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D., S., S., V. A. Ry.: [specimens] 13759-13810. No. 70 1887

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1887

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No 70

U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 70
September, 1887.

D., A. S., & A. Ry.

W. S. Bayley.

13759-13810

Survey of the Pre-Cambrian Rocks of the N. W. States.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left hand page place a map of as much of the section as has *actually been seen*. Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and figure attached, showing the amount and inclination of the dip. Denote slaty or other very plainly bedded rocks by lines running in the direction of the strike, with figures and a dip arrow attached as before. In all cases where there is the least doubt about the true bedding directions, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue line as 100 paces, and twenty of these spaces as one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left hand side of the page.

2. On the right hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section, and the dip and strike when observable, for instance: 4025 | 250 N., 300 W., *Strike, N. 6° E., Dip, 50° E.* Then follow with as full a description of the ledge as possible.

3. The ruling of the left hand page is also arranged so that a smaller scale can be used. Each one of the black lines may represent a section line and the red lines quarter sections and "forties." The scale of the maps may thus be reduced, if desirable, to two inches to the mile (the ordinary town plat scale.)

4. Collect a specimen from each separate ledge of rock, or wherever there is a change of rock on any one ledge. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be sampled, the position and extent of the ledge being marked on the map, with a note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples, trimmed to a uniform size of $2\frac{1}{2} \times 2\frac{1}{2} \times \frac{3}{4}$ inches will be allowed, but in all other cases *large sized specimens*, trimmed to a size of $3 \times 4 \times 1$ inches, must be selected, in accordance with § 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. In all cases collect chips for slicing. All specimens are to have numbers painted on them, in white on a black background, in the field.

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

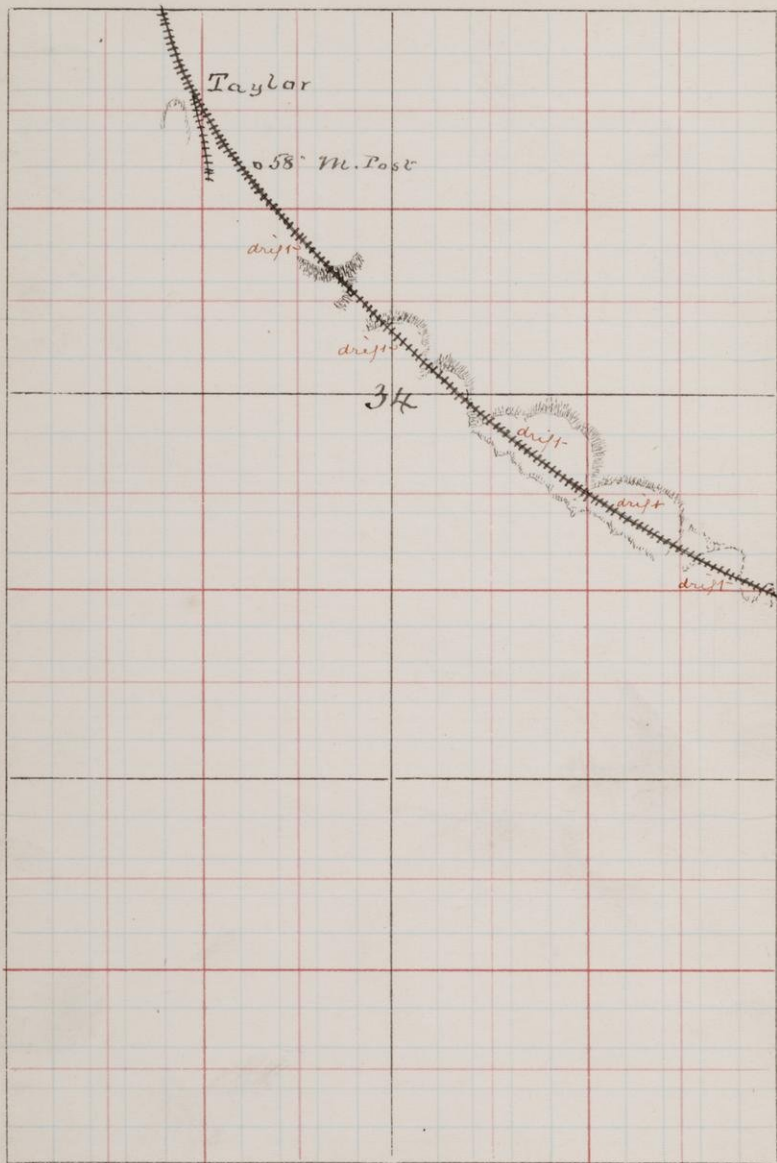
6. Forward this note book, as soon as filled, as registered mail matter, to R. D. IRVING, U. S. Geologist, Madison, Wis.

All the strikes recorded in
this book are calculated
from the magnetic merid-
ian (var. 2° - 3° W the east) and
in the case of States are
clearage strikes - except where
otherwise stated.

13770-13803 - Marquette district.
Michigan - pp 6-40

T. 50

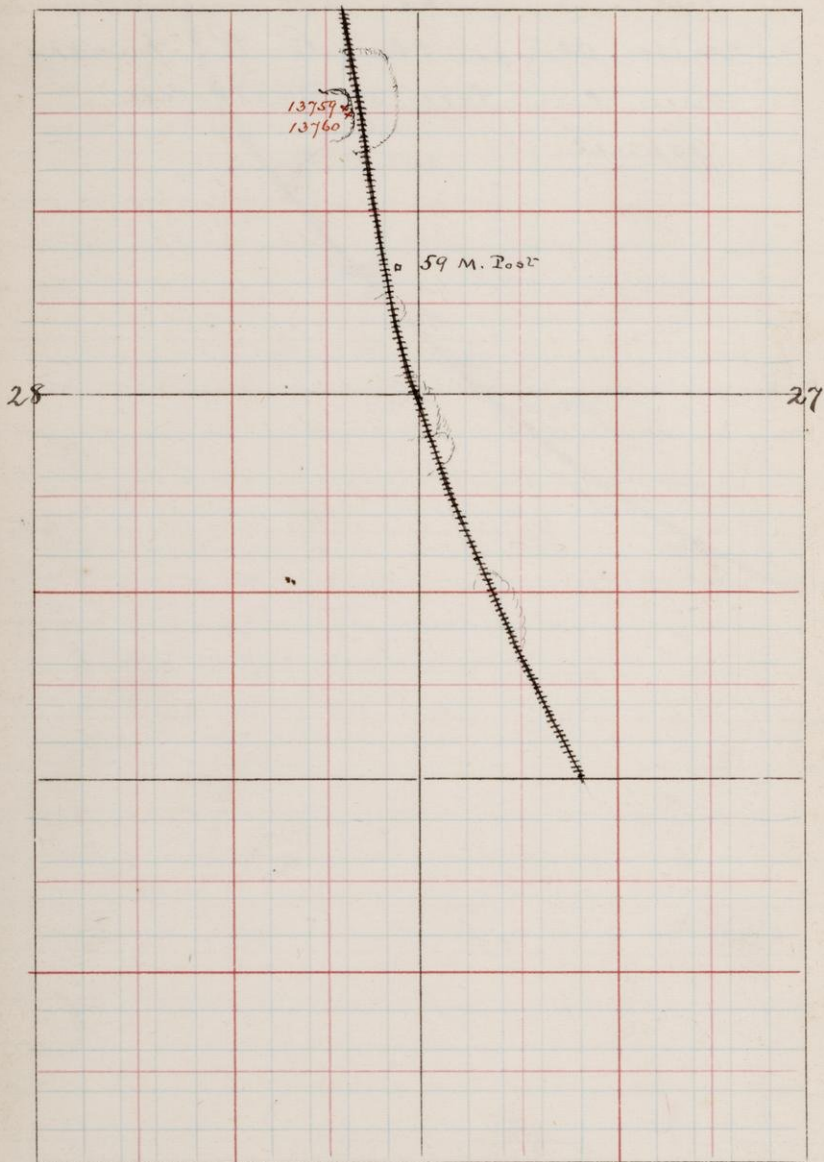
R. 33



1
Between the 57" and 59"
mile stone the R. R. passes
over low hills of sand and
gravel

T. 50

R. 38

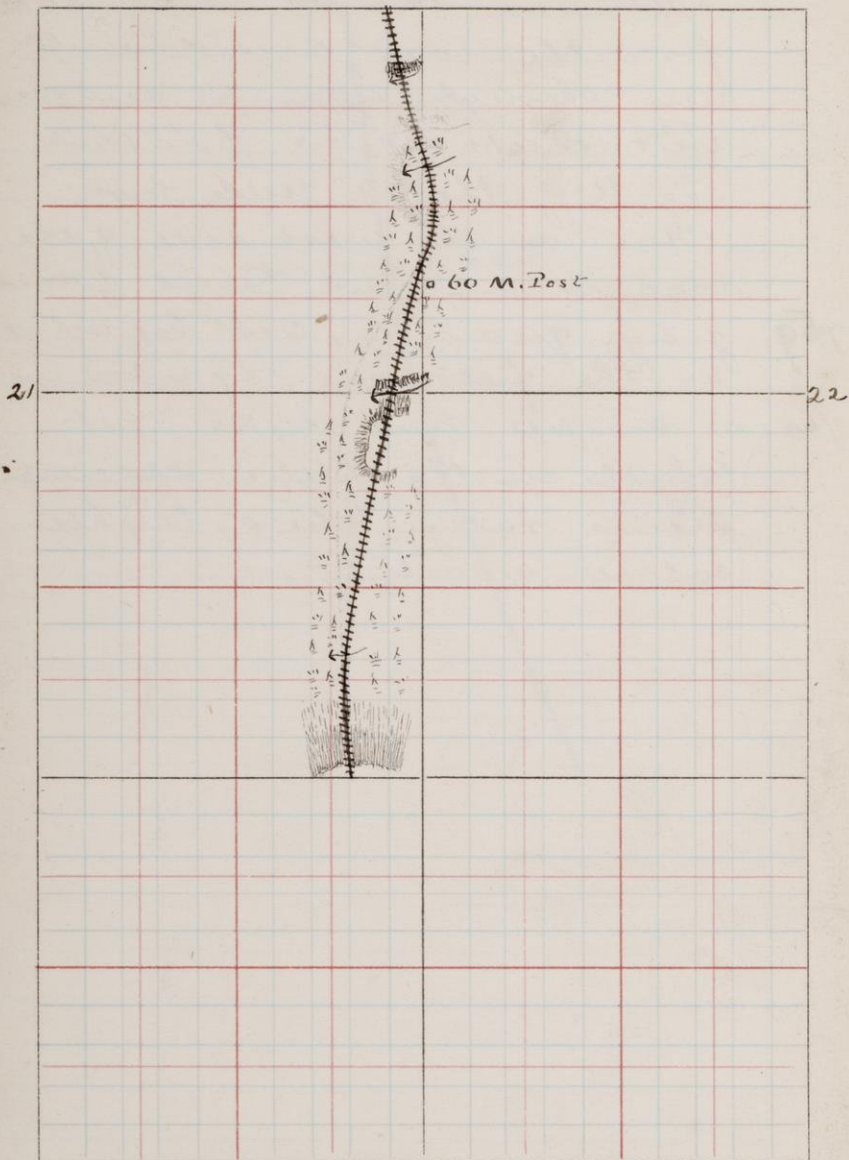


Between the 59" & 60 mile
forks the road continues to
run through swamps and over
drift; except at one point —
500 ft of the 59" mile fork.

- 13759 Here on the west side of the
road is a round knoll of dark
gray quartzite, cut by what
in the field was regarded as
13760 a small trap dyke, but
which in the hand specimen
seems rather to be a lighter
colored quartzite.

T. 50

R. 33



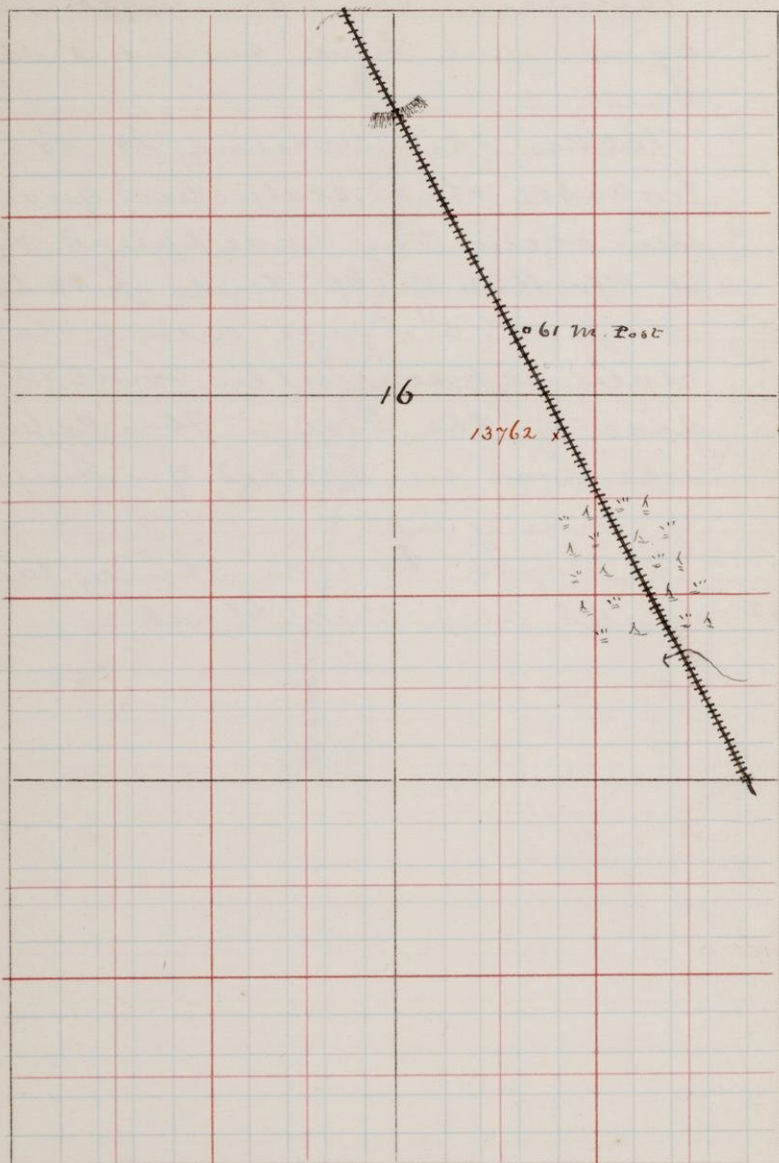
Between 60" & 61" mile stones
again we have swamp and
sand.

Below this covering it is
probably that slates and quartz-
ites occur very wide spread as
at 1400 N.W. of 60" mile first there
is quite a large area of black
slate exposed on the South-West
side of the road. This expo-
sure was uncovered for purposes
of quarrying.

