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Notes on region between Crystal Falls, Mich. and Michigamme Riv[er]: [specimens 26000-26081]. No. 181 1895

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1895

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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.

181

Notes

in

Region

between

Crystal Falls, Mich.
and

Michigamme Riv.

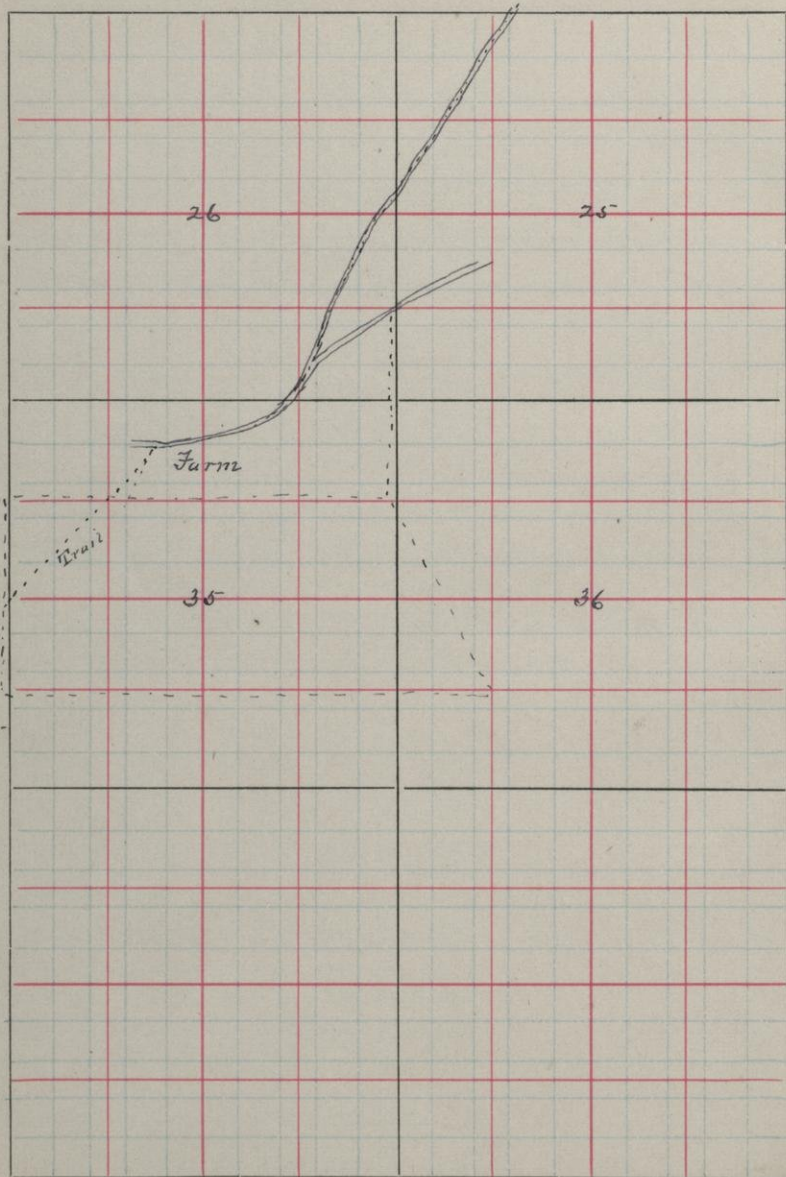
July, 1895

W. S. Bayley
W. F. Willard

S.

T. 42

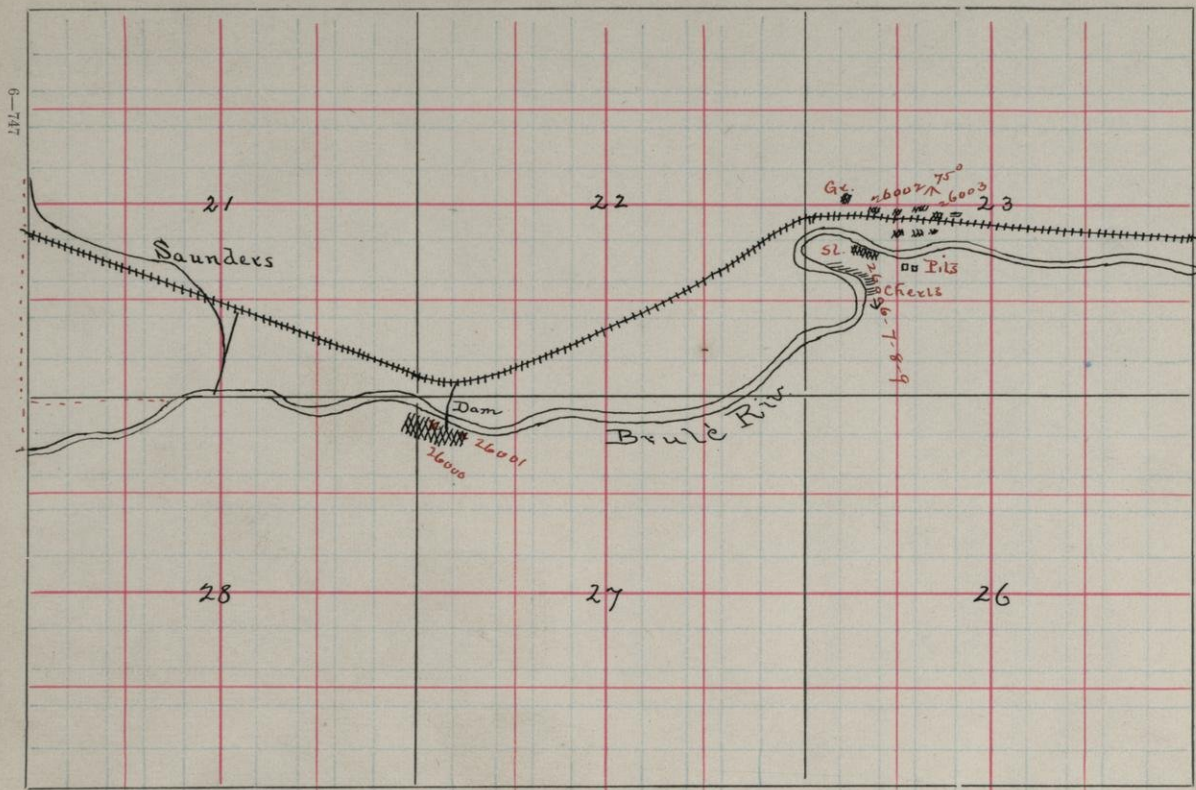
R. 35



July 14th

Made a run into Secs. 25, 26, 35,
and 36, in T. 42-35. South of Iron
River following the lines indicated
on opposite page, finding, howev-
er, no rock ledges. The river bank
at this place is a high sand and
gravel bank.

R. 34



T. 42 - R. 34.

From above Saunders in Sec 21, T. 42
R. 34, followed the river and rail-
road eastward toward Armstrong.
See route in following pages.

? Just East of the point where the E 22nd
line of Sec 22 crosses the river is
a dam, on Wisconsin side of which
is a high bluff, some 100 - 120 ft.
high and about 200 paces wide
at base.

At the base the rock is a breccia-
ted, calcareous quartzite, which in
places is conglomeratic looking, is
spheroidal appearing - like the Goose
Lake quartzite on the Marquette
range.

26000 Specimen represents this phase

Further toward top of bluff the rock
is more quartzitic, but even here
it is plainly calcareous.

26000 Same near top of bluff.

Map. p. 3.

T. 42 R. 34

The nest of ledges in the railroad in the S.W. 1/4 sec 23. consists of exposures of a green schistose rock that seems to be a schistose amygdaloid. Its schistosity - strikes nearly E.W. and dips N. at about 45° . The foliation bands around dense green nuclei of the same rock as the foliated portions, but often non-amygdaloidal.

26002 900 N. 400 E of S.W. cor. Sec 23. 42-34. Schistose amygdaloid with long black amygdalules, elongated in line of foliation.

