on return on 1/4 line in 15.

h. ?

77733

N200 W 950 SE cor. Sec. 15-63-11

Small knoll of grey flinty
rock. No structure seen nor relations
observed. Weathers white.

The north 1/2 mile of section 15
consists of rolling drift hills
covered with thick balsam and
cedar undergrowth.

895 S. 21/22 T. 63 R. 11

Pr

Cor.

✓

6-747

21

S. fairs

~~11/11/11~~ 9. Elm.

E-W
I 900

22. (2)

Con

G. F. W.

27732

cut by granite

22

$\frac{1}{2}$

Exposures in sec. 22 are chiefly of greenstone. Outcrops are for most part small and very unsatisfactory.

After planning $\frac{1}{4}$ foot on S. line between Secs. 21 & 22 we go over more overgrown hills & it is very difficult to tell whether Exposures are in situ or not.

N 300 W 0 S. 21-63-11

Small moss covered ledge of gasper striking E-W, dip 80°. Can get no relations. Brush is very thick and soaking wet.

N 400 W 1000 SE Cor. Sec. 22-63-11

Test pit 3 ft. deep with fragments of a porphyry on dump. Does not seem to have been bottomed in rock.

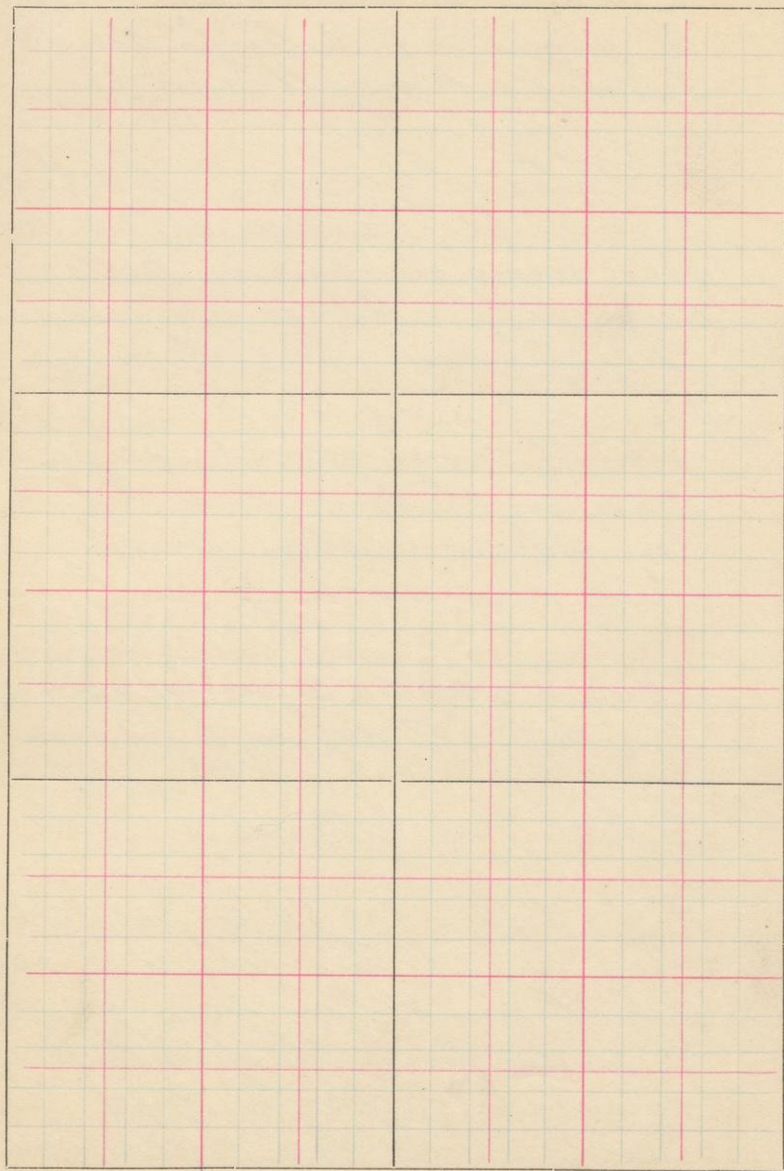
N 450 W 1000 SE Cor. Sec. 22-63-11.

There is at this place a shaft which must have been quite deep to judge from the dump. Dump consists of gasper and the bands show close plications. This is probably the eastern

8 97 S.

T.

R.



h.
27

continuation of the small
gasper exposure found $\frac{1}{2}$ mile
west of here.