13762 The rock here is thinly lam-
inated and very black.

T. 50

R. 38

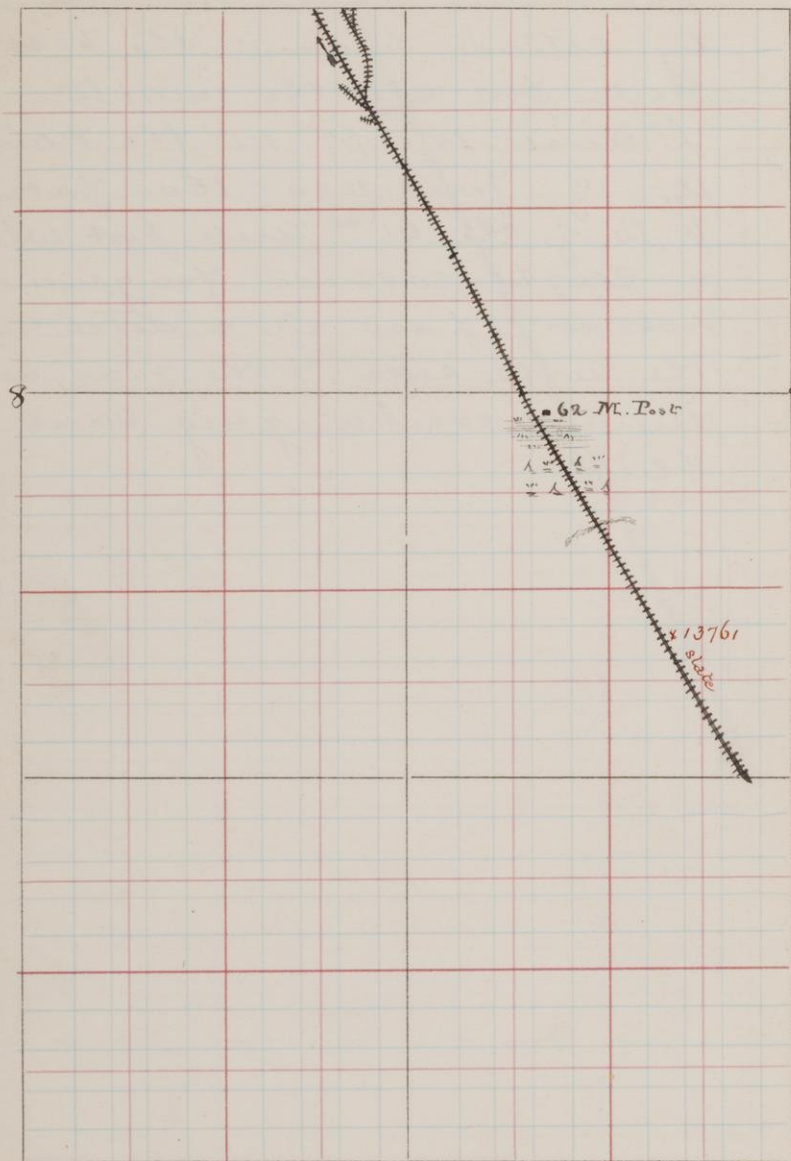


The same character of country extends beyond the 61st. mile post all the way to L² Anse, except in the vicinity of from 1000 - 1500 paces N. W. of the 61st mile post, where a slight colored fragmental rock is exposed in a ditch on the north side of the road, under an overhanging sand bluff.

13761

T. 50

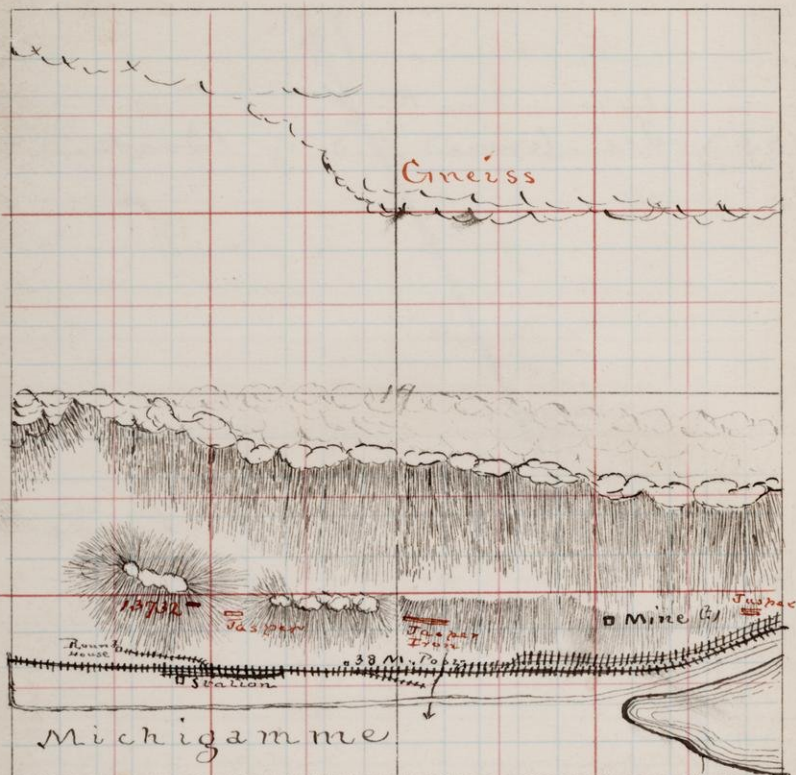
R. 33



13763

6

See toward End of Book.



Position 38 Miles. not not definitely located with
 respect to Sec. lines

Country between Champlain
and Michigan.

Between the 33" and 34" mile
stones the railroad runs along
Lake Michigan for the first
quarter mile, being built across
a swamp extending north from
the lake shore.

Beyond the swamp it cuts
through sand hills and boulder
ridges until at 1300 paces
W of the 33" mile stone it
reaches the foot of the green-
stone ridge, which has already
been noticed further west.

The character of the rock
forming this ridge is remark-
ably constant. Here, as fur-
ther to the west, the rock is
dark and coarse grained,
massive except where it ap-
pears to have been rendered
schistose by pressure. At
these places it approaches in
aspect a hornblende schist.

T.

R.



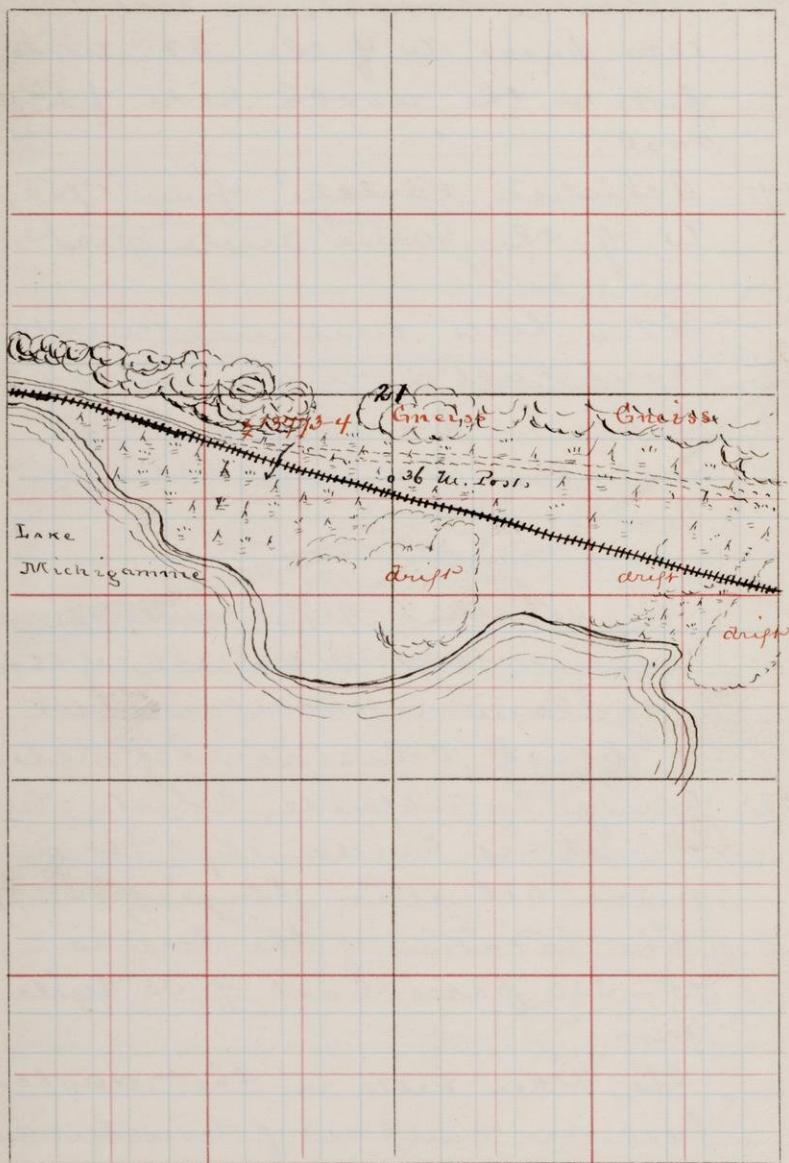
- 13770 Massive hornblende rock from
1350 paces W of the 33" mile
post, on the north side of the
road.
- 13771 Schistose variety from 1750
W. of the same mile post.

These hills continue west
about half a mile, ending in
a high & precipitous bluff
near the Sec. line between
Secs 22 and 23.

- A Swamp next intervenes
between the extremity of this
ridge and a solitary hill
of black schistose rock, resem-
bling hornblende schist, but
which is evidently but a
more schistose phase of 13771.

The location of the hill is
75-350 paces East of 35 mile
post.

The other hills in the neighbor-
hood are composed of boulders and
sand



North of the railroad, about 500 paces distant is a high range of granite and gneiss, probably the continuation of the line of hills further west.

West of the 35 mile post are drift hills as far as the 36" mile post.

Beyond this the road approaches very close to this line of granite bluffs.

13773 700 w. of 36" mile post.

Gray granite from face of bluff, about $\frac{1}{3}$ of the way up.

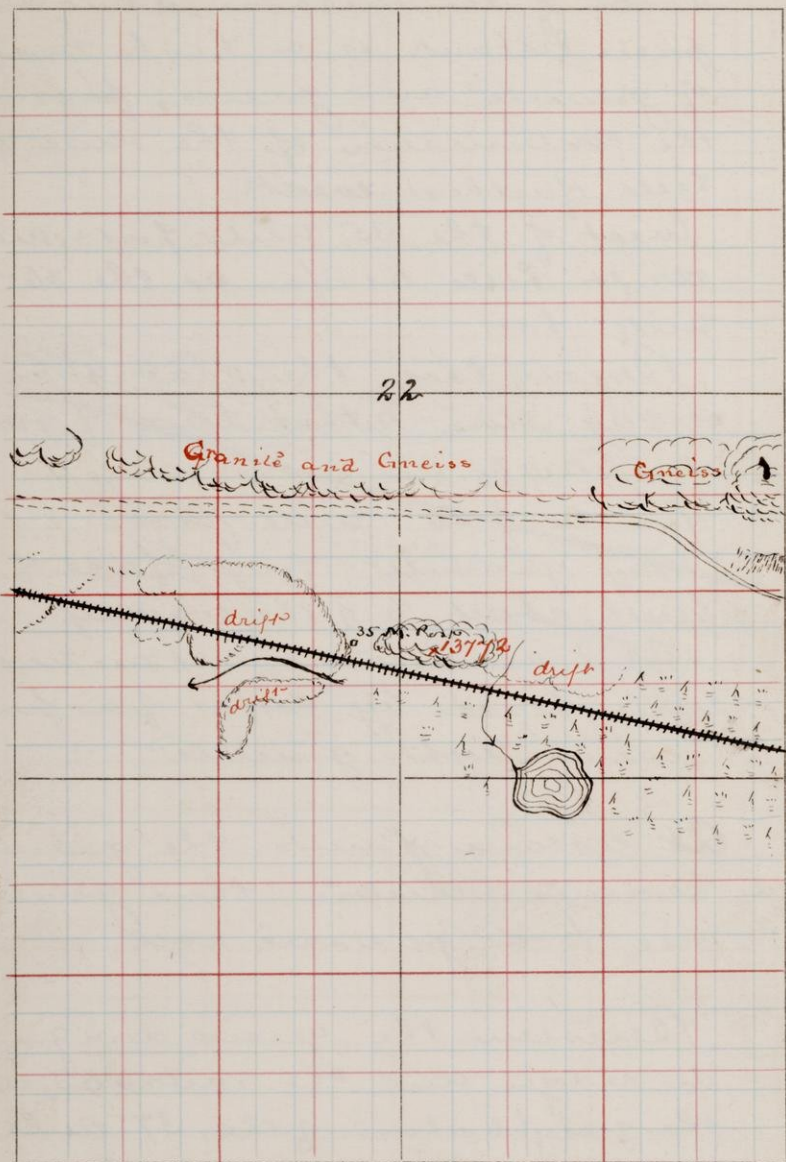
This granite is cut in numerous places by dykes of a finer grained light granite.

13774 At certain points the granite becomes schistose, thus giving rise to a gneissic rock.

Between the gneiss and granite ridge and the railroad, in the neighborhood of the 37" mile stone, again reappears the ridge

T. 148

R. 30



- of coarse hornblende rock, found both to the east and to the west
 13775 50 paces W. of 37" mile stone.
 Coarse hornblende rock.

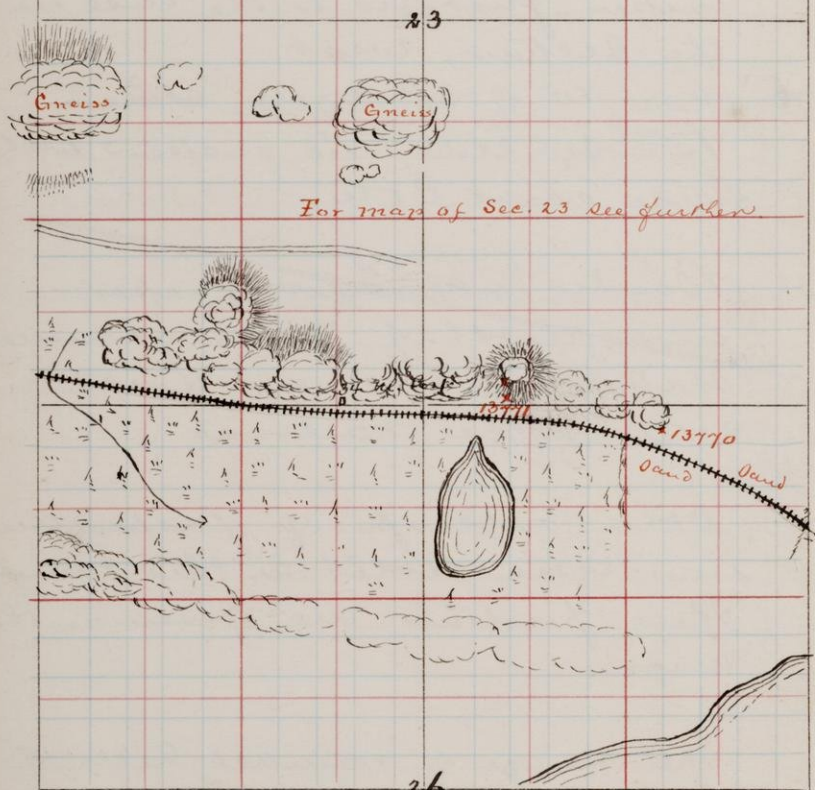
South of the greenstone hills is another lower range, consisting of banded iron and jasper, just as is the case in the sections west.