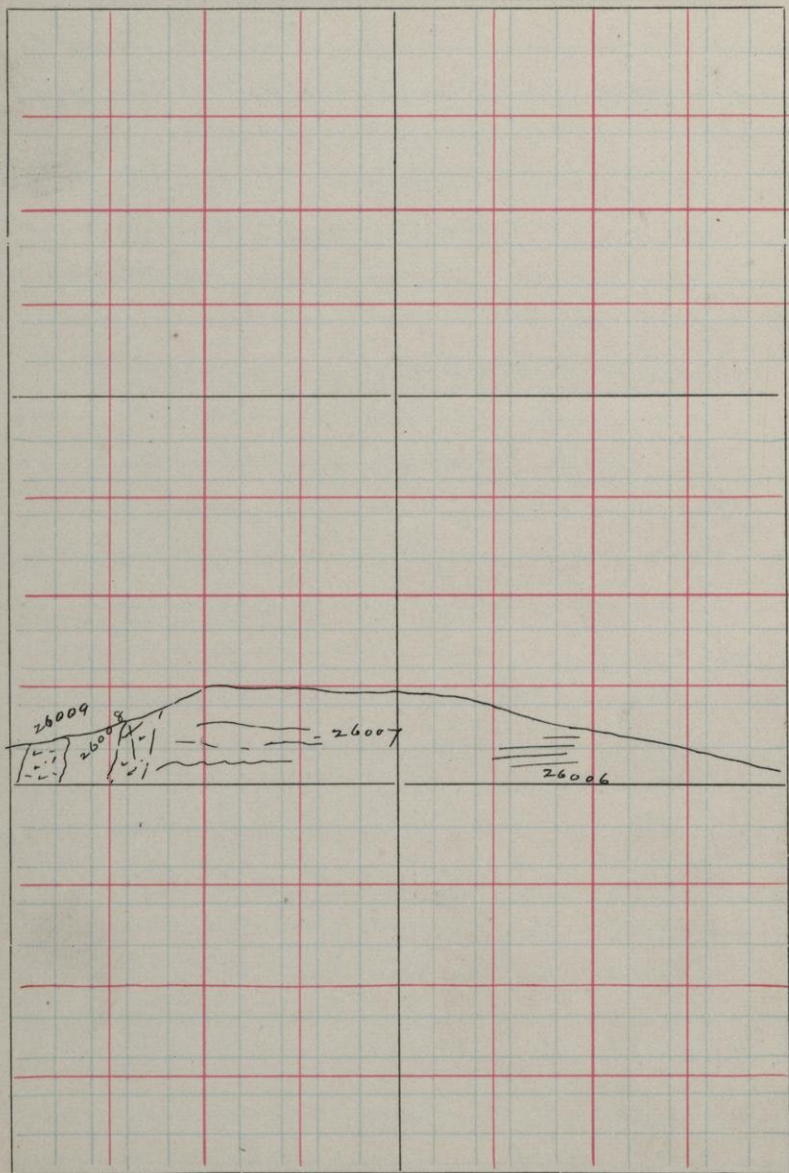
26003 Portion of dense nucleus from a ledge at 900 N. 700 E, on side of railroad. In this ledge there is a band of cherty material, very narrow, but resembling a thin bed. Its strike is E.W. and dip 45° N.

Again, on the east bank of river at about 80 E. 600 N of S.W. cor Sec 23. is a long, low exposure of an schistose crumbly rock that appeared from opposite side of river to be a ferruginous chert. Here and there it is cut by

S.

T.

R.



a soft green rock resembling an altered dyke.

Again at 350 E. 790 N. of O.W. Cor. Sec. 23. on Wisconsin side of the river, is another exposure of rocks resembling those just described. For 40 paces from the west end of exposure the rocks are schistose and apparently bedded, but otherwise are without well defined structure. Dip and strike could not be taken.

- For
- 26004 Green slate - W. end exposure
- 26005 Ferruginous slate -
- see p. 7. Black slate -
- 26006 Green slate - W. end exposure
- 26007 Ferruginous slate -
- 26008 Black slate -

26007 is only a ferruginous phase of 26008, while the latter and 26006 grade into each other.

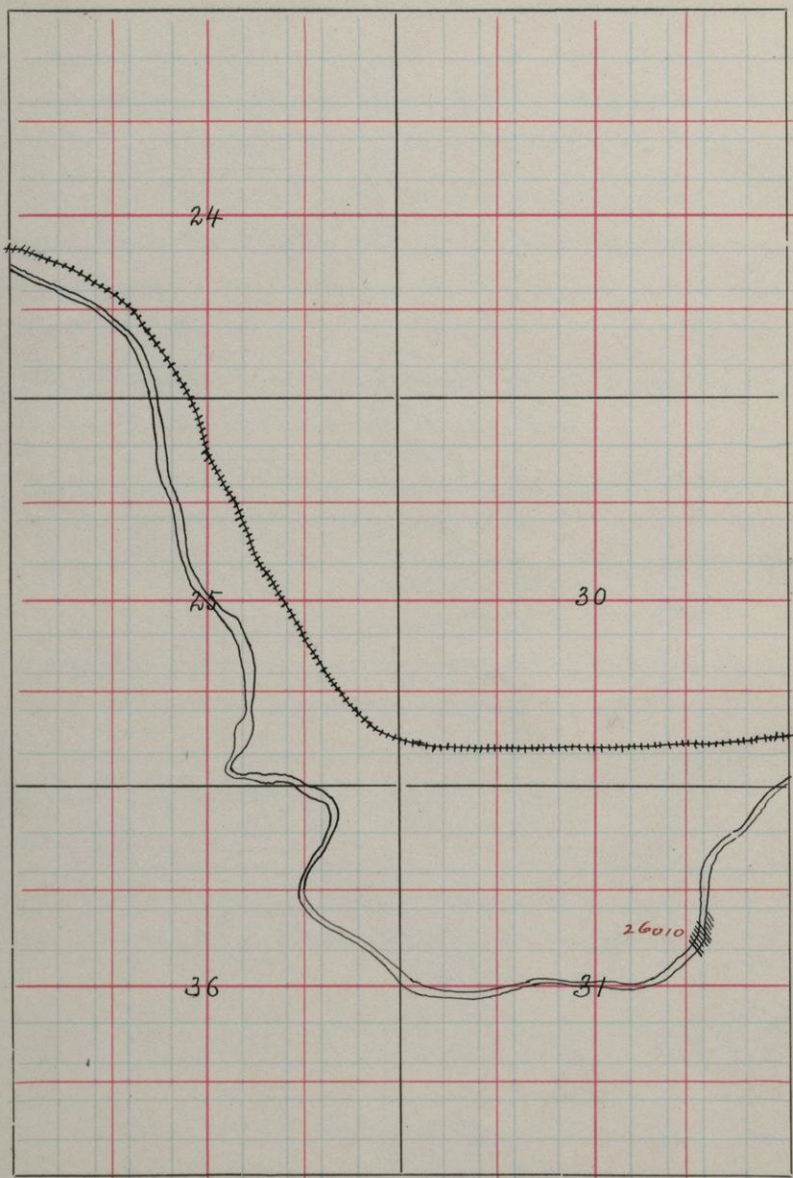
At the East end of the exposure are two massive knots of a schistose greenstone. They are both small and are apparently dyke-like. 26008 comes from between the two.

- 26009 Greenstone from Eastern dyke.

S.

T. 42

R. 34-33



J. 42 - R. 33

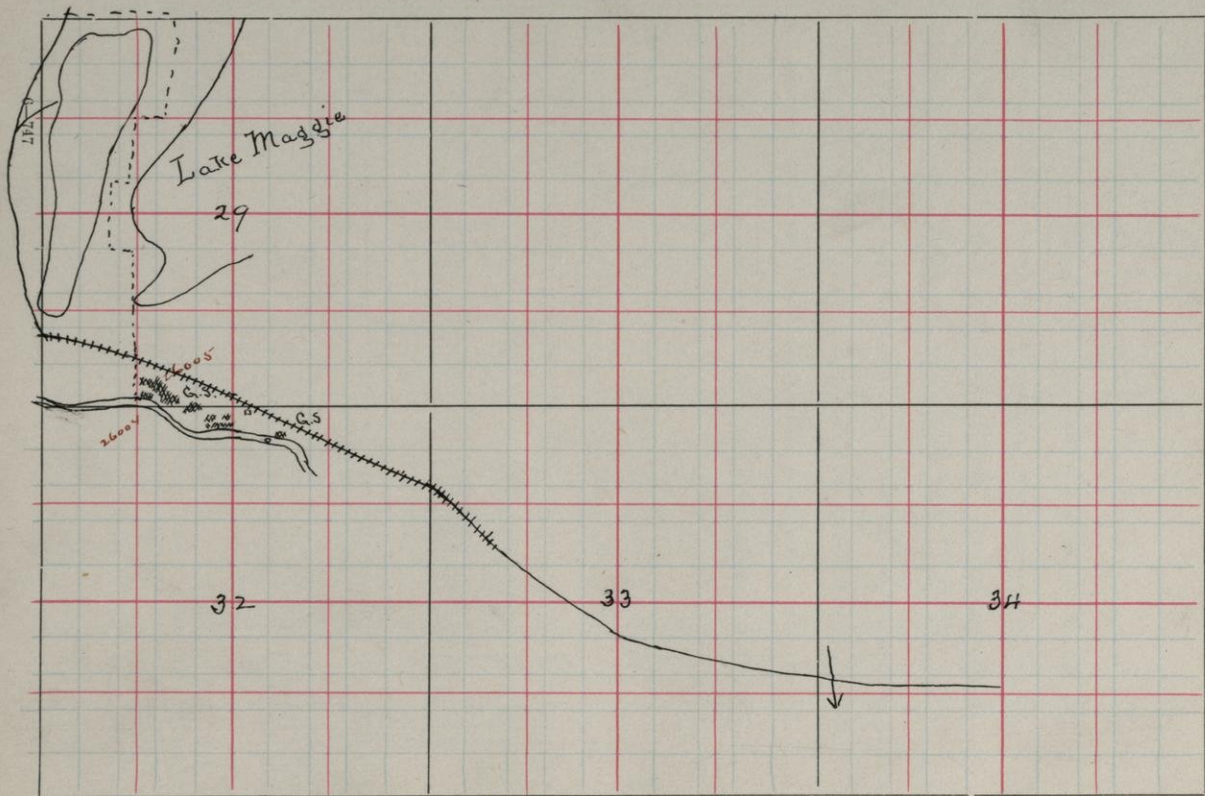
26010

Continued down rail road and river through sections 24, 25 in J. 42 R. 34, and 30 & 31 in J. 42 - R. 33. finding rock only at the falls and in ledges exposed on both sides of the river, in the N. E. $\frac{1}{4}$ Sec 31. The rock is a green ochre, something like and amygdaloid - with its - schistosity - striking 30° S of E. and dipping nearly vertically.