N 620 W 1000 SE Cor. Sec. 22-63-11
Hill of broken gasper. Can get
no strike. It is raining and
as needle has varied as much
as 180° can not be sure
even of our location. At about
N 675 W 950 Sec. 22-63-11
we come to exposure of dense
greenstone. Can not get relations
to gasper.

b. b.
27732

N ² 1480 W 1000 SE Cor. Sec. 22-63-11
Ledge of rock like specimen
cut by narrow $1\frac{1}{2}$ " wide, dykes
of red granite.

899
Cor.

S. 34/35-T. 64

R. 11

899

Cor.

V

6-747

#27735-
4

= 5c 27734

34

35-



FALL LAKE.

Cor.

277

277

h.s.

27734

N 1075 W 1950 SE Cor. Sec. 35-64-11
Exposure of micritic schist.
Schistosity strikes $N 60^{\circ} E$.

h.

27735

N 1860 W 1950 SE Cor. Sec. 35-64-11
Outcrop of very dense flinty
greenstone. No relations.

8 10/1
Cor.

S. 27/26 T. 64

R. 11

2

Cor.

V

2.50.

H. M. Coase

|||

1 1
1 1
1 1
1 1
1 1
1 1
1 1
1 1

26

LAKE

2.50.

Lila 27735-

2.50. Lila 27734
|||

Cor.

27

6-717

On this part of the run
we encounter massive
and schistose ledges as
shown on plat.

8/03
Cor. S. 22/23 T. 64

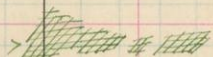
R. 11

Cor.

6-717

22

23

7  7 
S. 22. 20 mi S. 22. 20 mi

 4. 20

4. 50.

 4. 20

4. 50.

Cor

Exposures of gneiss occur
as shown.

8105-3436
S. 211

T.

64
63

R.

11

Cor.

Cor.

LAKE

5.76 Sec.
27742

36

5.7 27730
+ 5.54.

27740-2 5.77

106 27744

Cor.
X

Cor.

6-747

35-

14
2

24

27

Started to run south on
section line between 35/36-64-11.
Began run at Fall Lake.

A.C.S.

27736

N 340 W 1600 SE Cor. Sec. 36-64-11

Ridge of what appears to be
a schistose gneiss tuff.
Schistosity strikes $N 70^{\circ} E$.

h.c.

27740-42

N 650 W 1050 SE Cor. Sec. 1-63-11.

(This location is properly about
N 50 W 650 in Sec. 36-64-11 but we
could get no connection for sec. 36.

Here we come to an exposure
of tuff 27740. Pebbles and
matrix both porphyritic. Matrix
more sheared than the pebbles
& therefore somewhat schistose.

Some pebbles are of quartz porphyry
27741. In others there seems to
be a gradation from a very
siliceous pebble into the
matrix. Is this due to process
of silicification of gneiss
or chloritization (or sericitization)
of acid porphyry (felsite).

Exposed gneiss to south of

8107 S. 11/12 T. 63

R. 11

Cor

Cor

✓

H. Fine

27787

H. 27785

H. A

H. Fine

H. Fine

Cor.

H. 27739

H. 27739

✓

0-717

11

12

27

21

21

21

tuff is porphyritic like 27740.
Can get no contact between
them though.

Pebbles in tuff are subangular.
It may be water deposited congl-
omerate but I could find no
proof & consider it a tuff.
Schistosity strikes $N20^{\circ}E$.

h.c.45

27743

N1225-W1050 SE Cor. Sec. 1-63-11

(Remark about location of 27740 applies
equally as well here.)

Sericitic schist. (cf. 27737).

Strike of schistosity $N45^{\circ}E$.

Followed to N. by schistose
greenstone amygdaloid with
which however it is not
in contact.

h.g.

27737

N1600 W 0 Sec. 11-63-11

Ledge with badly broken
surface of very fissile rock
Strike of schistosity about E-W.

h.g.

27738

N1450 W10 SE Cor. Sec. 11-63-11

Ledge of green schist. No relations.

h.g.

27739

N0 W1000 SE Cor. Sec. 12-63-11

Broken ledge of red granite.

8109 S. 14/13 T. 63 R. 11
 Cor.

Cor.

Y

0-717

14

13

G. Li

G. Fins

G. Li

G. Fins

H. Fins

G. Li

G. Li

765°

5° N 25° E
20° E

G. Li

G. Li

X

Cor.

(715) # G. Li
 N 15° E
 70° E

25°

Cor.