- 13776 600 W. of 37" mile stone -
 Banded iron and jasper with strike about E.W.

- 13732 Banded iron and jasper, just north of Michigan station, on hill on north side of the railroad.

Other outcrops of jasper and iron were noted in this vicinity. Their positions are given on the maps.

The range of rounded hills to the south of the railroad, extend-



ing east and west in Secs.
26 etc - are composed of drift
material.

On the line between Secs.
26 and 27 they are 450 paces
South of the railroad.

T. 48

R. 30

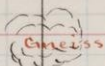


T. 48

R. 30

15

14



County Road



22

23

Sept. 19-

Went north on line between
Dees. 22 and 23

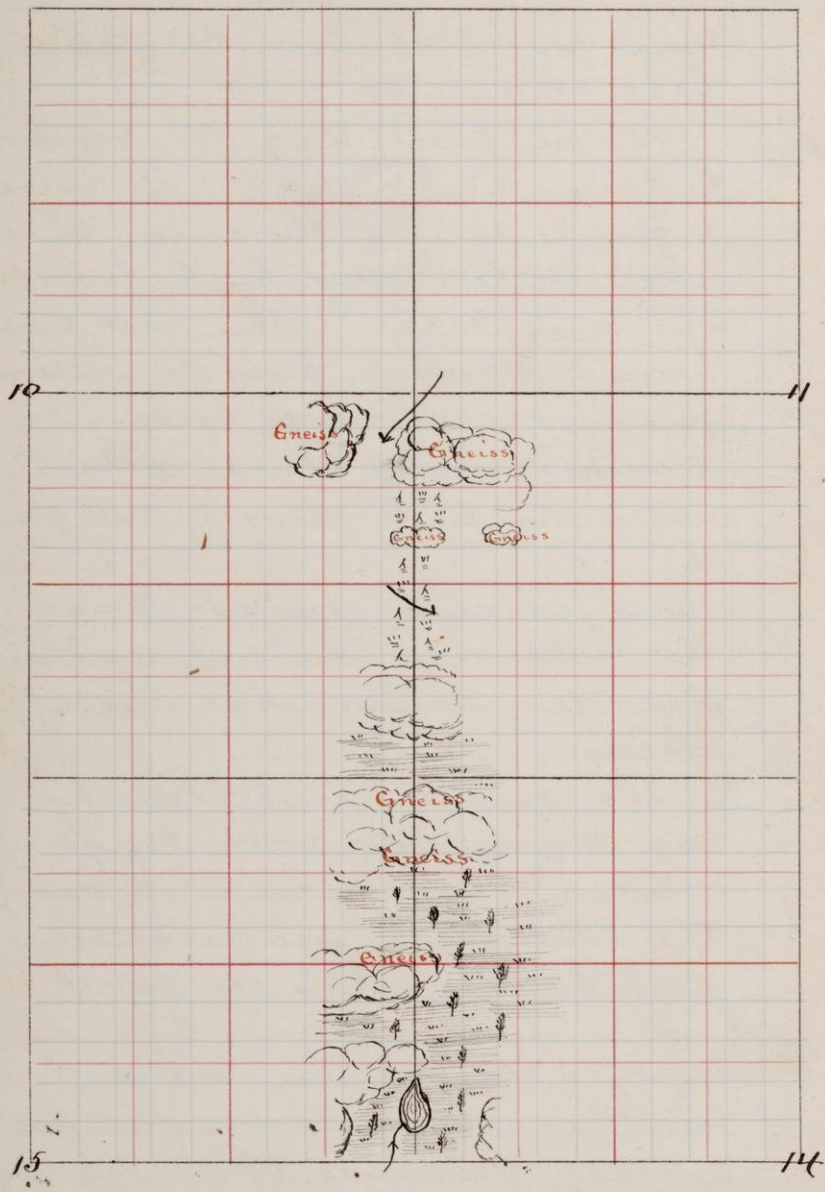
At 400 paces N. of the corner
between 22, 23, 26 + 27 a ridge
of gneiss crosses the line. This
ridge is here very high, precipi-
tous and bare. The rock com-
posing it is a gray micaceous
gneiss, occasionally holding in-
clusions of horn blende schist
and dykes and veins of red gran-
ite.

13744

This ^{gneiss} extends for at least
a mile and a half, with
but few unessential modifi-
cations.

The country is broken by
very many hills with rough
almost perpendicular sides to
the south, and comparatively
gradual slopes on the north.

North of the D.E. cor Dec 15 the
hills become less abrupt - for
a short distance, but beyond



the quarter post again resume their more usual character.

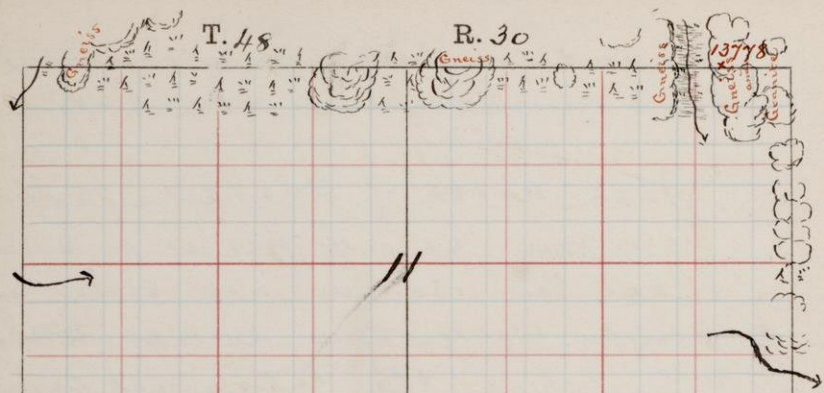
Just north of the quarter post between Secs 14 & 15 is a small lake, bounded on all sides by bluffs of gneiss, except to the N. E., where the tamarack swamp, ^{the center of} in which the lake is, runs as far in a north easterly direction as can be seen.

At 450 paces north of the D. E. cor Sec 10, and again very near the quarter post, the Pesheke River was crossed. This stream here flows in a gap between two ridges of granite and gneiss in which the rocks are very well exposed.

At this quarter post ran east to east line Sec 11.

On this line the rough hills continue to alternate with swamps.

In the eastern part of the mile, the hills became rougher and much more precipitous.



S.W. Cor.

High Granite and Gneiss Bluffs.

on both sides of the little stream 270 paces W. of the E. quarter part of Sec 11, the rocks are almost perpendicular and very high.

East of the stream the country is exceedingly rough, the hills are high and precipitous, and are in many places covered with windfalls. They consist of the usual micaceous gneiss, cut by veins and dykes of granite and dykes of trap (13778).

13778

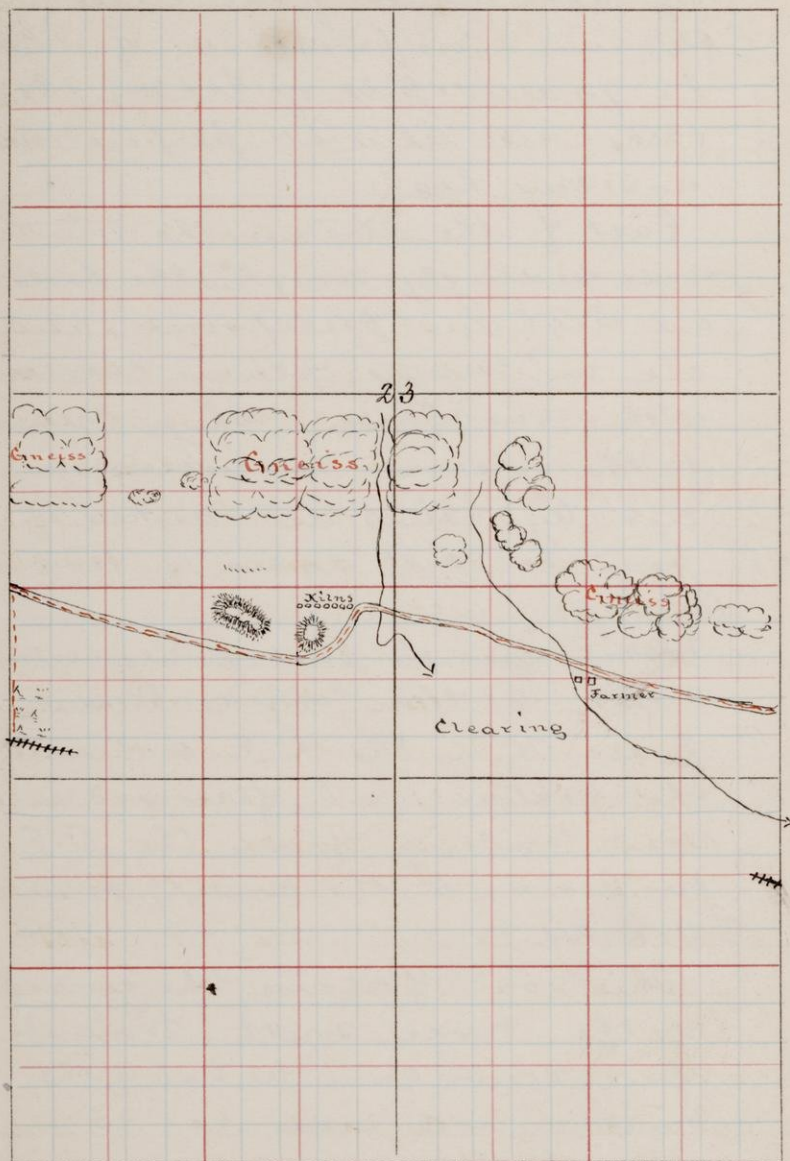
From E quarter part of Sec 11, ran south to the Pesheke River, 200 paces N of the D. E. corner of the section, and followed a road leading from the D. E. cor Sec 11, to the county road in Sec 24.

This road follows the course of the river south. From it fine views can be had of the banks on both sides.

The stream throughout its entire

T. 48

R. 30



course flows through a gap in the immense ridges of gneiss and granite, which extend as far south as the southern portion of Sec. 24.

Sept. 20.

Traveled east and south along the county road from W. line of Sec 23. T. 48. R. 30, in order to map road with some degree of accuracy and also to examine the contact of gneiss with the younger rocks.

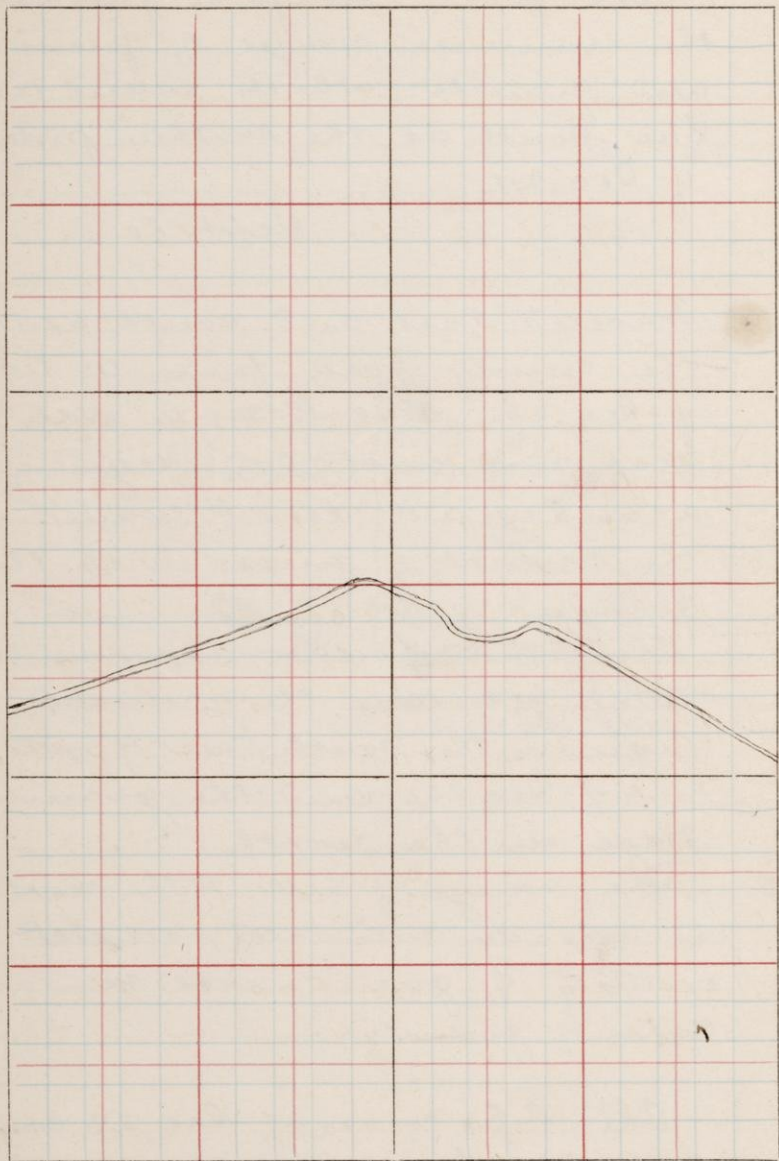
This road follows along in the valley between the greenstone ridge on the south (see of former map of Sec 23) and the granite ridge on the north.

The range of hills to the north, as already intimated, consist entirely of gneiss, with veins and dykes of granite.

The S.E. corner of Sec 23 could not be found, as the land in this vicinity has been cleared

T. 48

R. 30



and burned over, and all traces of the original marks have been demolished.

The corner was located approx. approximately by facing E. from a 716 post, placed by the C & N. W. railroad Surveyors on the west line of the section.

Continued along the road toward Champion.