S.

T. 42

R. 33



In Sec. 29, 42-33, S. and W. of S. 14 part of Section, near the Station Arm string, is a large piece of the Schistose amygdaloid, spheroidally parted thus resembling a conglomerate of greenstone in a schistose greenstone matrix. The schistosity strikes a little S of E. From the position of the amygdaloidal and non-amygdaloidal band, I would judge that rocks strike S.E. and dip 75° N.E.

26004 is from river side. 650 E. of S.W. Cor Sec 29.

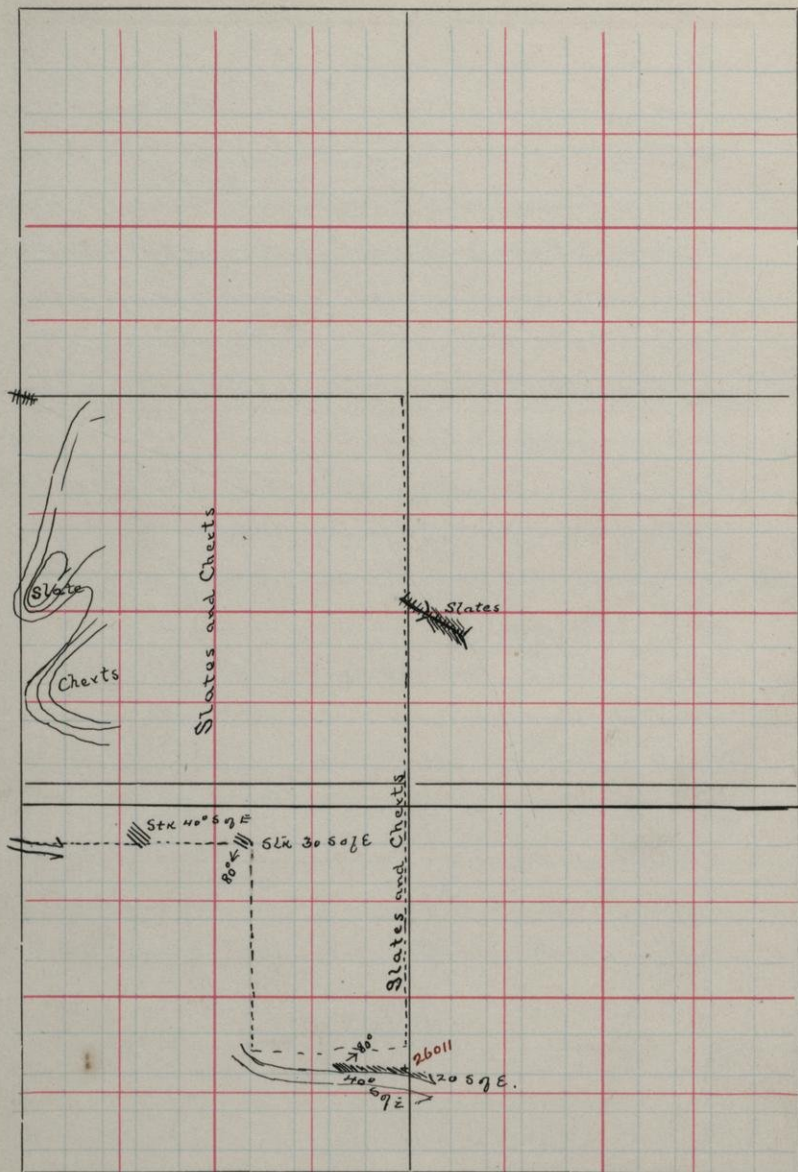
26005 From hill, at about 750 E. SW N of same corner.

The country in Secs 34 and 35, 42-33, and Secs. 2 & 3, 41-33, between railroad and river is without exposures.

S.

T.

R.



T. 42. R. 33

Ran south from bridge on railroad, over creek at about center NW $\frac{1}{4}$ Sec 36, along the west side of a ridge of hills as far as 1075 S. Then East 600, South again 600 and East 400. From this point run north to railroad,

over all this country formed ledges of chert and slates. The northerly ledges consist mainly of loose pieces. Near the river, however, there is a distinct interbanding of layers with a strike 20° S of E. and a vertical dip, or a dip to the N. E. at 50° . Along the river the rocks are compact the bands of chert sometimes measuring 8 in. in width. At East end of run, on the river bank, the strike of the rocks veers a little to the north being here about 20° S. of E.

26011

Specimen of black slate from river bank.

On the run north the chert are less frequently met with, and the slates more so. A large cut in the railroad at 50 paces East of the run exhibits beautifully the slaty rocks. These are very fissile, and are interbanded.

with but very little chert. Their strike is about S.E. and dip vertical. In places the layers are contorted, but only in a minor way. At the East end of the But the layers bend a little to the South.

Could not get location in this entire run. Ledges may be easily located from bridge, which must itself have been located accurately in some of the northern runs.

T 42 R 32

Tran 500 S. of U.E. Cr Dec 19. T. 42 - 32
ran west to

in south side of large hill at 500 W.
350 S. of U.E. Cr. are exposures of the be-
ciliar chert breccia like that on west
side of river at Crystal Falls. This breccia
consists of white chert fragments
with sharp edges cemented in all
directions in a groundmass of black
slate, which is very ochistose, and whose
foliation strikes about N 05. From the
relations of the chert fragments to one
another it seems probable that the
rock was an interbedded chert-slate
series, which has been shattered and
made ochistose by pressure and frac-
ture.

26012 Specimen chert breccia.

Interbanded with the breccia are
wide layers of slate.

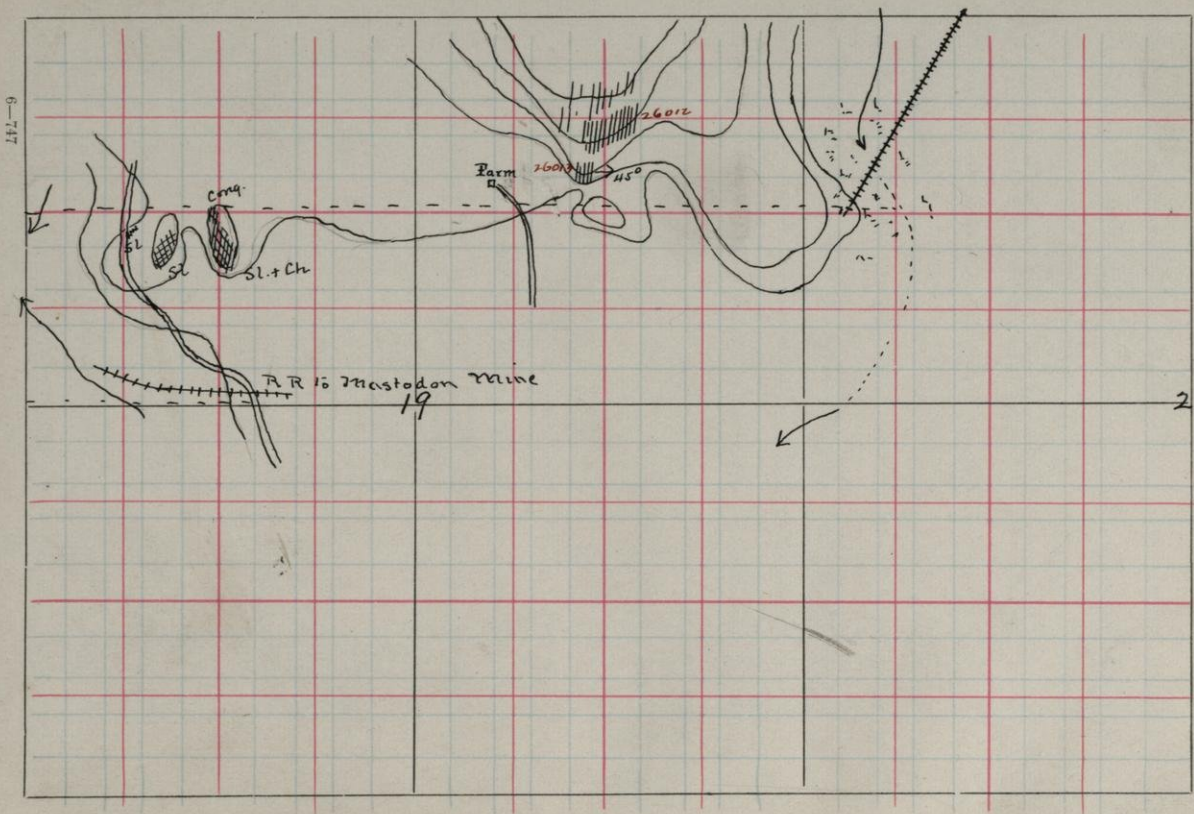
At 560 W. 425 S. on south slope of the
hill the breccia is especially well exhibi-
ed. The chert fragments are here so
numerous that the rock is almost
white. The matrix is ^{almost} entirely absent

S. 19

T. 42

R. 32

20



6-747

in places, while at other times it is scarcely observable. The Oolitic is apparently dips 45° N. 45° E. and this is apparently the true dip of the layers.

26013

Chert breccia with but little matrix.

At 500 W. 650 S. of U. E. Cor. Sec 19 are two hills, composed of slates in which no well defined dip and strike could be determined. In a few instances of small exposures the slates appear to be intersected with narrow chert bands which are brecciated.