On section line between 14/13
framed ledges of greenstone.
Ran E along section line.
NO W 1270 SE Cor. Sec. 13-63-11
Here found a very small exposure
of gasper. Banding strikes
 $N 15^{\circ} E$, dip 90° . I presume it is
in situ but only got a
small exposure by scraping
the moss off.

N 570 W 1000 SE Cor. Sec. 13-63-11
Here is another small moss covered
ledge of banded gasper. Strike is
 $N 25^{\circ} E$, dip 90° .

10/11

S. 25/30 T.

64

R.

10

Cor

Drift Hills!
No exposures!

25-

30

6-747

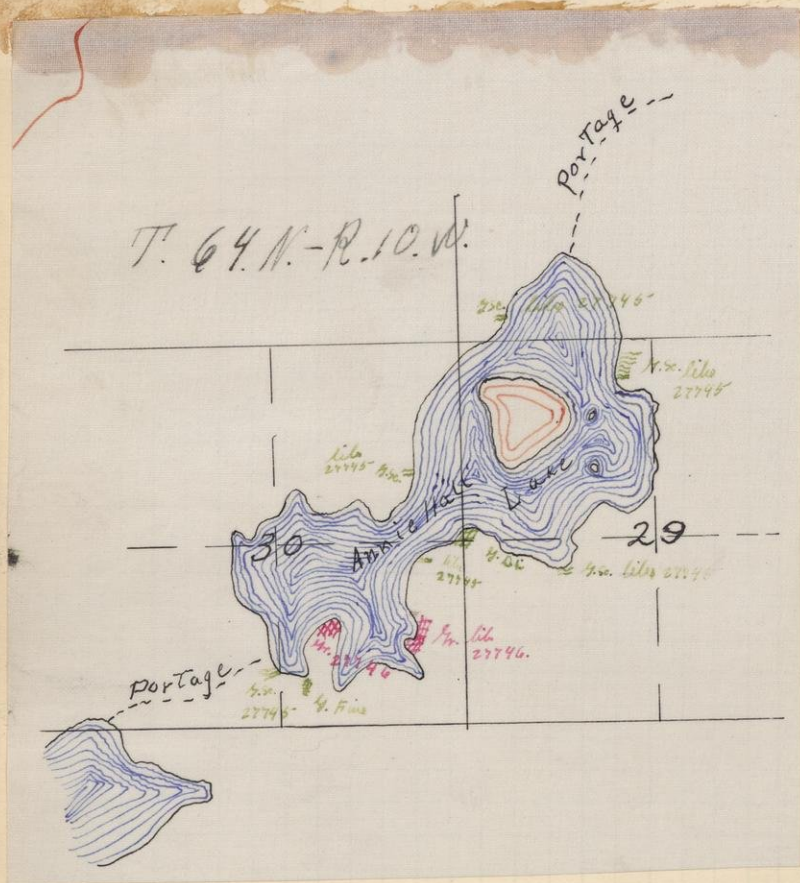
4.50.
Add. 2.20
Lake

24

b.p

27744 N50 W25 SE. Cor. Sec. 25-64-10

Small exposure of porphyritic
gneiss. This is like that
at N500 W1000 in 1-63-11



Canoeed around Annie Hall or
Wind lake and took following
specimens. G. flat for locations.

R.S.
27745 Just south of portage trail on
W. end of lake is a ridge of schist
exposed. It is badly broken on
surface and covered with moss.
Schistosity strikes about E-W.