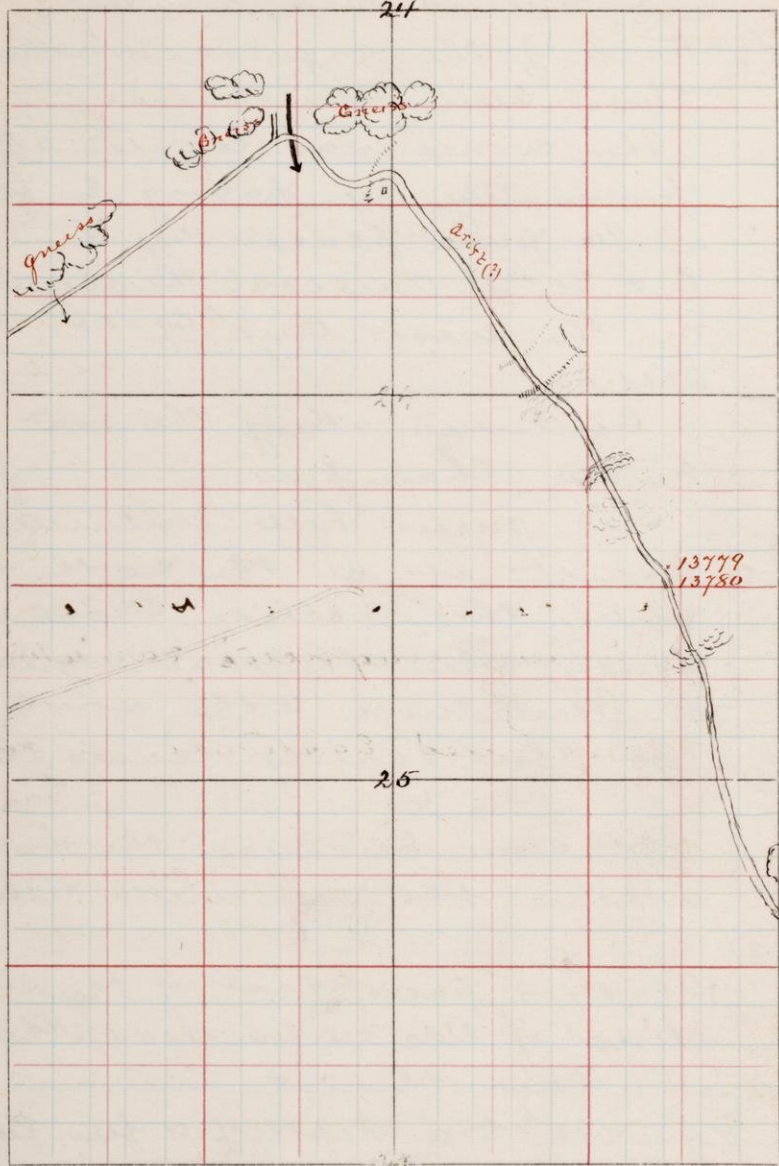
The green hills continue to skirt it on the north, until the Peckete River is crossed, when the road begins to trend more to the south and thus rapidly leaves them.

For some distance the road appears to be over drift hills.

At 2400 paces East of the N. W. clines of Dec 24 (on road) there is a cut through sand and gravel to a depth of a few feet. Beneath this layer are

T. 48

R. 30



outcroppings of slaty rocks -
 some in loose form, but
 others must certainly be in posi-
 tion.

13779 graphitic slate, with which
 is associated, as if inter-
 stratified, harder black sili-

13780 ceous bands, not so fissile
 as the graphitic slate, but
 much more contorted, and
 containing lens shaped cores
 of the same material.
 Strike 25° S of W. Dip. vertical.
 Strong magnetic variation!

Continued Eastward on road
 where it runs at the base
 of a series of hills, which are
 apparently drift hills, but
 which further to the north
 have been opened for iron.
 These hills continue on to
 the east exposing here and
 there edges of iron and Jasper.

T. 48

R. 30

T
48
R
30

T
48
R
29

24

19

25

25

30

At about 700 paces on the road, east from the line running northward from the 31st mile post on the railroad is a large outcrop of banded iron and gasper over which a little stream falls.

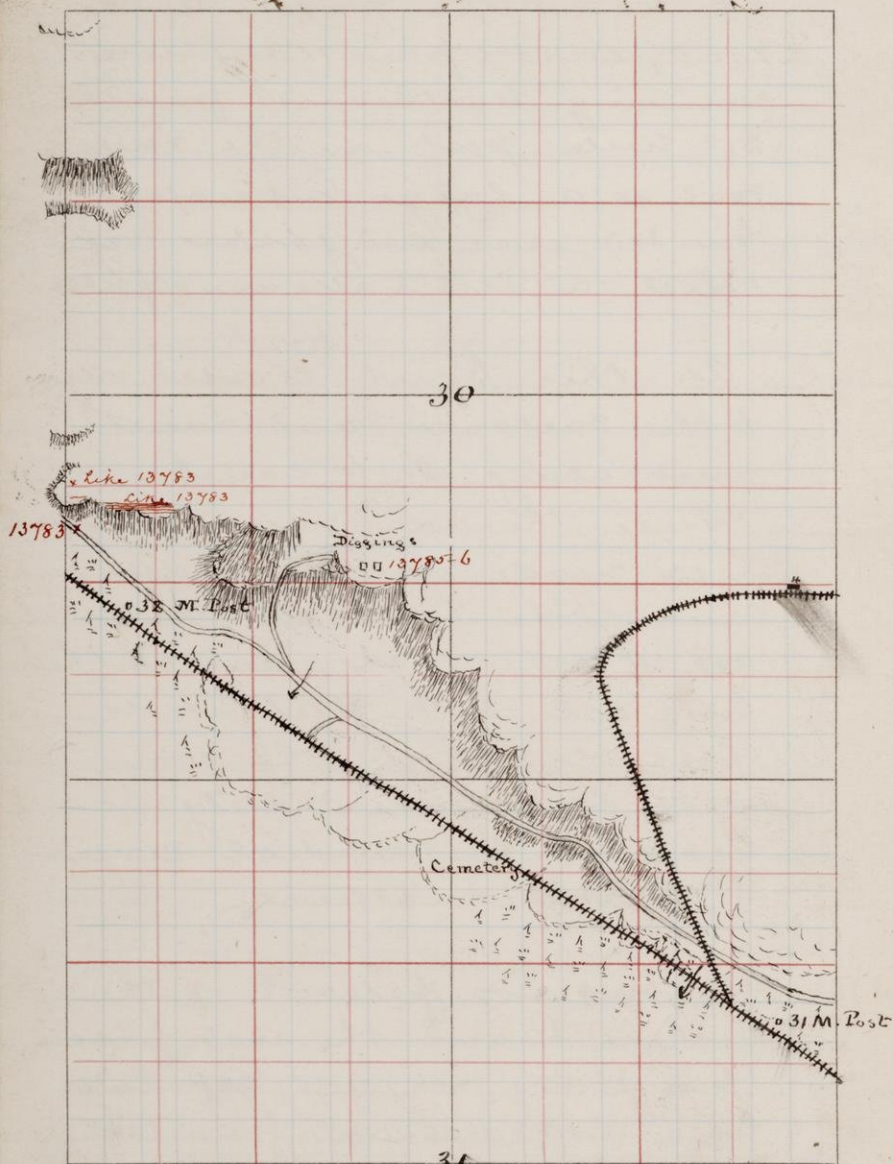
At this point crossed over to the railroad and went west along it to camp.

Here the road runs through hills made up of boulders and sand. The boulders are nearly all of iron rocks, and as the cuts are not deep it is possible that the iron rocks lie immediately beneath a superficial covering of detrital material.

13781 At about 300 paces E of the Pecheko River the road passes through two rock cuts, separated by a short distance from each other. The rock is similar to 13780.

T. 48

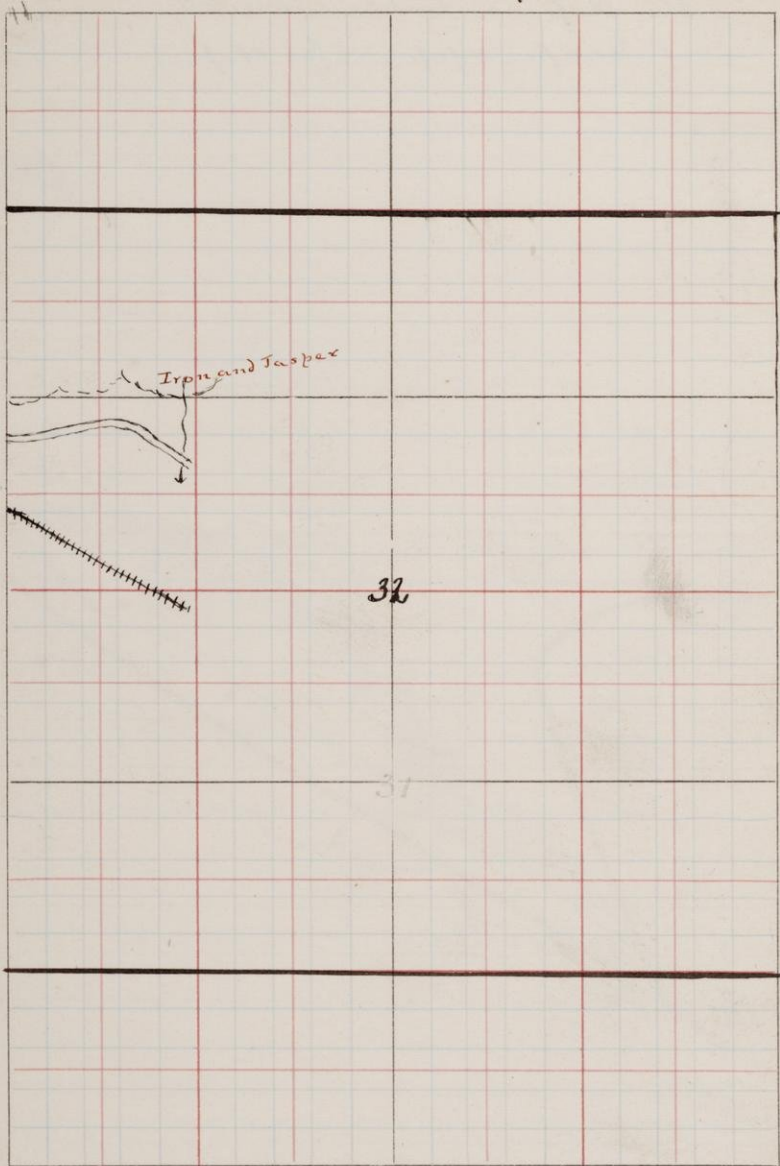
R. 29



Its dip is to the South
(map. opp. p. 11.)

T. 48

R. 29



Sept 21

Ran north on range line
between T48 R30 and T48.
R29 until struck granite.

13783 About 50 paces east of the line
on the county road is an out-
crop of siliceous iron ore
like 13780 - collected yesterday.

This rock runs a little
N. of E forming a low ridge
upon which the cross pass is
slightly affected.

The hills to the east of the
line were then examined
to determine whether they
consist of drift or iron rocks.

At 850 E and 500 S of the
E. quarter part of Sec 25
are some old pits and old
dump heaps. The rock in
the heaps seem to be the same
as 13780 - 13782.

Some pieces contain cavities

T.

R.

24

19

I

148

R

30

T

48

R.

29

25

30

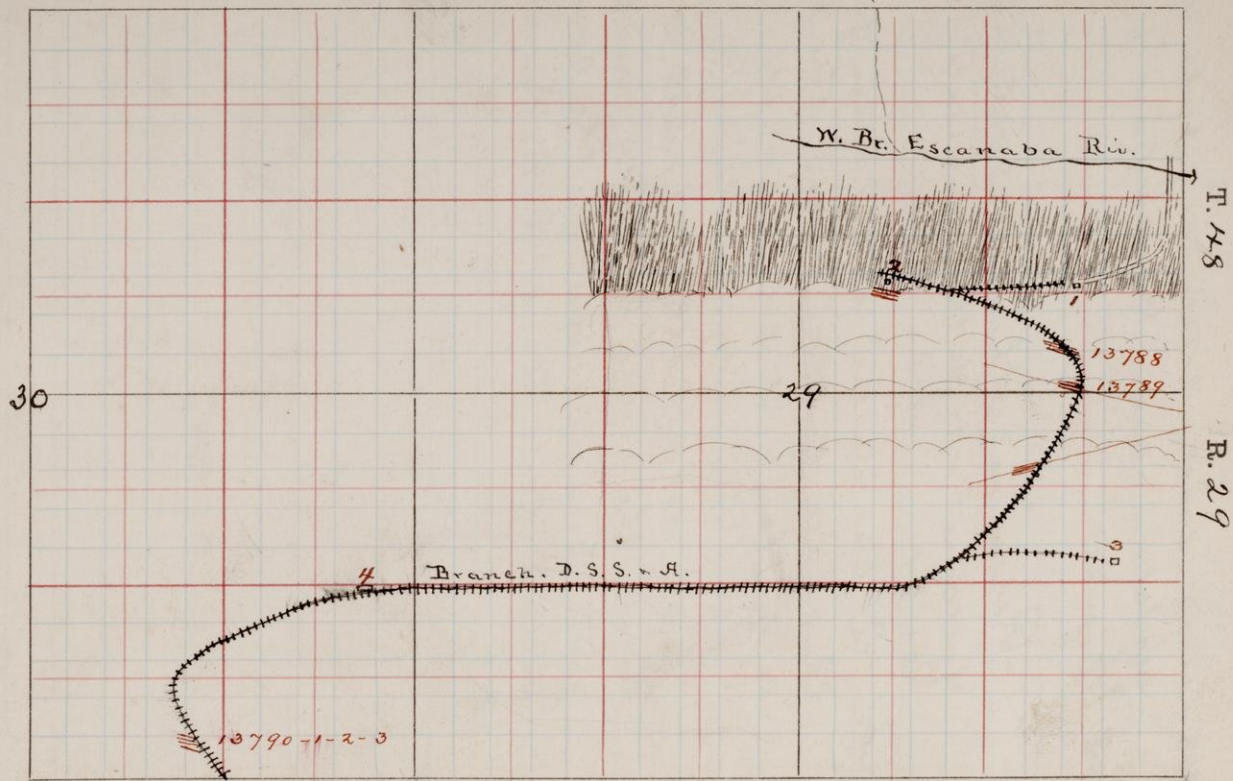
032 M. Post

13785 lined with little crystals of
 pearlescent and concretions of
 pyrite

Returned then to line and
 followed it to the granite in
 Dec 24.

13784 A specimen was taken from
 the face of the bluff 500 paces
 N of the D.E. cr. Dec 24, but
 was afterwards mislaid.

Here as at other points to the
 west the ridge is bold and rug-
 ged - precipitous on the south
 side - 500 N. of D.E. cr Dec.
 24.



Sept. 22"

Went north on spur railroad running into Sec. 29 in T 48 R. 29.

The course of the road is approximately given on the opposite page.