At 650 W. 125 S. of U. E. Cor. Sec 20.

26014

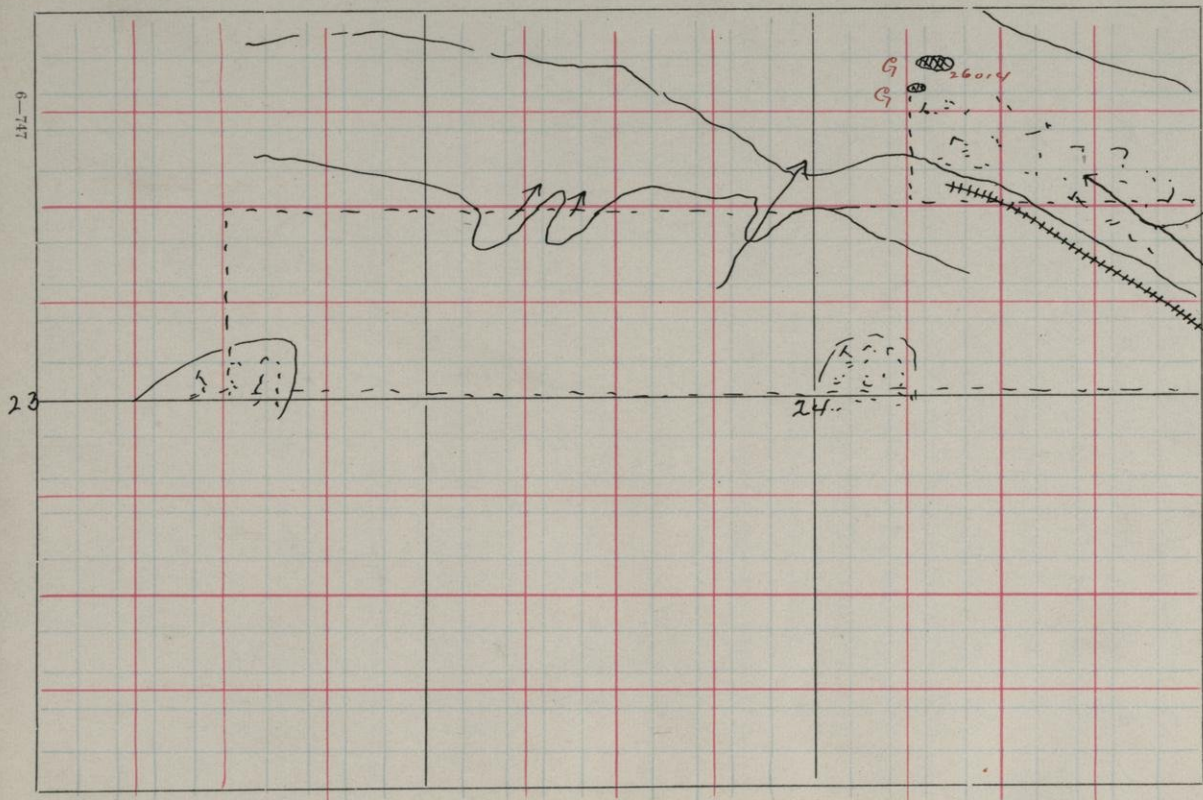
T. 42 - 33. is the Northwestern of two small hills of dense greenstone. In return run no rocks were observed as far East as center of Sec 19, 42 - 32.

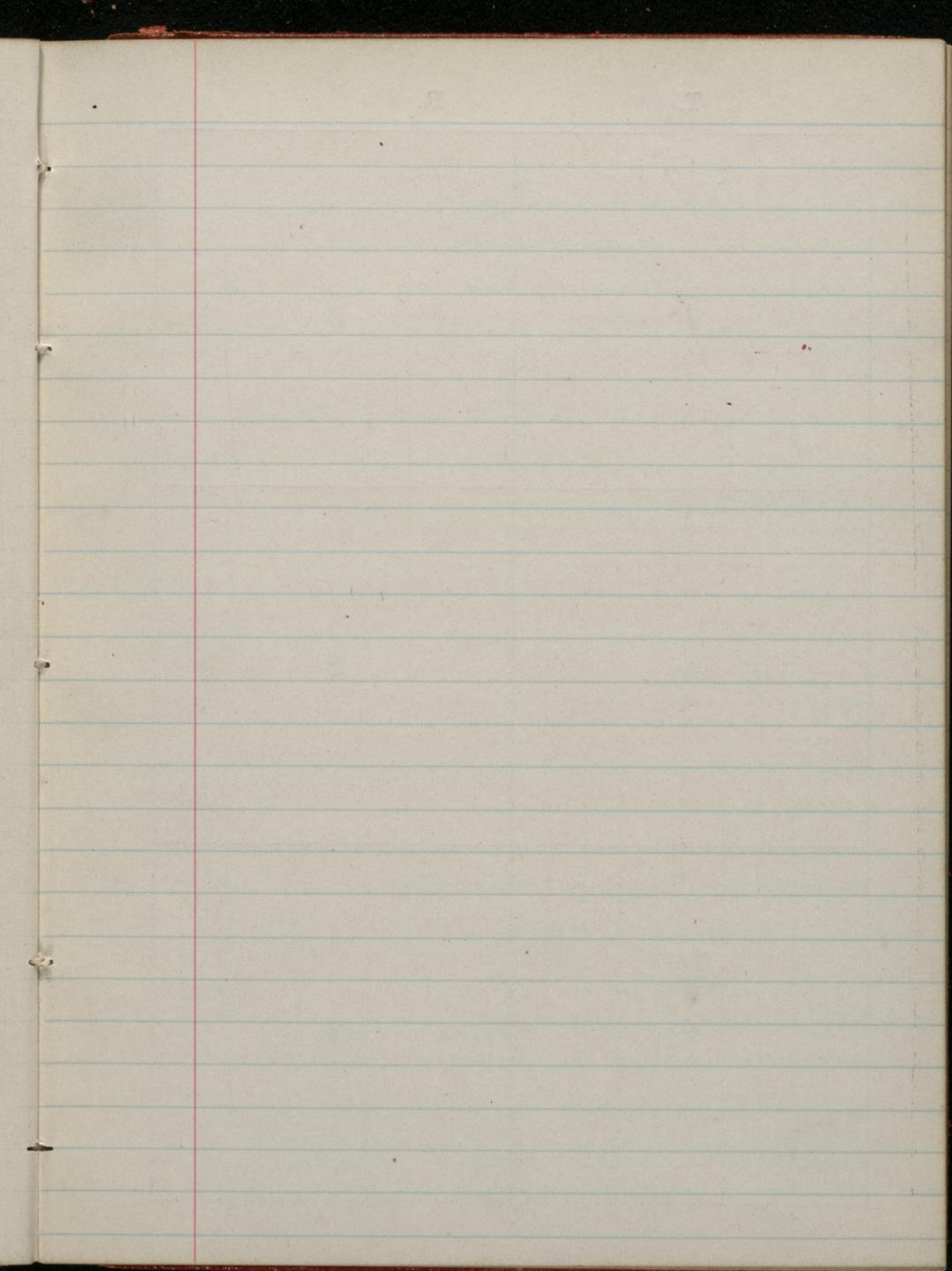
Map p. 12.

७२

T.

R.