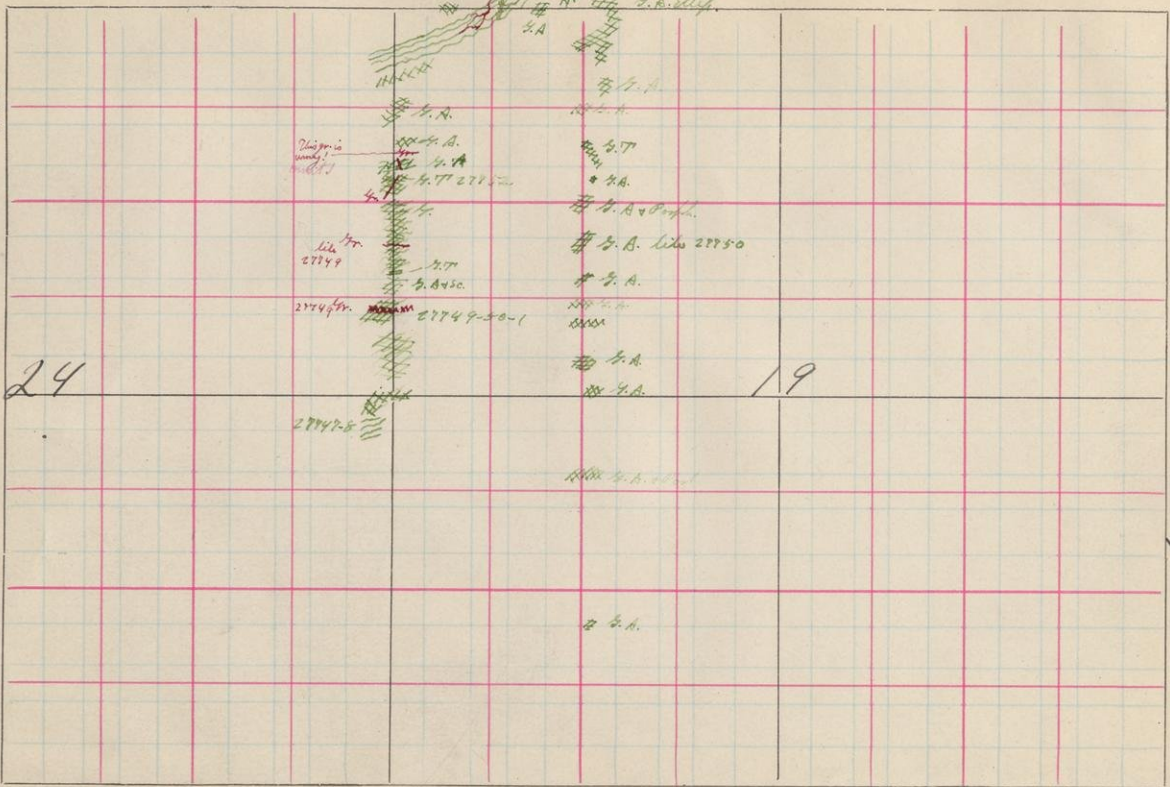
h.
27746 Grey granite is exposed on south
shore of lake at point indicated.

115
S24119 T. 64

R. 11/10

✓

19



6-147

1
S.A
27741

27741

S.A.S.

27747-8 N900 W 80 SE Cor. Sec. 24-64-11.

Exposure along west edge of swamp
of altered schistose amygdaloid
greenstone. Schistosity strikes about
N60°E. This is interbedded with
coarse schistose dolerite or
hornblende schist 27748
From here on to the N. section
line of section, east along it
& S. 1/2 mile east of this line
exposures are very numerous and
are chiefly schistose amygdaloids
and tuffs. This is clearly a great
volcanic series of rocks.

Mr.

S.A.

27749-50

N1190 W 0 SE Cor. Sec. 24-64-11

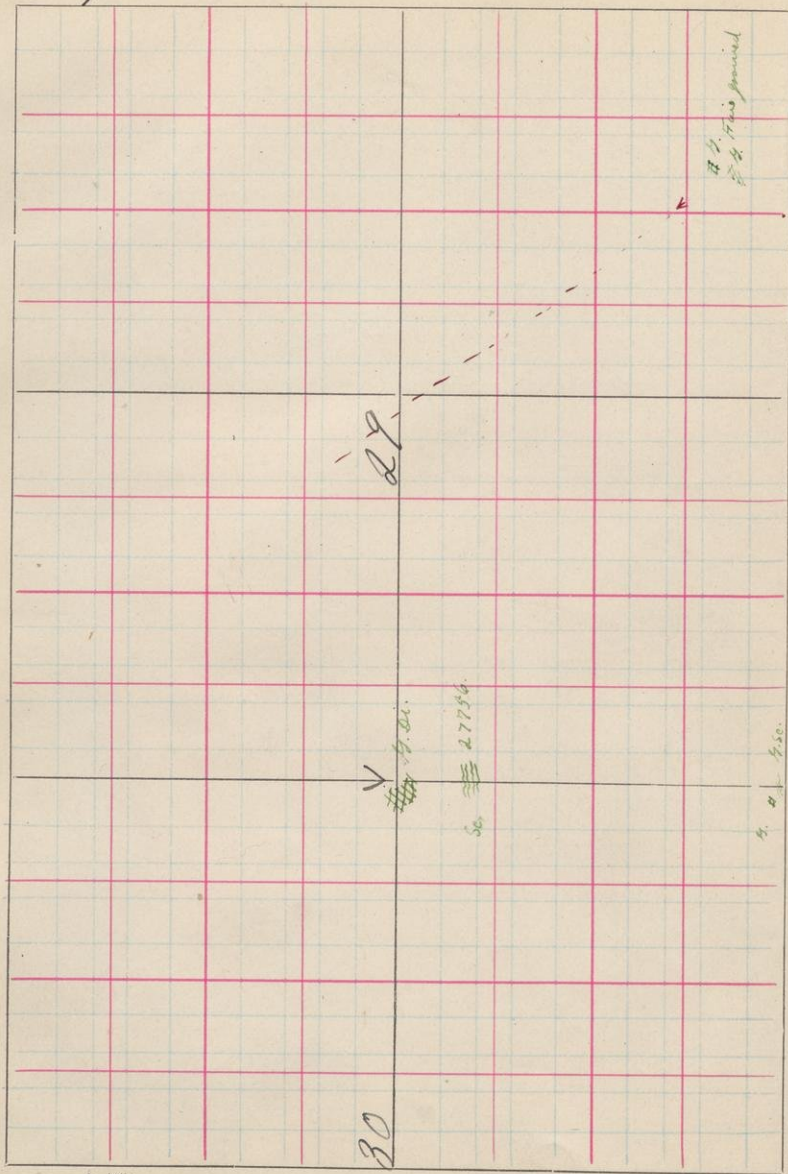
at this place a dyke 2 ft. wide of
grayish fine grained granite 27749
cuts the schistose greenstone.