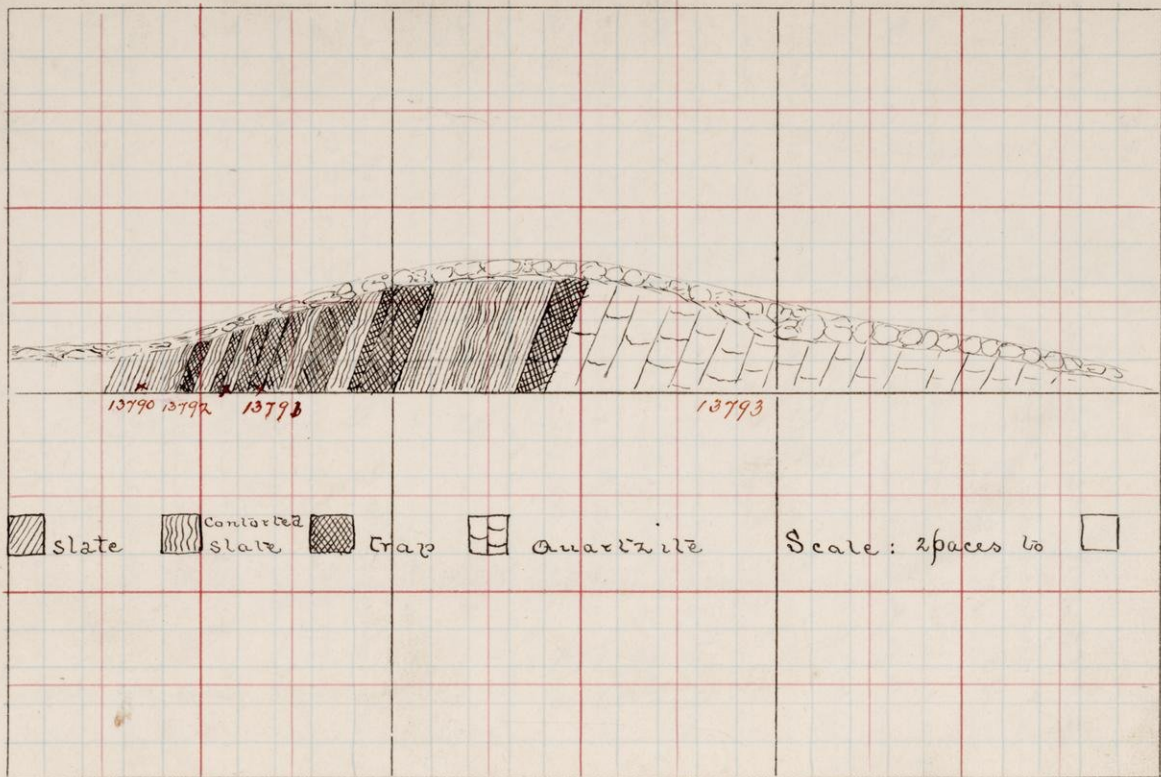
Of the corner stake in N. E. cor Sec 29, only an old unmarked post could be found. The old post having disappeared and all the old bearing trees burned.

The country is well cleared and has been swept by fire.

At 165 paces N. of the north line of Sec 29 the line of gneiss bluffs occur, trending in an E & W direction.

13787 Specimen of gneiss from face of bluffs 165 paces N. of N. E. cor Sec 29.

These bluffs form the north-



ern boundary of a wide valley in the center of which the ^{W. Branch of the Escanaba} ~~Rock~~ flows. The southern limit of this low valley is fixed by high hills of iron bearing rocks. The bottom of the valley is flat, and is underlain by iron beds, as reported by the engineers of the new Branch of the C. & N. W. R. R.

The shafts of the various mines on the south ridge were located and the mines numbered provisionally, for purposes of reference. The numbers are indicated on the map.

The one of all these pits is a comparatively soft ochreous variety, thus differing essentially from the specular ones of Michigamme, Spenon etc. The one appears to be limonite, or at any rate is mixed with a great deal of this mineral. It frequently

contains cavities in which are crystals of calcite, siderite or ankerite and a silky yellow mineral looking like a phosphate of iron.

In some cases the ore appears to be loose, in others it is well banded and yields good record of strike. In no case is the iron bearing bed to be clearly distinguished from the surrounding rocks. These are soft carbonaceous(?) slates and gas-py schists without any well marked bandings.

The dip of all is nearly vertical, the ^{strike} dips a few degrees N. or S. of W.

At pit (11) no strike was attainable, as the only open diggings are in drift or loose material, which here covers the rock to a depth of ± 25 feet.

At pit (2) strike = 12° N of W (true),

" " (3) " "

" " (4) " "

T.

R.

Gently Rolling

T
47
R
28

13810

13809

13811

Clarksburgh
Station

The cuts on the railroad yielded following data.

13788 125 N. 300 W of E. quarter
post Sec 29. Strike a little
N of W.

13789 40 N. 285 W. of E quarter post
Sec 29. Strike 12° N of W (true)

Exposures of thinly bedded
slates about 350 W and 200 S
of E quarter post Sec 29.

Strike 8° S of W.

The bedding is somewhat
distorted so that dip and strike
can not be relied upon as
affording data for studying
structure.

Just north of the south
line of Sec 30 is a long
cut, on the west side of which
the rocks are well exposed as
indicated in sketch a few pages
back.

13790 Black slate

13791 Trap dyke (?) or bed of black quartz
etc.

T.

R.

25

Gneiss

30

T
48

R

29

T
48

R

28

x 13795
x 13796Quartzite and
Slate

x 13807

Open Spruce and Tamarack

Swamp

30

31

Gently Rolling

13792 Curved and layered slate
next to dyke?

13793 Black, very vitreous quartzite.
The slates strike 12° N. of W.
and dip S. at a very high
angle. When struck with
the hammer this slates as-
sumes, where bruised, the luster
of graphite.

Where near the trap it ac-
quires pyrite and becomes
scaly.

The position of this ledge is
not known with certainty, as
no marks were seen at S.E.
Cor Sec 30, except a stake
set by a woodman.

Sept. 26"

Went north on road leaving
Clarksburgh a little east of
range line between R. 28 and 29.

The course of this road as indi-
cated in the map is as close
as could be determined with-
out meandering. At every

T.

R.

I
48
R
29

24

T
48
R
28

Gneiss

19

Gneiss

Gneiss

13864

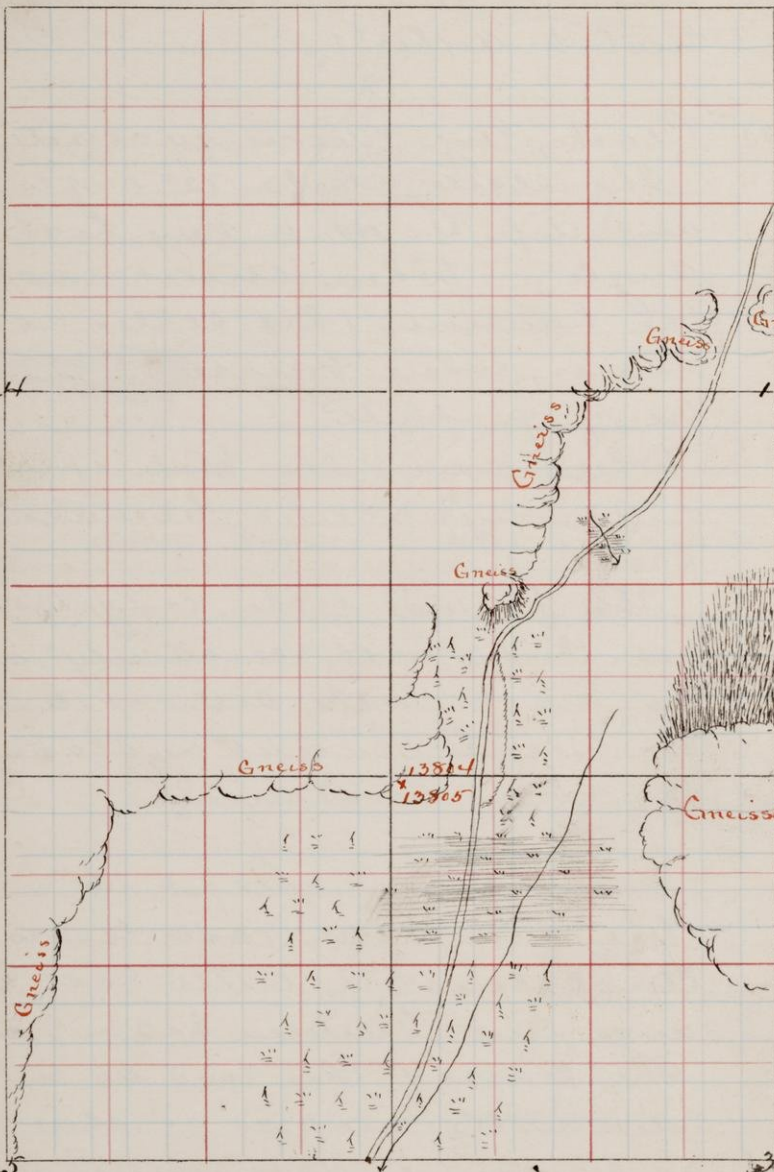
13805

Gneiss(?)

Gneiss

25

20



point where it crosses the section lines its position was definitely ascertained. The position between section lines is approximately, but probably not accurately represented.

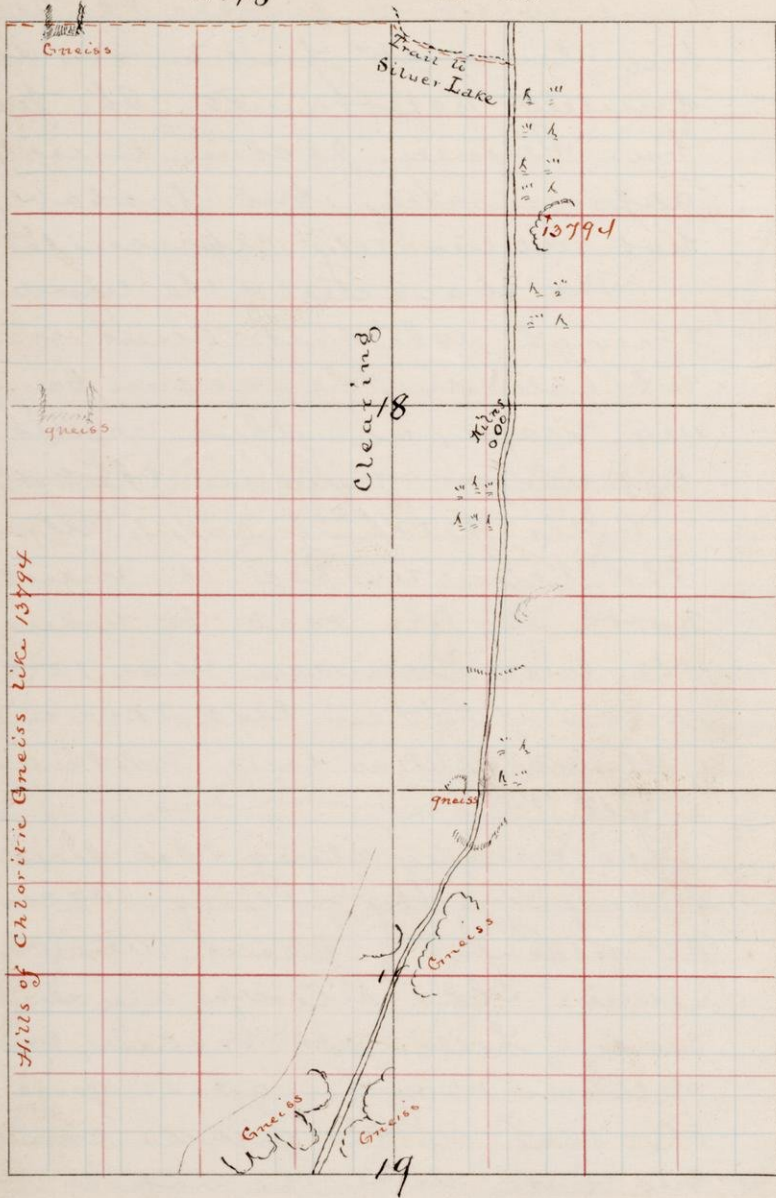
The character of the country through which it runs is indicated on the accompanying maps, and thus no description is given in the notes.

After pitching camp near the kilns in Dec 18, went north on the road to where the line between Dec 7 & 8 crosses it, then left road and followed section line north and south.

The country along this line is very gently rolling. Occasional outcrops of gneiss were observed. These outcrops are in the sides of hills, not broken, crumpled and ragged as is generally the case in the gneiss country - but with more the aspect of

T. 48

R. 28



the hills of the shale region.

13794 500 S. 650 W of U. E. cor Sec.
18

Chertic granite from E side
of road. low outcrop.

The center of Sec 18 is cleared -
in it no rocks were seen.

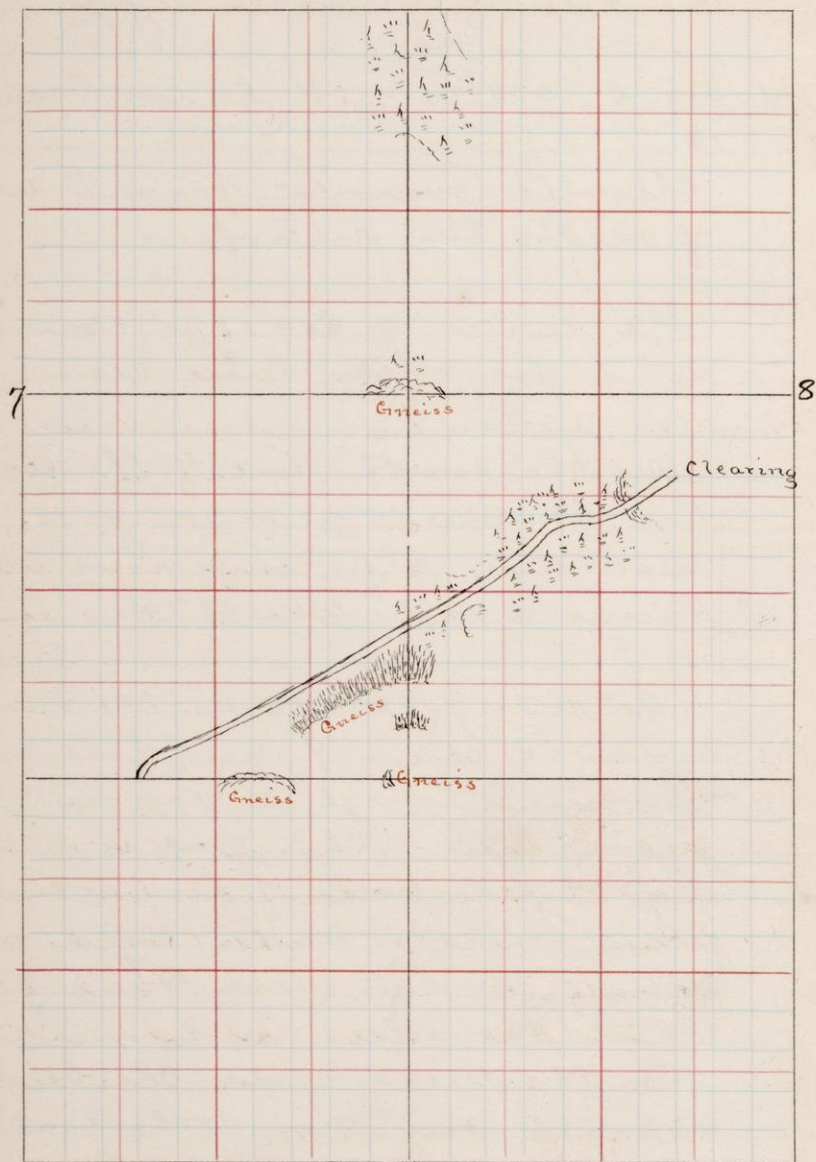
On the south line of the sec-
tion, however, and along the
west line are numerous ex-
posures of rock like 13794

As we go south on the road
beyond Section 19 we find it
running through a gap in
gneiss hills. This gap is occu-
pied by a piece of low swampy
ground, which is drained by a
stream, on the west bank of
which the road runs.