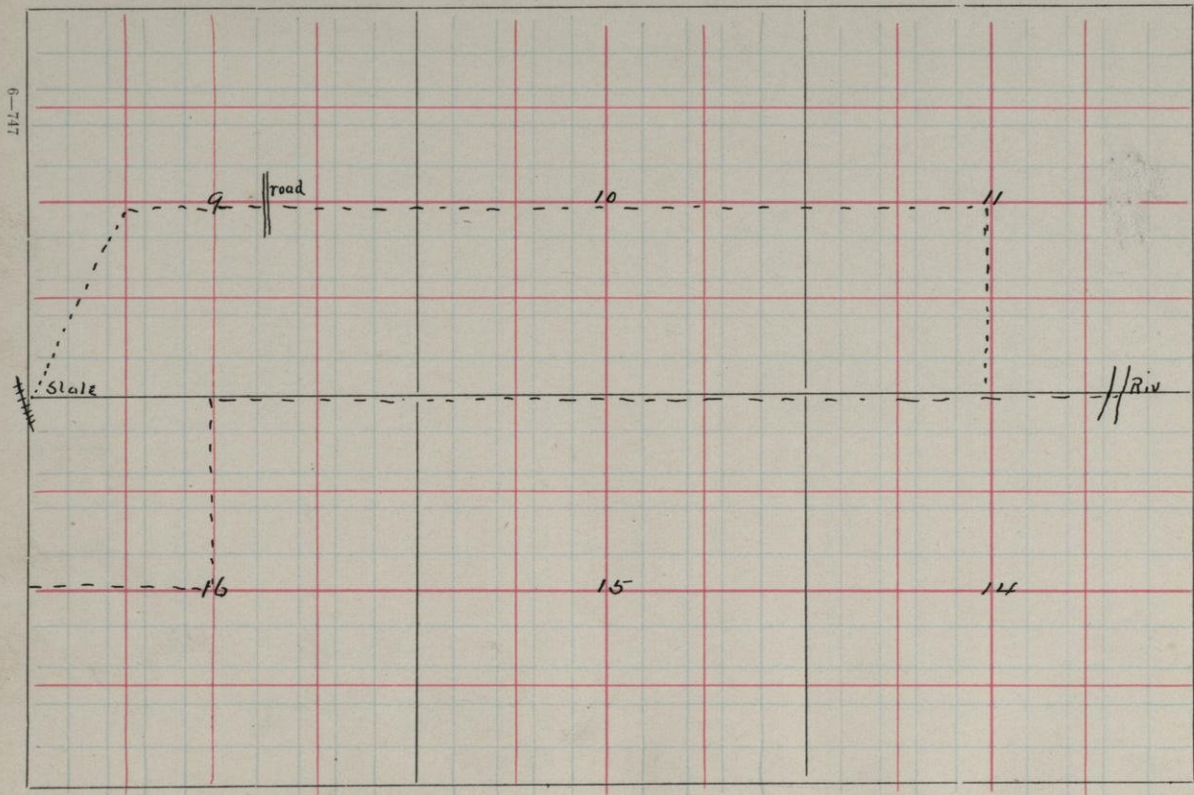




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T. 42

R. 32



J. 42. P. 32

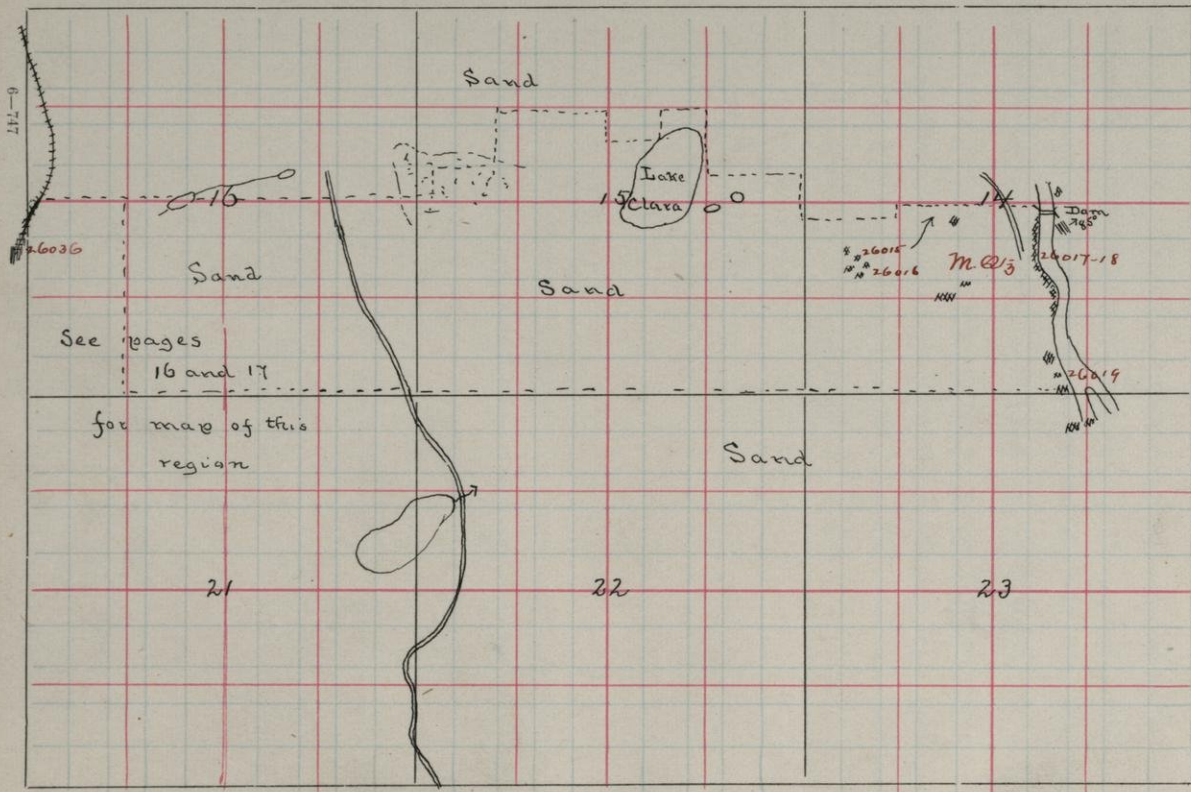
Millard made run indicated on opposite page and found no rocks. Run over sand plains exclusively.

At O.W. Cr 9 cut in slates studied by Clements.

७

T. 42

R. 32



T. 42 R. 32

Drove W. $1\frac{1}{4}$ p. Dec 16 ran east to Paint
River then south half mile and west
as indicated.

For first two miles east ran over sand
plains. In Dec 14. however found a
number of ledges, principally of mica-
ceous quartzite, called by Brooks 'mica-
schist'.

26015

At 275 p. 300 E of W $1\frac{1}{4}$ p. Dec 14 the first
ledge occurs. This is a small flat expo-
sure of granitic sandstone, often fine grain-
ed, like specimen, at other times coarse
like a recombined granite? This is
crossed by shear zones 10-20 in wide,
in which the rock is a white schist.

26016

The shear zone material is cut out in
many places. Its strike is 20° E of S. The
bands may have been finer grained
than other bands and so may have
suffered shearing more effectively.

At the dam near the center of Dec 14.
the same quartzites appear well ex-
posed on both east and west sides of
river.

On the west side micaceous schist?
or micaceous, schistose quartzites are

Exposed as soft fissile rocks, plain with a putty-like consistency when altered. For about 200 paces below the Dam these rocks are well exposed on river bank. At 250 paces below they become harder, like quartzite.

- 26017 Soft quartzite or micaceous schist
 26018 Showing gradation between hard quartzite and soft schist, exhibiting the fact that latter is altered form of the quartzite.

All along the river as far south as 1000 paces below the dam are outcrops of the quartzites.

- 26019 Quartzite from about 250 N. of S. line Sec 14. 42-32 on Paint River.

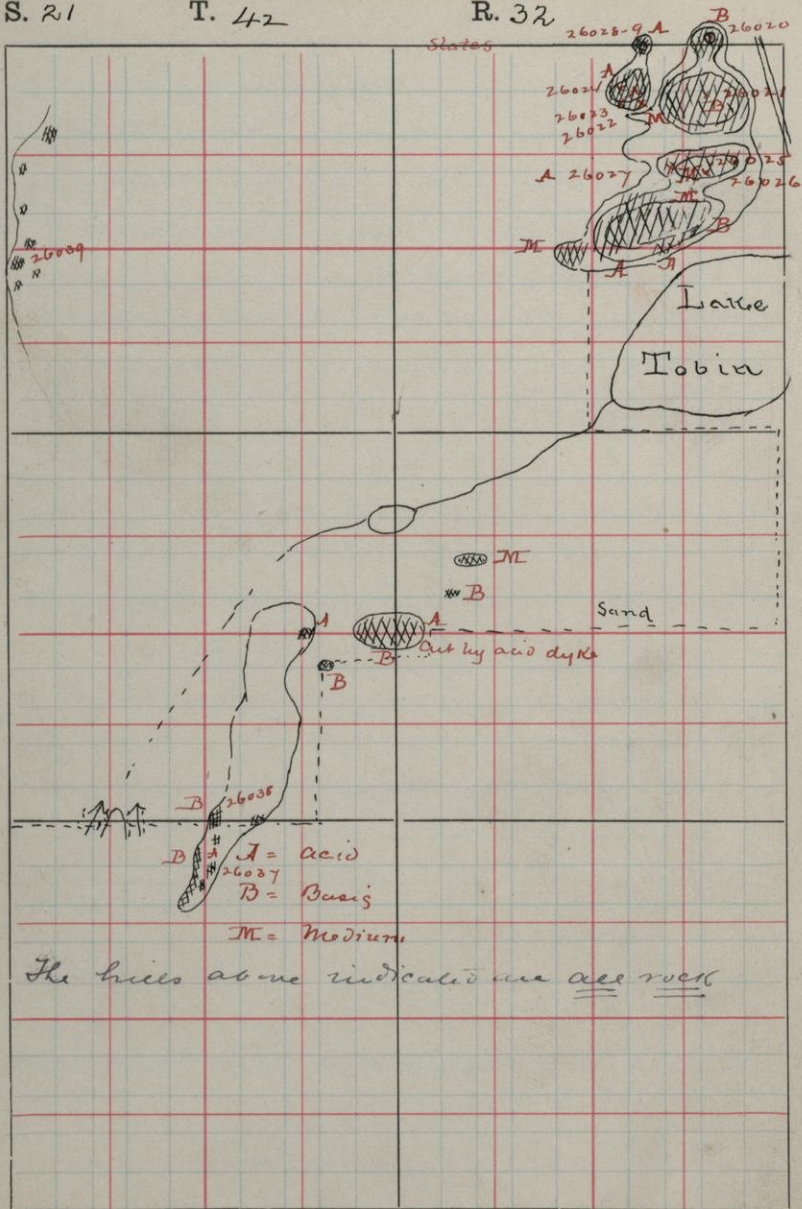
The only strike and dip at all well defined was noted at the East side of dam, where strike appeared to be S.E. and dip N.E. at 85° .

On return run found nothing until reached Sec 21 - where several knobs of rock and a score or so of test pits were examined.