A few feet north of the dyke
the volcanic character of the
fine and coarse greenstone is
well shown by the presence of
abundant amygdaloids.

The amygdaloids are scattered
over some areas; in others
they are collected chiefly along
certain lines. Here this runs
about NE. Amygdaloids are oval
long axes of ovals are parallel
and agree with schistosity of rocks
which trends N60°E. Amygdaloids
vary from very small ones to
others which are 2" long & 3/4" along
shortest diameter. Curiously the
largest amygdaloids are in the

117 S. 30/29 T. 64

R. 10



Pole
bath
2775

N

coarsest grained schist. Is this
because, owing to porous nature,
rearrangement took place best
in very vesicular rocks? 27750.

Polish
both
27750.

This coarse schist grades down
into a dense rock 27751 with
few amygdalites, in places they
seem to be wanting.

Collected 2 specimens of 27750 showing
slightly different appearances.

N

N1338 W O SE Cor. Sec. 24-64-11

Mass of schistose greenstone tuff.
Pebbles & Matrix extremely altered.
Amygdaloidal character of many
fragments is still perfectly
clear. Now fragments are drawn
out NE and are oval.
Can't tell strike of bed of tuff
or thickness on account of crumpling.

Blank Odd Pages

119-123

Skipped

From last location we continue
passing, on our line north,
over alternations of coarse and
fine grained schistose amygdaloidal
lavas. The alternations could only
be mapped on large scale and after
very detailed study.

h.c.
27752

M5-12 W O Sec. 24-64-10

Here there is another mass of
unquestioned greenstone tuff. Specimen
shows two fragments. Schistosity $N 60^{\circ} E$
agrees with long direction of fragments.
Tuff is cut by numerous dykes
from 3" to 12" wide of a fine to
medium grained more or less schistose
basic rock. Judging from its
schistosity was injected before
great folding of beds took place.
One dyke 8" wide shows very
distinctly a reparation on the

122
weathered surface into a central
mass and four bands on each
side as follows:  There is only
a surface exposure and I can't
get specimens to study the
differentiation. Tuff also cut
by ^{gray} granite dykes.

Fragments in tuff are of coarse
and fine grained basalt, non amygd-
aloidal + amygdaloidal and some
with small + others with large
amygdaloids. Tuff seems to be about
200 feet thick. Amygdaloidal
cavities are sometimes 3" long.
Some of the rocks seem to show
flowage lines. Rocks glassy?

Associated with the well defined
volcanics we find especially
well developed near NW. Cr. 24. —

124

some very fissile schists which
have a fine banding on the
weathered surface. There are
presumably volcanic muds
and sands.

N. 26°

27753-4 N. 26° W. 87° to SE Cor. Sec. 18-64-10

Here such a fine rock is cut by
dikes both basic & acid. Dikes
here do not show schistosity
due to soft mud giving & allowing
all movement to take place in it.

The granite is normal light
pink to grayish like 27749.

Both acid & basic rocks show dike
character beautifully, dividing &
also enclosing intruded rock.