On the west side the bluffs
approach very close to the road.
They consist gneiss and granite,

T. 48

R. 28



13795-6- See next page

29

13797-13803 .. few pages further

and possess the usual features of hills of this material.

On the north line of Sec. 25 they leave the road and run off to the west, then bending south again, they finally come to an end at about the ^{center} quarter part of Sec. 25

13804 is a specimen from bluff at the corner between Secs. 24, 19, 25 & 30.

This gneiss is cut by veins of quartz and dykes of greenstone and granite some of the former of which have become schistose.

13805

The lower portions of Secs. 25 & 30 are occupied by high bluffs - on the right (west) a quartzite ridge, on the east a small ridge of greenstone.

The positions of these are indicated on the maps.

The quartzite hill is about 350 paces in width and is apparently isolated. The main mass of the rock is quartzite, as indicated. With this is associated considerable slate, the two being frequently intermingled so that they have the appearance of gneisses in many instances.

The strike of the rocks is E & W. This would carry them into the knob of greenstone to the east. No indications of it however were detected on the east side of the road.

About $\frac{1}{4}$ mile to the S.W. of this quartzite is the bluff of greenstone mentioned. This like the quartzite is isolated, and no contact between this and the quartzite was noted.

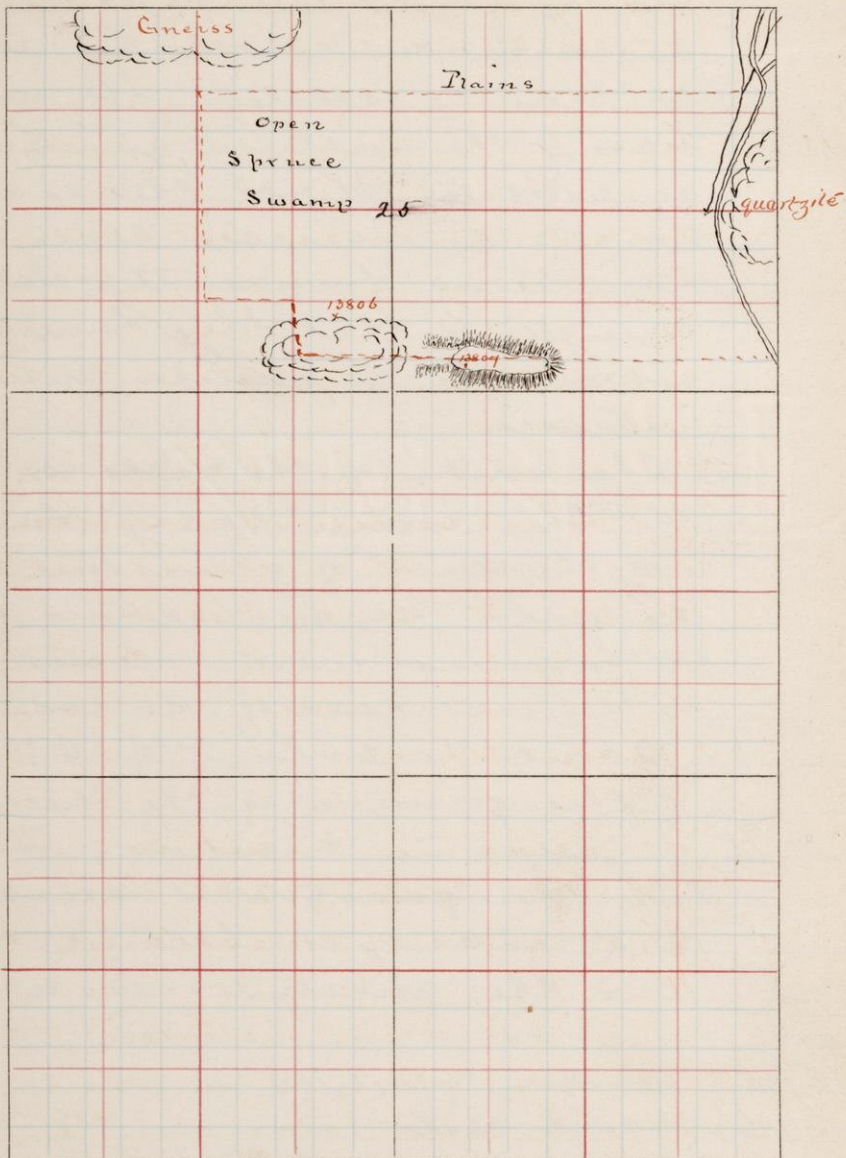
13795 } Schistose quartzite

13796 } Black slate

200 W. Hoo & of quartz from be-

T. 48

R. 29



between Sec 25. T 48 R 29 and
Sec 30 T 48 R 28.

13806 Schistose greenstone

13807 " "

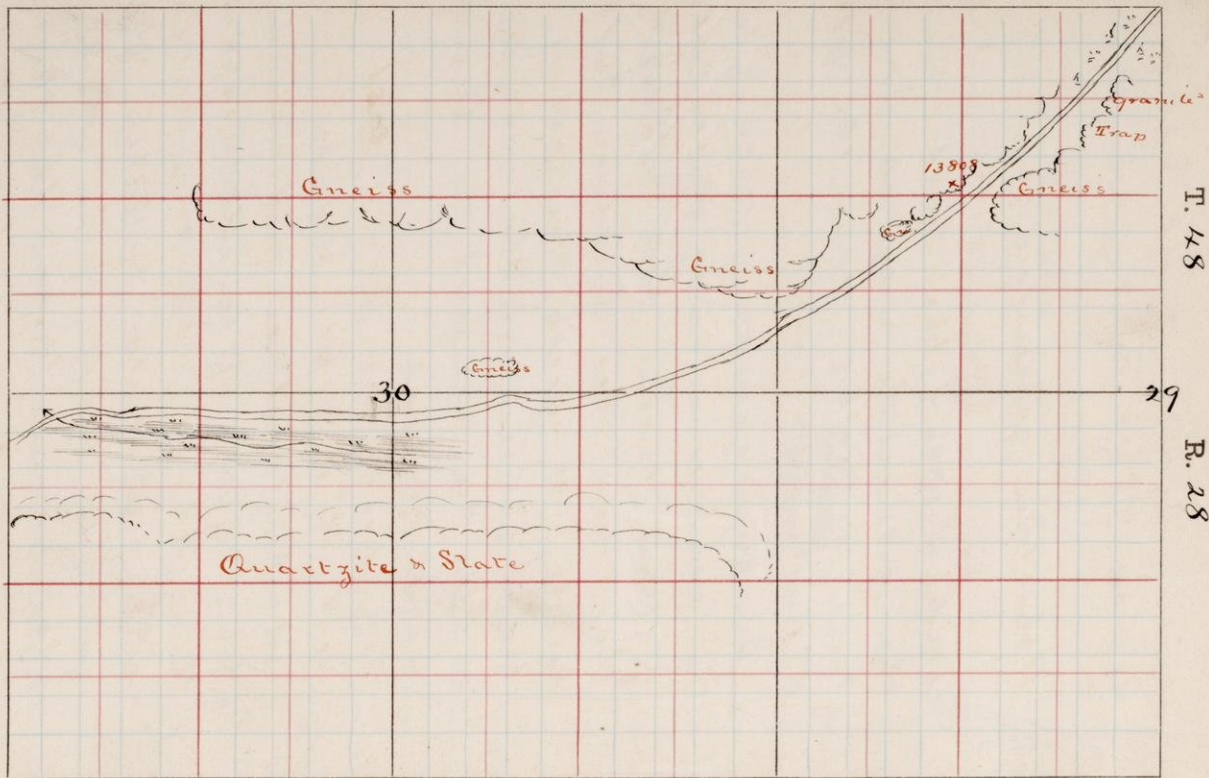
13806 & 13807 are both from
the greenstone ridge on south
line of Sec 25, near the quan-
tity post.

In consequence of lack of time
the examination of the relations
of these various rock masses
could not be followed suffi-
ciently to yield results of any
great interest. The region
should be studied in much
greater detail.

Sep. 30.

Started east on road running
from forks of river into Sec 20
T R.

This road runs between the
quartzite bluff from which
13795-6 were taken and the
gneiss bluff further north.



F. 48

R. 28

13808

13809

13810

See further.

The road is laid out so as to follow the East branch of the stream, and throughout passes as far as practicable along the low bottom land between the two ridges mentioned.

Just beyond 1500 paces east of west line of Sec 30 T48R28 the road takes a turn to the north crossing the gneiss through a gap as indicated on the map.

13808

At about 600 paces east of west line of Sec 29 is an outcrop of schistose greenstone.

It appears from its associations to be a schistose dyke with a strike of 22° E of N.

Continuing beyond this point the road becomes less and less distinct and finally loses

T. 48

R. 28

20

Cleared

Gneiss

29

S.E. Cor

except in the N.E. $\frac{1}{4}$ of Sec. 20.

This $\frac{1}{4}$ Sec. is cleared and fenced. The soil appears to be composed of drift material.

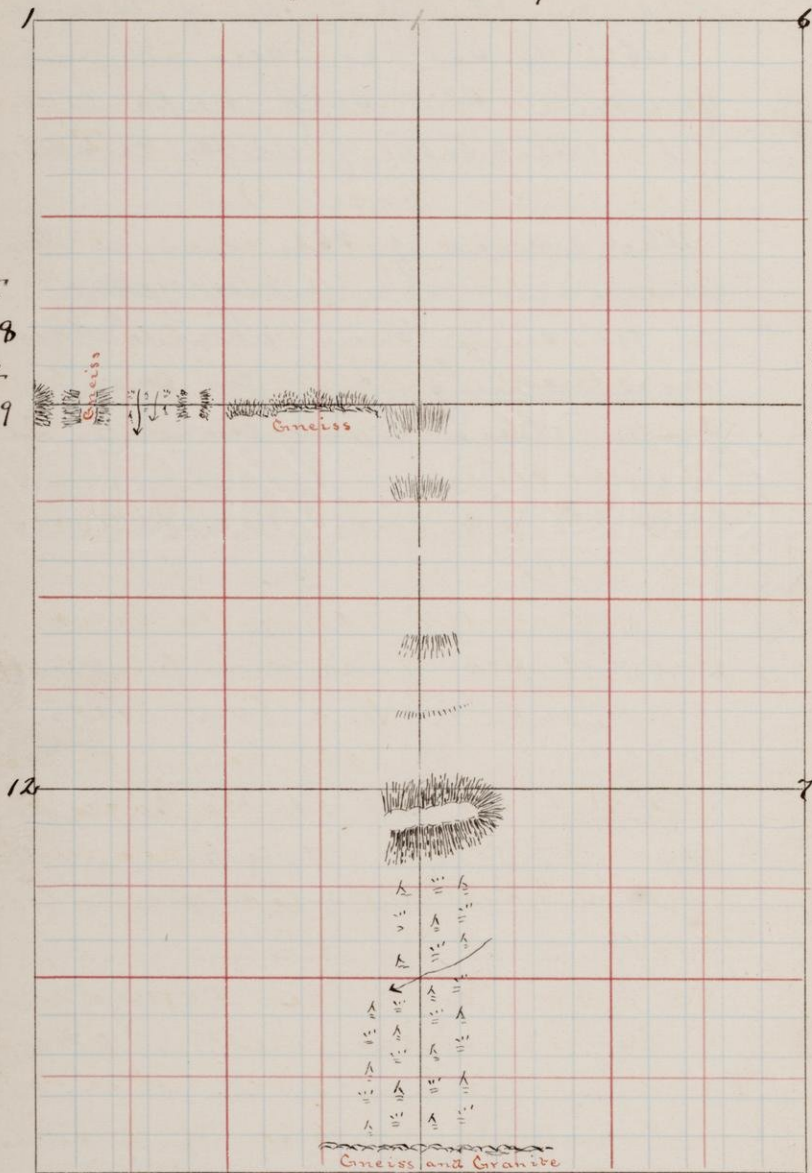
The course of this road is by no means accurately given - as no time was allowed for measuring, and no section lines were seen crossing it.

T. 48

R. 29

T
48
R
29

T
48
R
28



Sept. 27

Went north on road to crossing
of the N. line of Sec 18 T48.
R. 28 (See page 28).

Then went west along this
line to the S. W. corner Sec.
7, crossing Mr. Wright's trail
to Silver Lake at a few paces
east of the S. quarter post of
the section.

At this corner went north
one mile.

The country along the south
side of Sec. 7. is comparatively
level, only a few low hills
with rounded tops being crossed.

One of these about 150 paces E. of
the S. W. cor Sec 7 exposes in its
side a dark chloritic gneiss like
13494.

95 paces N. of this corner is
a perpendicular cliff of gneiss
running almost E. & W. It is 40 ft
high and is composed of gneiss,
cut by dykes of red granite.

Beyond this is a cedar swamp to the north of which is a rounded hill of some size, which however showed no rock in the line. From here to the N. E. corner, the country is again rolling.

At N. W. Cor Sec 7, ran west. From 150 to 500 paces W. of this corner the line runs along the top of a very abrupt hill of gneiss, which runs about E. W. and in certain places presents a perpendicular face to the north.

Beyond this gneiss exposures are frequent. The rock is not quite so dark in color as 13794 but is more like the chloritic gneiss found in and around the Huron Mountains.

At N. W. Cor Sec 12. T. 48.

13797

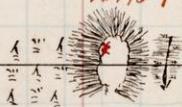
R. 29 is a small hill of greenstone, running down to the west to a swamp.

T. 48

R. 29

3

10798-9



Continuing west, crossed several small ridges of gneiss as indicated on map. Between these hills, as has already been remarked elsewhere, are swamps - cedar, spruce, Tamarack and alder.

Just west of the U. W. cor. of Sec 11 is a little creek which runs through a swamp, extending as far north as could be seen.

On the west side of this swamp is a hill of gneiss and granite.