S. 21

T. 42

R. 32



J. H. R. 32

- In the U.E. 1/4 Sec 21. 42-32 is a group of hills, located in Brooks Map as granite? The major portion of the rock is a well defined greenstone, resembling a gray Diorite? This predominates in the northern portion of the group, and comprises the entire mass of the northern hill. As we pass southward the Dioritic aspect of the rock gradually changes. At the top of the next southern hill the rock is lighter in color, more feldspathic and consequently more acid. On the knob west of this these features become even more pronounced. The rock in this knob gradually becomes red, and in it are noticed specks of quartz, and little masses of chlorite; until finally it passes into a rock resembling a red granite? The westernmost of all the hills is a bright red granite? which in one or two places seems to intrude the Diorite? but which in most places grades imperceptibly into this rock. In the valley at the south base of the
- 26020
- 26021
- 26022
- 26023
- 26024

Map p. 16.

Like the granite^s seems more basic than elsewhere, and in the hill with some the basic granites^s are well represented.

26025 } are specimens of the more basic
26026 } granites^s in this hill, and

26027 is the most acid phase.

The ^{most} northwestern hill of all is the most acid, the rock here being a bright red granite^s.

26028 is from its^s south side

26029 from its^s west end.

From the observations made here it is plain the Brooks saw only the western hills, and so was led to believe that the rock in all of them is a granite^s. It is plain, however, that this granite^s is a phase of the Diorite^s. It is probably a later phase of differentiation than the Diorite^s itself, as its^s dykes sometimes penetrate^d the latter rock.

S. 16

T. 42

R. 32

□ Slate

□ Slate

No 6 □

No 1.
2603026032
26031
26030
26029
26028
26027
26026
26025
26024
26023
26022
26021
26020
26019
26018
26017
26016
26015
26014
26013
26012
26011
26010
26009
26008
26007
26006
26005
26004
26003
26002
26001
26000

S 1/4

Scale 50 paces = Blue block

J. 42. R. 32.

In the S.W of the S.E 1/4 Sec. 16. are the pits already mentioned. These pits are all in black or red slates, in which are also chert layers. The one was principally limestone? Quartz veins cut the country rock. Nothing was seen in situ; all observations were made in dump heaps.

In pit No. 5. The chert and slate resemble slightly the Crystal Falls chert breccia, but the quantity of this rock present is very inconsiderable. There is present in the dump, however, a slate containing fragments of other rocks.

26032

26030

Black slate from pit No 1.

26031

Red slate from " " 3.

26033

Red slate from pit. No. 7.

A row of other pits ranged along the section line are all in black slate and fragmental slate like 26032.

26034

From pit 100 paces E of 1/4 post.

Map. p. 18.

J. 42. P. 32

At 1500 W. 50 N. of S.E. cor Sec 16 are several small pits in red shales and at 1525 W. 200 N. are several others

26035 At 1525 W. 210 N. same corner is a large piece of quartzite, that is probably a boulder. Specimen taken to compare with quartzite ledges, if discovered in this vicinity?

At 260 S. 95 W. of W. & S. Sec 16 is a cut in the rail road, about 100 paces long. It is through black shale, with a general strike a few degrees west of north. It is, however, much contorted, showing on side of cut many foldings of strata turned upon themselves so frequently that a horizontal line passes through the same layer many times in a few inches. The thickness of the beds in the cut is thus much less than it appears to be at first sight.

26036

J. 42-32

From railroad, where South line of Sec 19 crosses it, ran East along line through
 26037 Decs. 19, 20 and 21, as indicated by dotted
 16 line on map, and returned west through
 26039 west p. center of these sections.

In Secs 19 and 20, but few rocks were seen.

26040 At 1400 N. 1300 W of S.E. cor Sec 20. is the west end of a large greenstone ledge, and 1500-1600 N. 100-200 W of same corner is a group of smaller ledges of same rock on South side of top of large hill. This greenstone appears to be different from that in Sec 21, and to resemble that of Marquette region.

Map p. 16.

T. H. 2. R. 32

In section 21 crossed the D.W. extension of rock ledges like those in the N.E. 1/4 of this section, forming the knolls north of Lake Tobin.

At 1500 W. of the D.E. cor Sec 21, on the west edge and on the top of a ridge form the divide's rock, which is here more basic than it is on the top of the same hill. The same gradation is observed here between the gray and red rocks - the divide and red granite - as was noted in the North-East.

26037 is a specimen of the red granite.

26038 more basic phase.

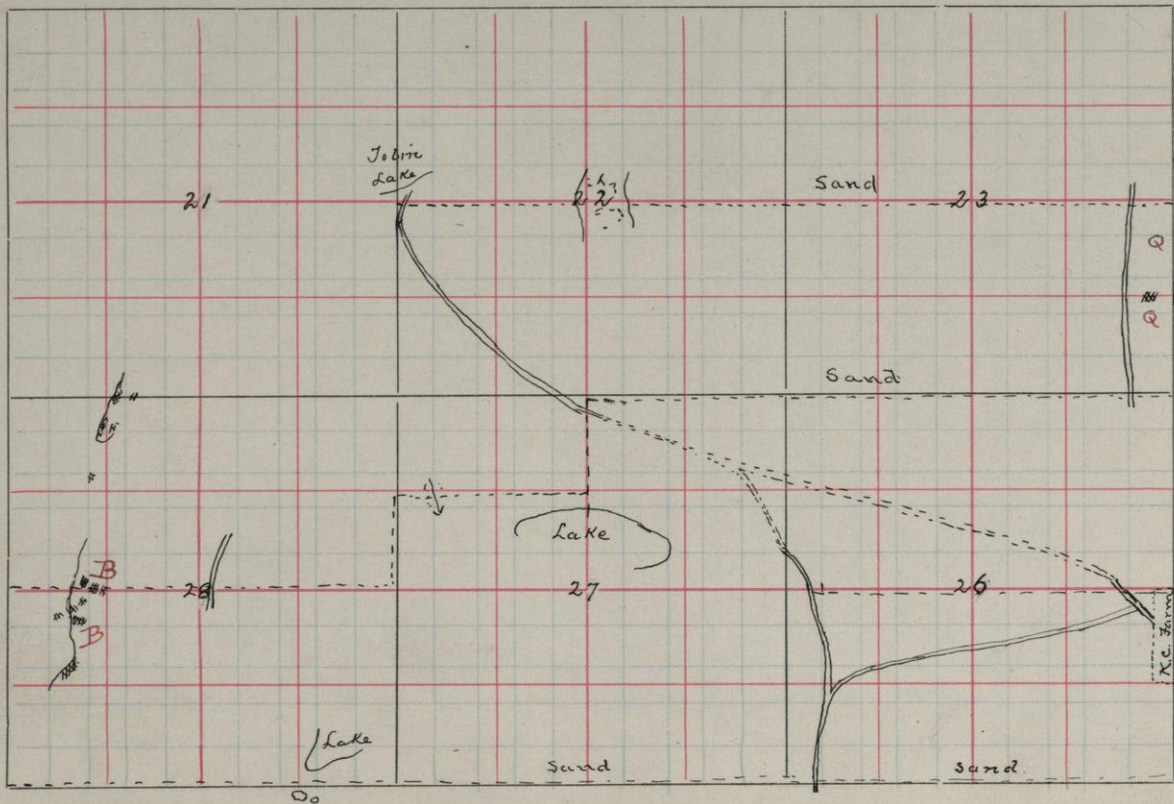
It seems that the basic phases form an envelope around the west side of the hill.

Other knolls of these same rocks are numerous just south of the center of Sec 21.

In the extreme N.W. portion of the section at 500 S. of the NW cor. is a group of greenstone ledges, like 26040, on the west side of a range of hills. The rock is jointed and much weathered.

26039

R. 32



6-747

M. p. 21 & 22.

T. 42. R. 32

Tran. W. $\frac{1}{4}$ p. Dec 22. ran west through
Decs 22 and 23 to Paint river then
South $\frac{1}{2}$ mile and East through Decs.
27, 28, 29 & 30 as indicated in opposite
map.

We west run found no rocks until
reached river where the micaceous quartz-
ite was observed in three or four ledges.

On return run in Dec 28, crossed
Extension of the granite & divided at
1650 W. 1000 N of I. E. cr Dec 28, and
a knob of greenstone, at 100 E of W $\frac{1}{4}$
Dec 29.

All the rest of the run was over sand
hills.