Dike from which 27753 came is 4" wide.
" " " 27754 " " 3" "

Schist is very much crumpled. Folds
pitch about 60° N. W. Strike of
schistosity is about NE-SW.

125 S. 31/32 T. 64

R. 10

27

Con.



4. Fine ground

4. Fine

4. Ellipt

4. Fine

4. Fine

4. Fine

4. Ellipt

Con.

Lake

32

This line is 500 paces
W. of E. Sec. line 32.

4. Fine

6-747

27755 N 40 W 1500 SE Cor. Sec. 18-64-10

Porphyritic gneiss. Phenocrysts
rounded (by pressure?).

All south run drift is heavy
and exposures few. N run was along
west flank of hill ^(clean of drift) ~~scoured by erosion~~
Can not be sure of bedding in these
volcanics but all ledges have steep
face S and slope about 45° to 60° to
N. Believe this represents about the
true dip of alternating flows & tuffs.

25 127 S. 6/5 T. 63

R. 10

50
277

Cor. 7

Cor.

✓

5-

Section sheet

6 5-
7 8

6

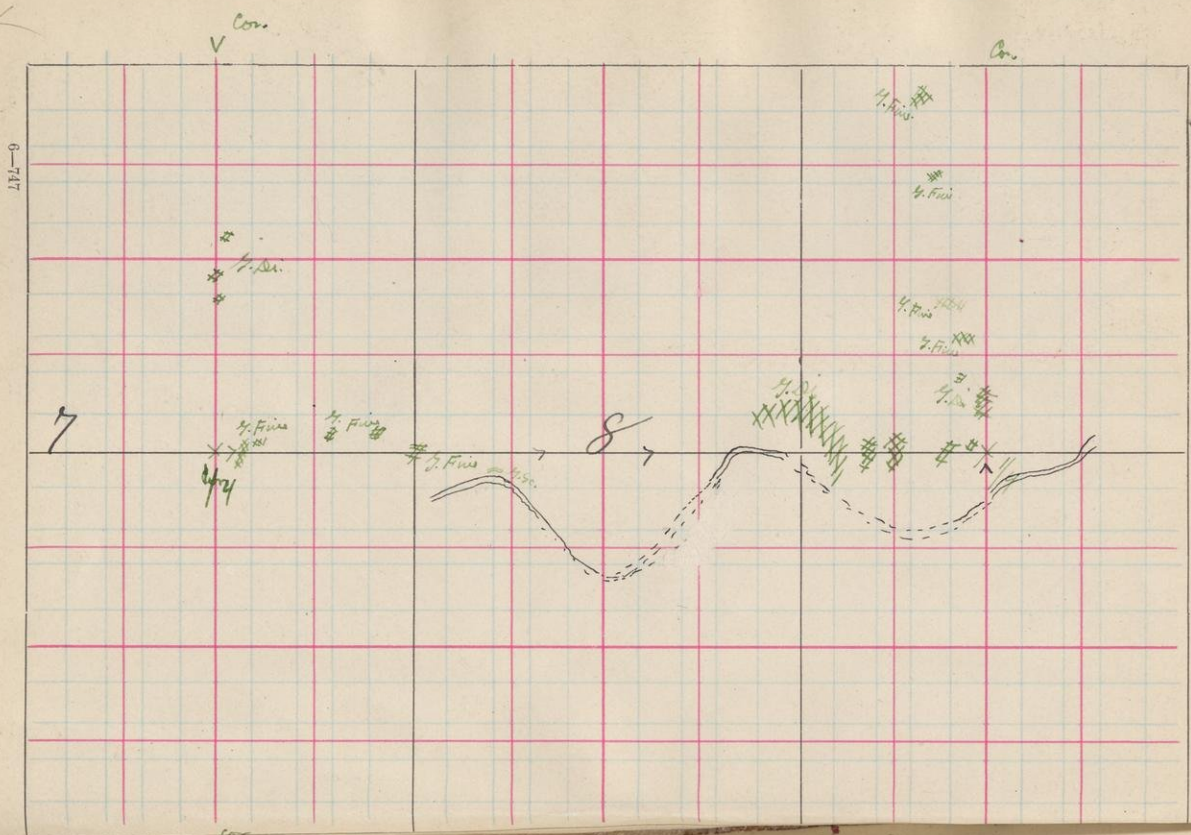
sl. ?

128

27756 N850 W0 SE Cor. Sec. 30-64-10

Now covered ledge of a calcareous
schist. Schistosity strikes a little
N of E, dips 60° N.

129 S. 48 T. 63 R. 10



6-747