13798 Coarse grained chloritic gneiss
13799 White granite cutting this gneiss.

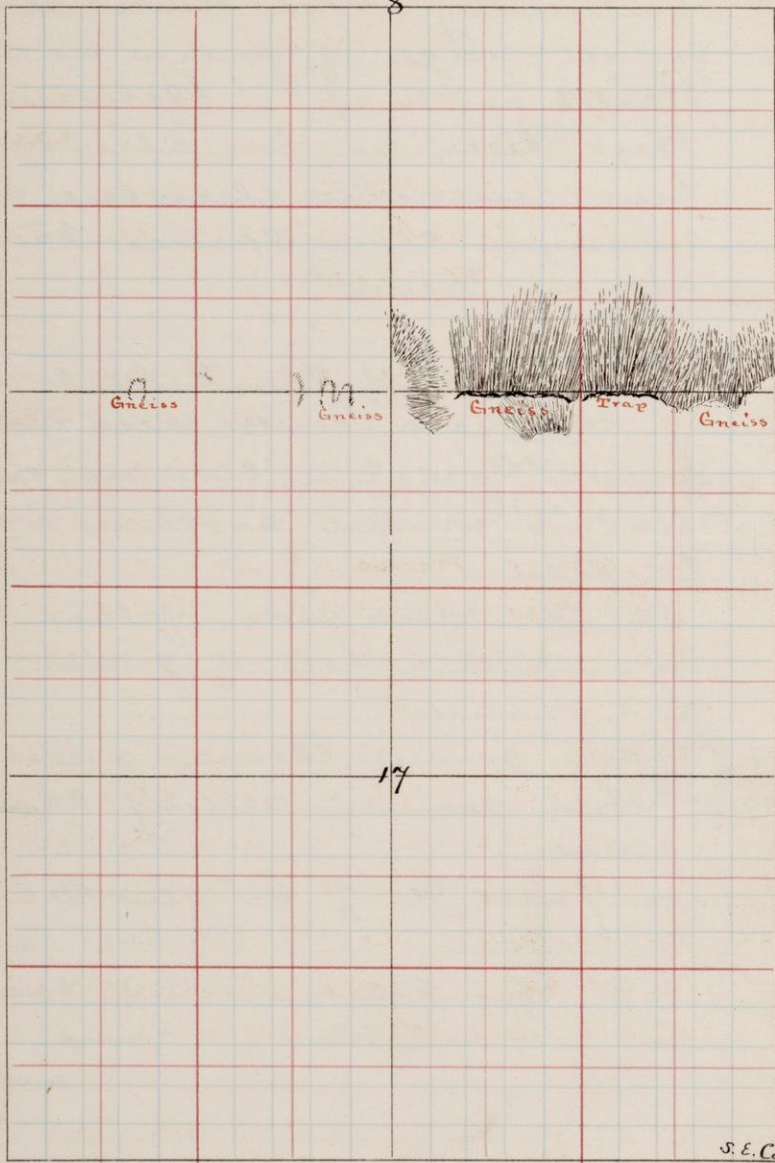
200 paces W. of D. E. cor Sec 3.

At this point turned back and retraced trail to camp.

T. 48

R. 28

8



17

S. E. Co.

Sept 28

Again went north on road to N. line of Sec 18, and there turned east.

The first half mile was over gently rolling hardwood country, in which are occasional exposures of gneiss.

East of the quarter post of Sec. 17 the country becomes more hilly. For nearly $\frac{1}{2}$ a mile the line runs along at the base of a perpendicular face of a bluff consisting of gneiss and trap.

13800

East of the creek in Sec 16 are hills, high and steep. In these no rocks were exposed until we reach a point 700 paces E of the N. W. Cor. of Sec 16 where ledges of a very light gneiss are exposed.

Beyond this point the country again becomes rough and broken, like typical gneiss country.

north and west.

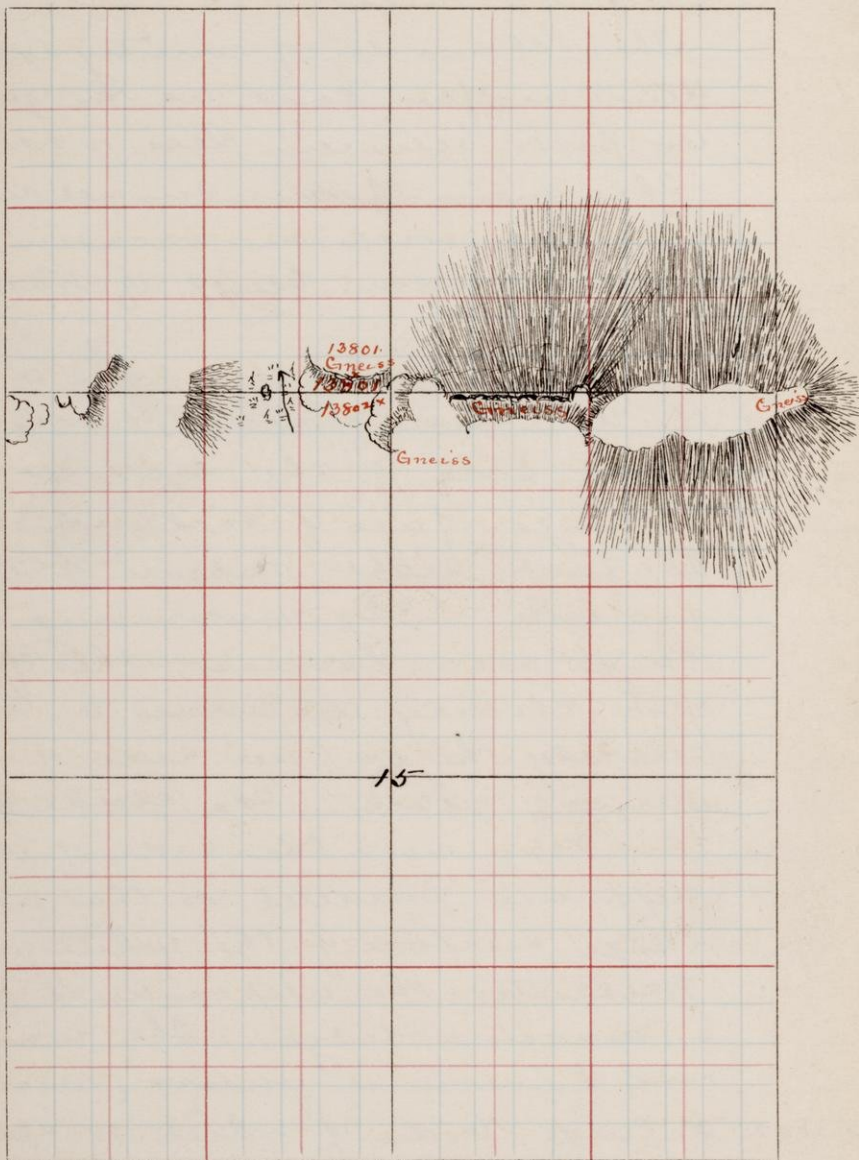
This character of country extended as far east as the quarter post between Secs 10 & 15.

The gneiss forms small rugged hills, with an occasional perpendicular bluff of trap.

- 13801 At about 850 paces East of the U. E. cor. of Sec 15, on the north side of the line is a large face of rock which at first sight appears to be a quartzite. By uncovering a large area, however, this face was clearly discovered to be merely the exposed side of a vein of quartz. The strike of this vein and the side of the cliff are parallel, so that a large surface of the white quartz presented the appearance of a massive ledge. The main rock however is gneiss (13801),
- 13802 a large body of which is seen in a perpendicular cliff, a

T. 48

R. 28



little further to the East.

13803 N.V. Cr. Sec 16. From a trap
dyke.

East of the N. quarter part of
Sec 15, the line runs for some
distance along the brow of a
very high hill, sloping gen-
tly to the north. The character
of this hill and the surround-
ing country reminds me very
strongly of the Huron Mts.,
South of Arvon.

At its top is an almost un-
interrupted exposure of gneiss
for 500 paces. The eastern
portion is generally level but
very high.

Sec. 14 is cleared, and contains
a settlement known as Green-
wood. A road from Ishpeming
affords the means of com-
munication with the markets.

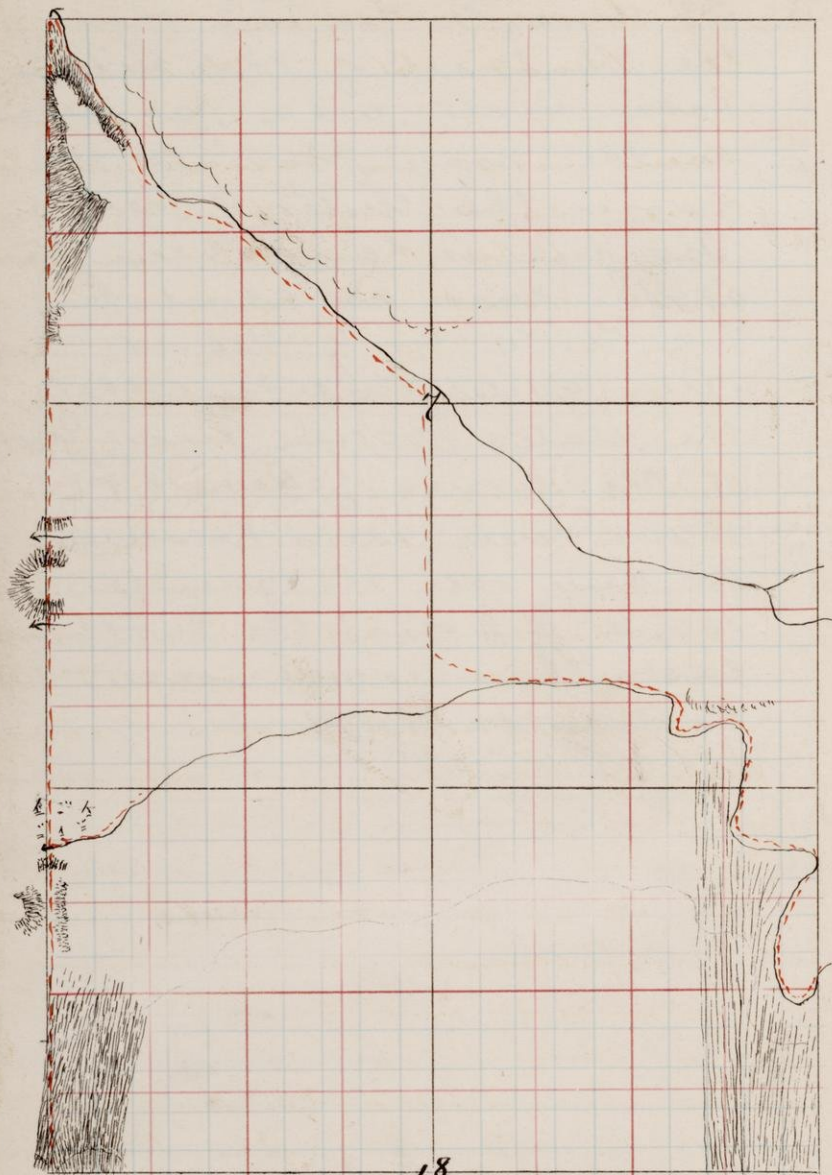
N.B. It will be noticed that the S. line of the Silver Lake Plate area, as given in the map provided me, crosses the center of Sec 15. The gneisses have been traced as far east as about 500 E of U. W. Cor of Sec. 14.

I am quite confident that the slates occur just north of the corner of Sec 15 & 14.

None were seen however. At any rate the gneisses extend further to the north and east than is represented by the lines on the map.

T. 50

R. 31



Arrow Range

cf. Book 61. p. 27 etc.

+ 34

Went south on range line between 50. 31 and 50. 32 -

From D. W. cr Dec 6 ran south about $1\frac{3}{4}$ miles

For the first mile south of the D. W. cr. Dec 6 the country is rolling like that characterizing the slate area.

No rocks were seen in position.

The little creek 1540 paces south of U. W. cr Dec 7 T 50 R 31, contains in its bed many boulders of slate and a few of granite.

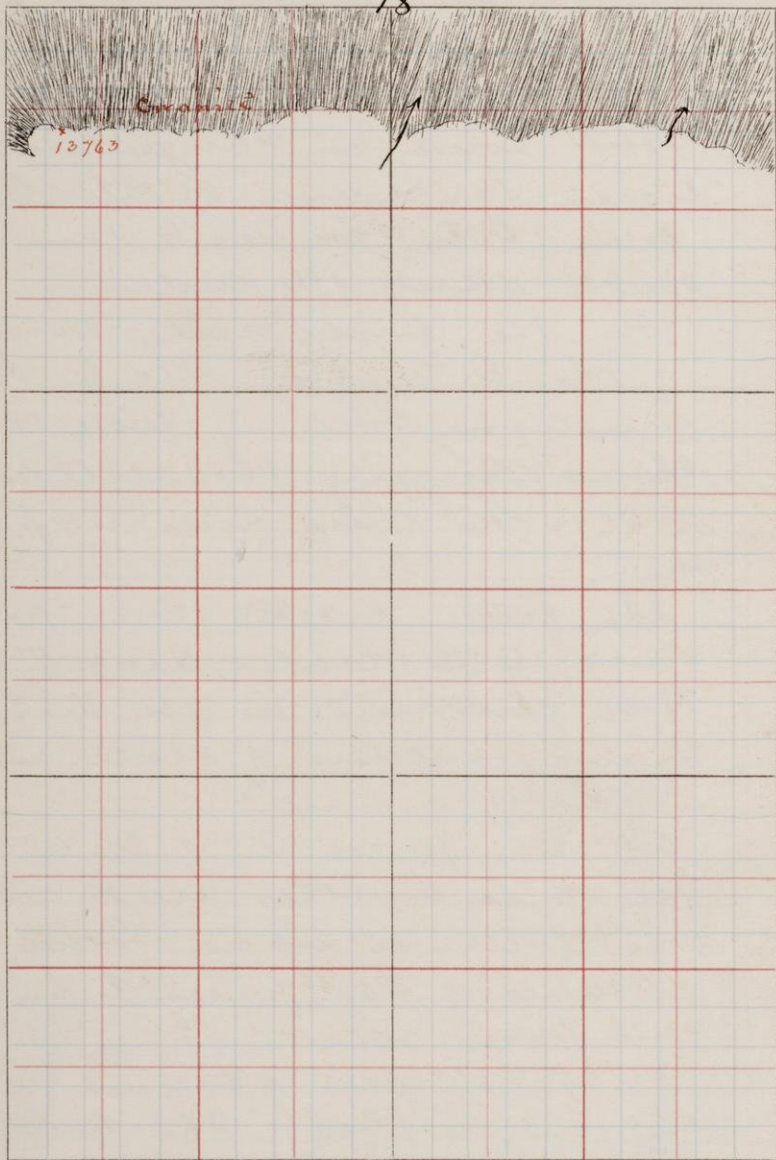
At 125 paces S. of U. W. cr Dec 18 is another creek, which was followed up and down a distance of 300 paces E and 400 paces West.

No rocks were observed in position in its bed. The bottom consist principally of sand

T. 50

R. 31

18



with pebbles of slate and granite
Continued South to 1300 paces
S. of N. W. cor Sec 18.