26040 Page 20.

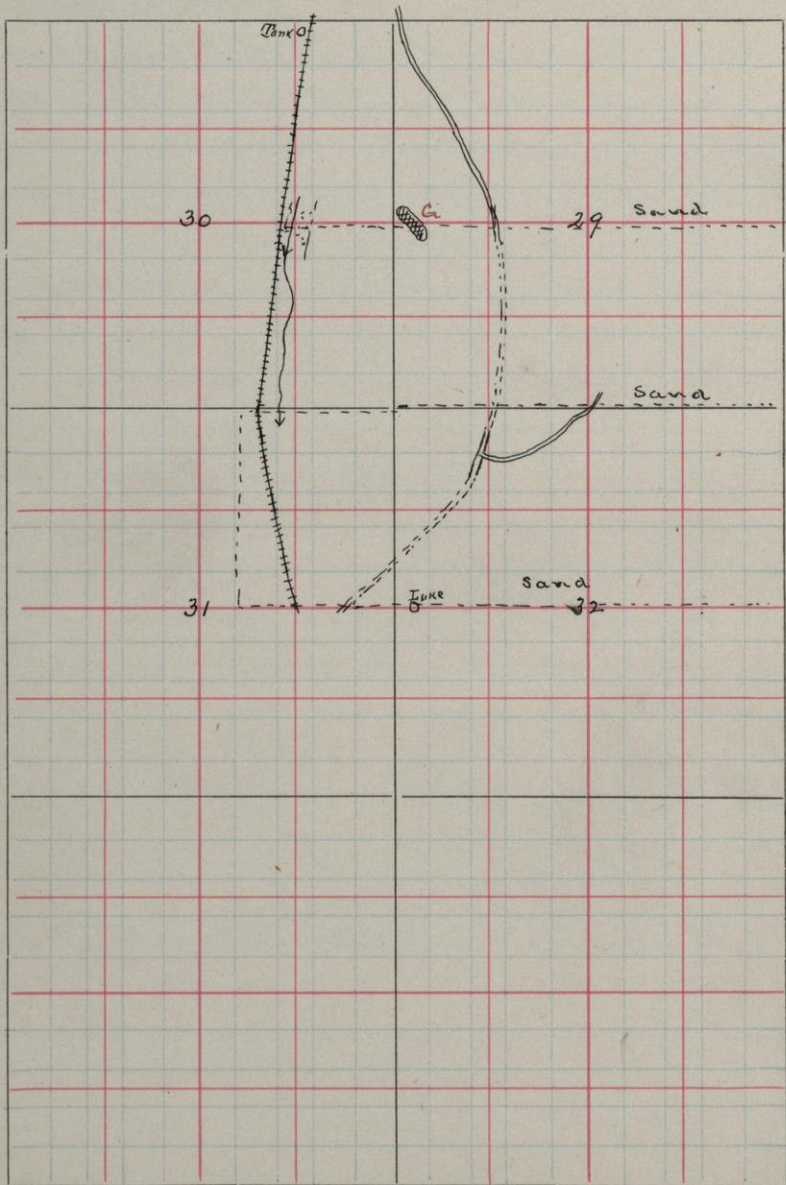
26041 " 24

26042 The greenstone at 1650 W. 1000 N of I. E. cr
Dec 28 runs South as a series of small
exposures in hill as far as 500 N of
I. Dec. line Dec 28.

S.

T. 42

R. 32

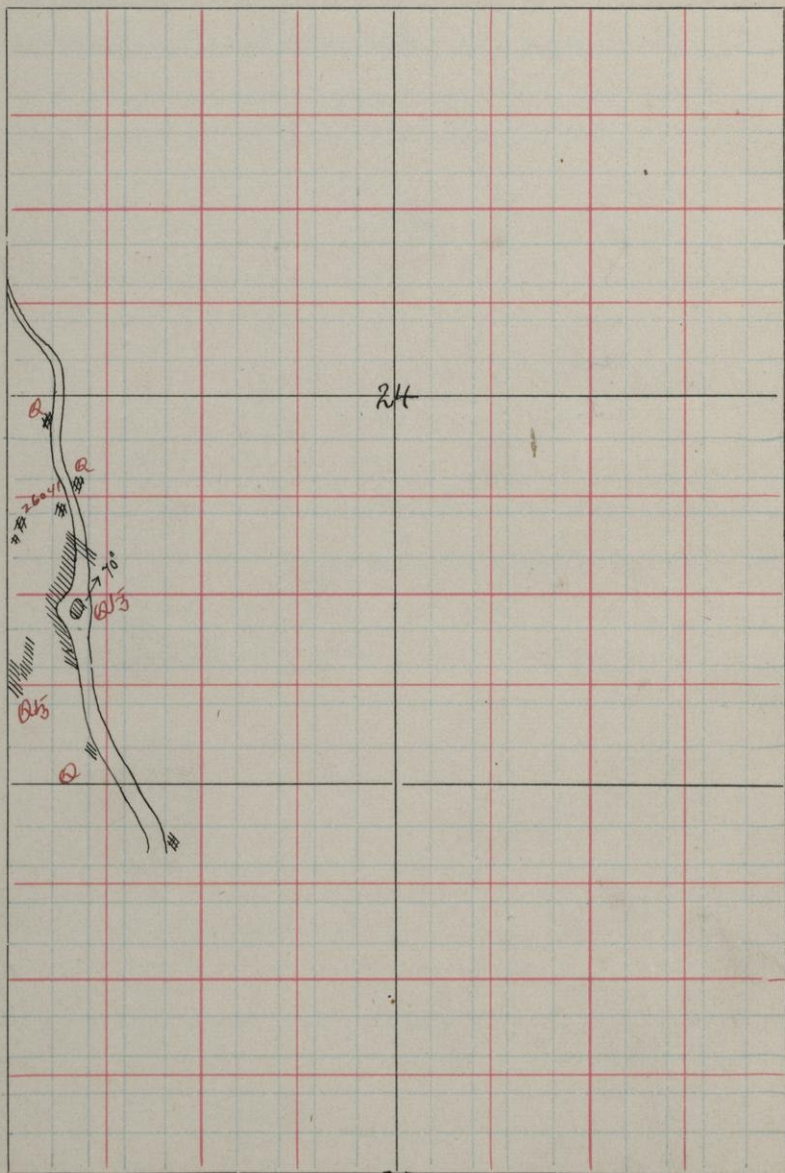


See page 22. for description of map. of
Decs 29 & 30

S. $\frac{24}{25}$

T. 42

R. 32



T. H. R. 32

The river from center line to north line of Sec 24 in T. 42 R. 32 was examined carefully. The rocks exposed on its sides are exclusively micaceous gneisses, as up at the dam.

26041

From 400 to 600 S. of the W. post Sec 24 they are well exposed principally on the west side of the river, where they strike 50° E of S. and dip about 70° N. E.

The rocks in many places are cut by large quartz veins, as much as one ft. in width.

Near the southern end of the exposures the rocks are slaty. These are interbedded with recrystallized granite. The latter resembling compact red sandstones and the former mica schists.

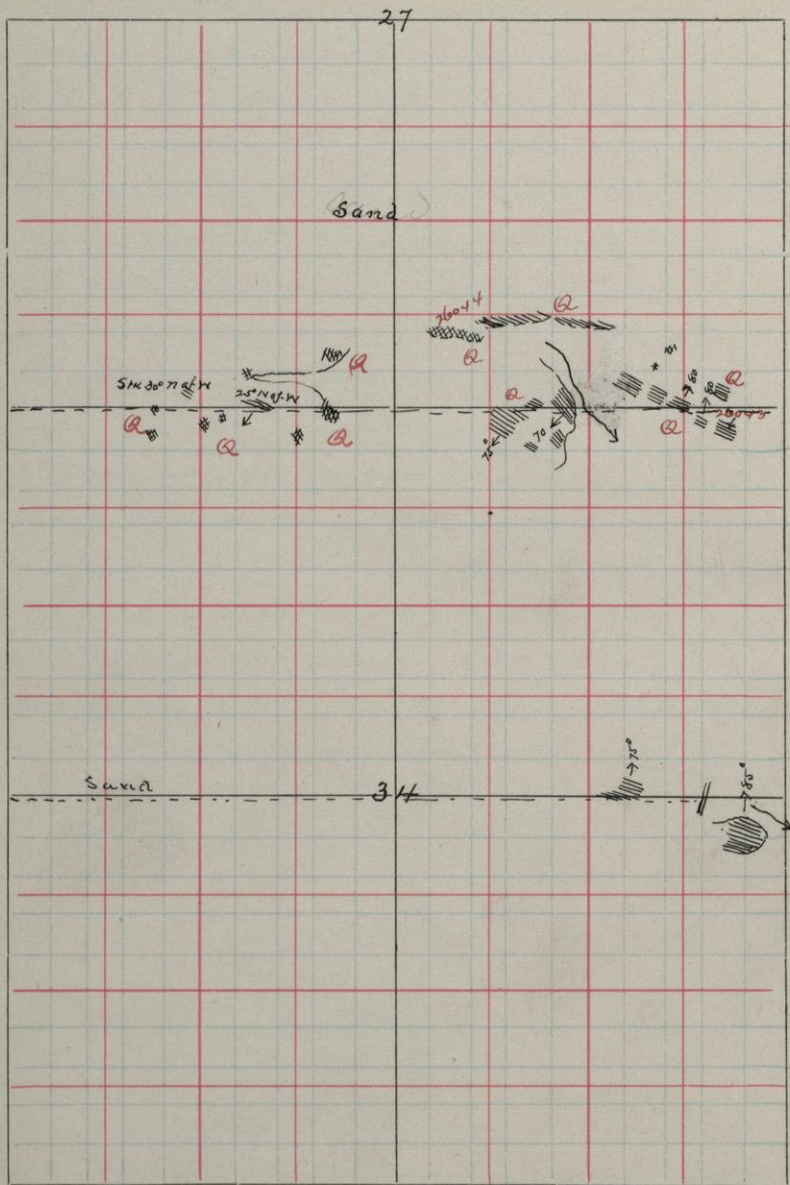
26042

Page 22.

S.

T. 42

R. 32



Sand

Stk 30° N of Y

25° N of W

26044

11

11

3/11/04

1

Sura

34

750

2

J. 42. R. 32

From N.E. cor. Sec 34 ran west to railroad then S. $\frac{1}{2}$ mile and East.

A great number of ledges of quartzites of the micaceous variety, was noted in Sec 27, where they form knobs and bare ledges, covered with bare rocks.

The rocks are all well bedded, schistose and massing micaceous quartzites like those in the river being inter laminated.

The group of ledges first met with in the N.E. of the N.E. $\frac{1}{4}$ Sec 34. Strike 20° N of W and dip 80° N.E.