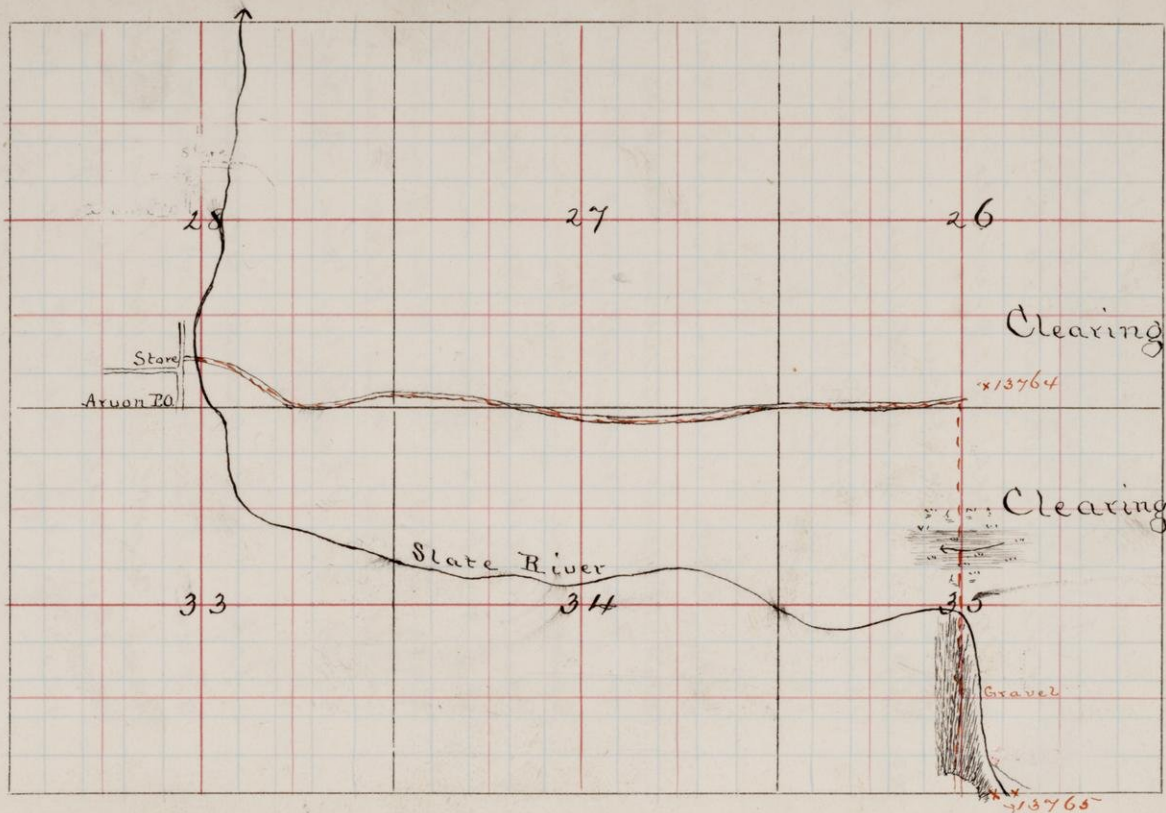
Here encountered a high
rough hill of granite and
greenstone, etc.

13763

Specimen of chloritic granite
1300 S. 125 E of N. W. cor Sec
18 - T. 50 R 31.

At this point turned east
and went across Section 18
to the creek 420 East of the
East line of the Section. Followed
this creek down, expecting to
find it as given in Land of-
fice plat. It was found how-
ever that this creek runs
S. W. to the S. W. cor of Sec 7

Left the creek somewhere
about the center of Sec 7 and
ran north across this Section
to the creek which flows from
the Section at the N. W. corner



T. 51

R. 31

Went East along road running from Arvon to a farmer's in Secs 26 and 35. T 51. R 31.

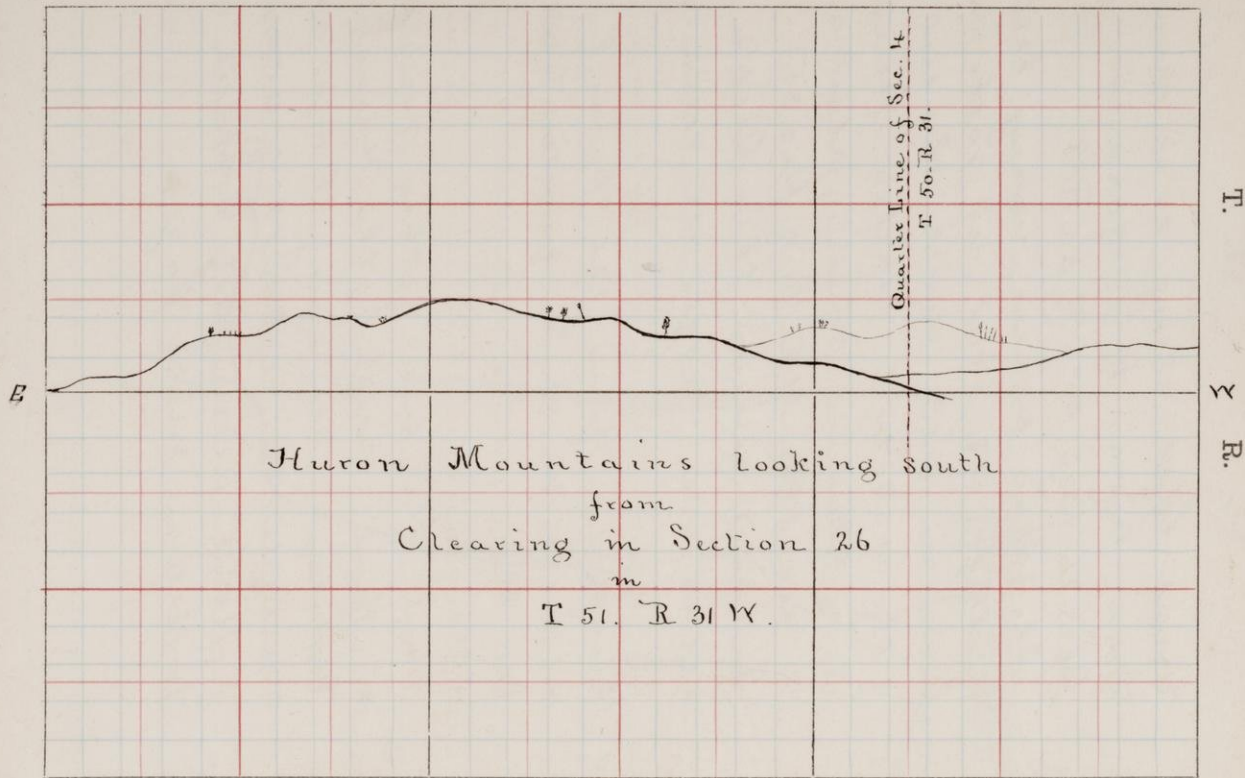
The road crosses many hills of drift etc., but no rocks were seen in situ until the end of the road was reached. There is a clearing covering about a $\frac{1}{4}$ Sec. (the N.E. $\frac{1}{4}$ of Sec. 35).

In and around this Section occasional ledges are seen.

13764 Quartzite from 125 paces E and 125 N. of N. quarter part of Sec 35.

From the end of this road is a fine view of the Huron Mountains, running E & W, at some distance South of Arvon.

Have attempted to sketch their profile on next page.



From the extremity^y of this road ran south from north quarter post of Sec 35 to south quarter post of same section then east to N. W. cor Sec 4 in T 50 R 31.

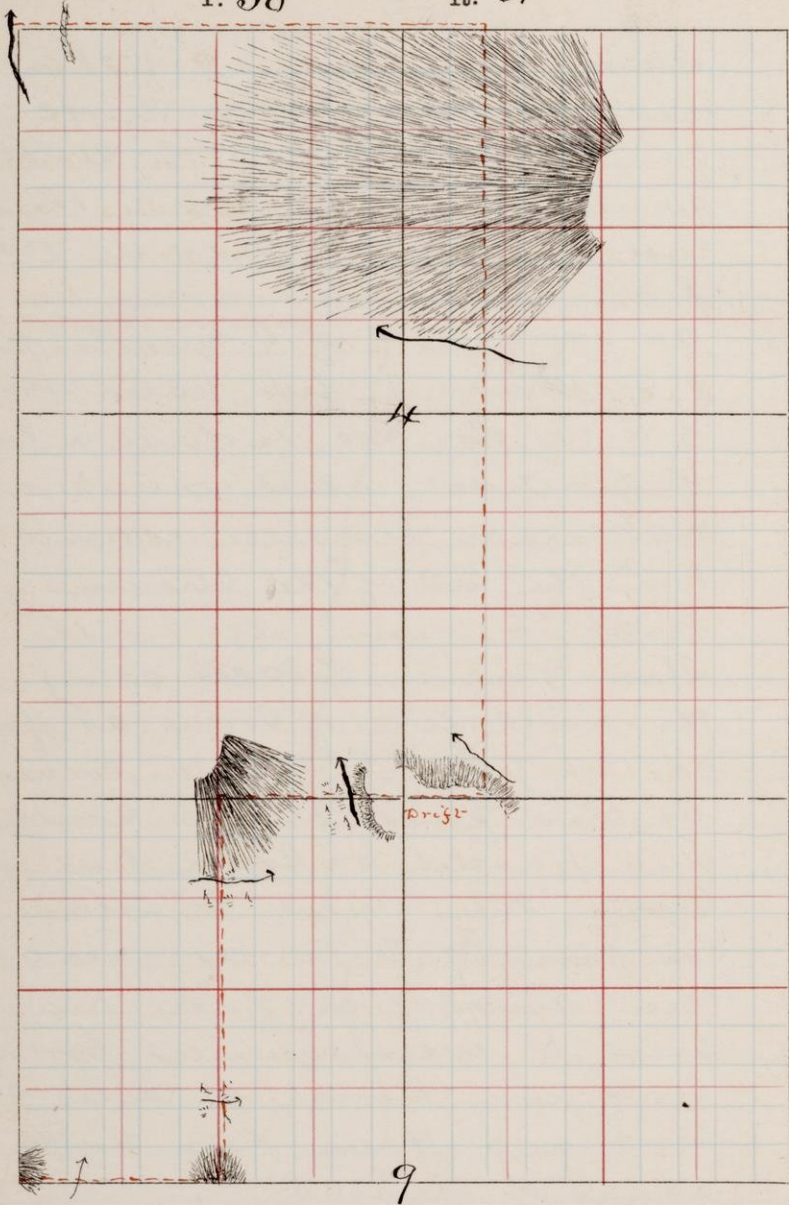
13765 At 275 paces E of S. quarter post of Sec 35 and a few paces west of N. W. cor. Sec 4. found a ledge of quartzite, which extends a considerable distance up and down the bed of the stream.

Then continued ~~east~~ along the north line of Sec. 4 as far as 1200 paces E of N. W. corner.

At this point turned south, and traveled to South line of Section, then west to within 500 paces of N. W. cor. Sec 9, then south 1000 paces and west to west quarter post of Sec 9 and through to center of Sec 8, and from here north again to the road.

T. 50

R. 31



The character of the country in Sections 4 and 9 is sufficiently indicated in opposite map. No further description is necessary as no rocks were found in place.

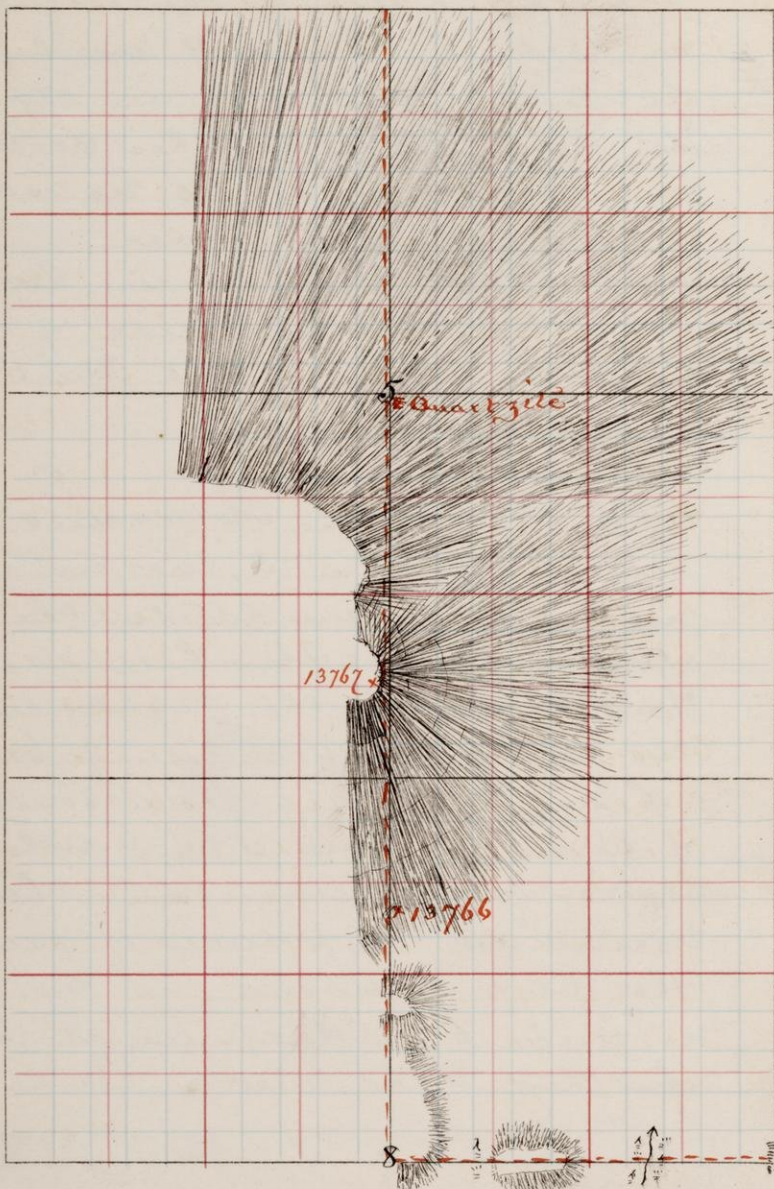
The hill marked in Sec. 4 is the western rise of the eastern ridge of the Huron mountains.

As we begin to ascend the hill in Section 5, we immediately again strike the older rocks. The hill is that shown to the right in the sketch on preceding page.

Like the Big Hill South of Arvon, so here the Southern slope of the mountain shows numerous exposures of rock. The slope however is by no means as steep as it is further to the west.

T. 50

R. 31



13766 Massive greenstone from
1700 N 1000 W of D. E. cr.
Sec 8. T 50 R 31

The top of the hill - 250
N of D. line of Sec 5 - is
crowned with a series of ledges
of gneiss and hornblende
Schist, striking 15° S. of E.

13767 is a specimen of hornblende
Schist from 250 N. 1000
W. of D. E. cr Sec 5. T 50 R 31.

Beyond this series of ledges
the slope begins to fall
away to the north. Just
beyond the crest - as in the other
cases noted with respect to
this range of hills further
west - is an exposure of
quartzite of which no speci-
men was taken.

This is very near to the
center of the Sec 5.

No other rocks were observed
during the day.

T. 51

R. 31

Quarx Fine Sec 5

35