The group in the NW $\frac{1}{4}$ of the N.E. $\frac{1}{4}$ same section strike 25° N of W and dip 75° S.W.

One ledge in the N.E. of NW $\frac{1}{4}$ strikes 25° N of W and dips S.W., and one in the NW of the N.W. strikes 30° N of W.

As a rule the rocks to the north are more schistose than those south and they dip northerly, while those to the south are quartzitic and dip southerly.

26043

150 W of NW cor Sec 34. Strike 30° N of W. Dip 90° .

J. 42. P. 32.

26044 212 N. 100 E of ~~S~~ $\frac{1}{4}$ Sec 27.

In Sec 28, 29 & 30 no rocks were seen
Maps p. 22 & 23.

On return trip East, nothing was seen
 in Secs 31, 32, 33, 34, until reached East
 side Sec 34, where micaceous quartzites
 were again observed. These rocks are ex-
 posed on the southern slopes of the tops
 of hills and sometimes form bare knobs.
 In the center of the $E \frac{1}{2}$ Sec 34 the strike of
 the layers is 100° of $\frac{1}{4}$ and their dip $65^\circ-75^\circ$
 N. E.

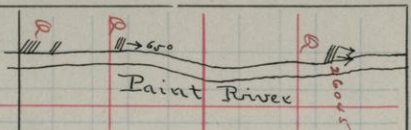
Maps p. 23 & 25

Sec 26. Ran East from $W \frac{1}{4}$ p. Sec 26 to Paint
 river in Sec 25, south along river $\frac{1}{2}$ mile
 and west. The rock on the north side of
 the old bridge at the K. C. Co's Farm is a
 coarse grained, almost typical mica-schist,
 interleaved with the quartz-mica schist,
 both probably Oolitic quartzites. The band-
 ing is not perfectly even, but it curves

S.

T. 42

R. 32



J. 42. P. 32

slightly, striking in the whole, a little S.
of E. and dipping high to the N.E.

26045

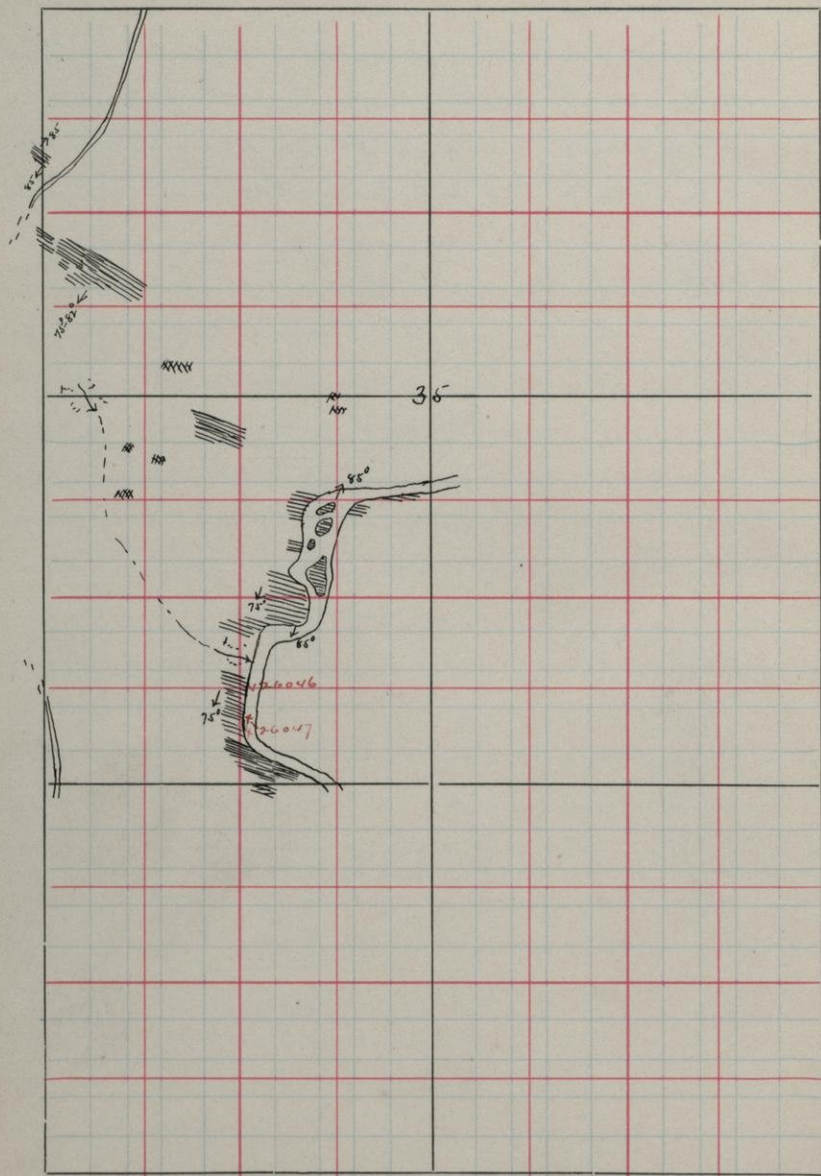
is quartz-mica schist from this place.
Dip: 150 S. 125 E of W 1/2 Sec. 25.

Map. fo. 22 and 27.

S. 35

T. 42

R. 32



T. 42. R. 32

From U. W. Cr Sec 35 ran South $\frac{1}{2}$ mile,
then East to Paint River, South along
west bank of river and west to road.

A large number of exposures of the quartz-
mica schist were seen on the run. The
rocks are usually well bedded with
strike a little S of E and dip usually
to the South.

Detailed observations of strike and dip were
made as follows:

1500 S. of U. W. Cr Sec 35.	Strike 30° of E.	Dip 85° N 85° S
600 S. 50-100 E "	" 25° "	" 75° - 82° S
1050 S. 200 E "	" 15° "	"

On river the rocks are beautifully
exposed on both sides

At 1300 S. of U. line Sec 35.	Strike 15° of E.	Dip 85° N.
" 1500 " " "	" 15° "	" 75° - 80° S.
" 1700 " " "	" 15° "	" 75° S
" 1800 " " "	" 20° "	"

26046 Schistose phase of the quartz-mica rock

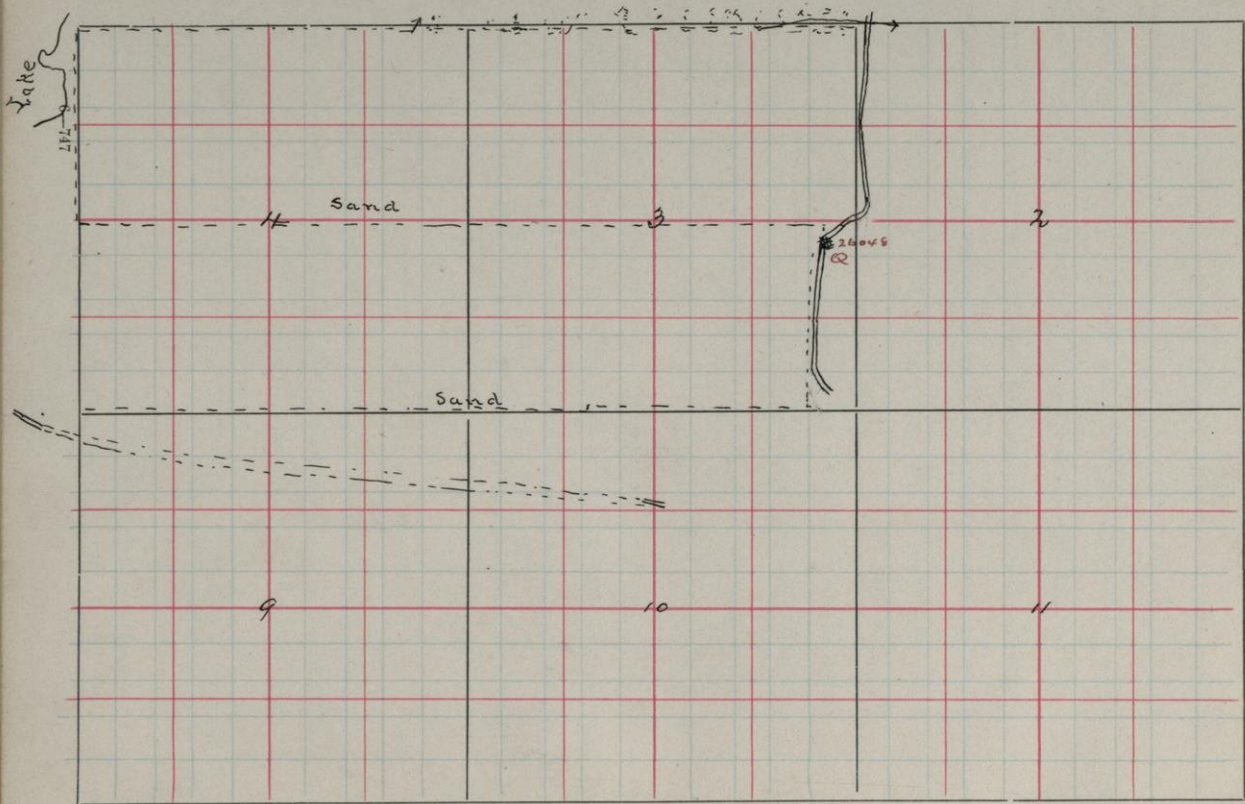
26047 Quartzitic phase

Book from same knob at 1750 S.

S.

T. 41

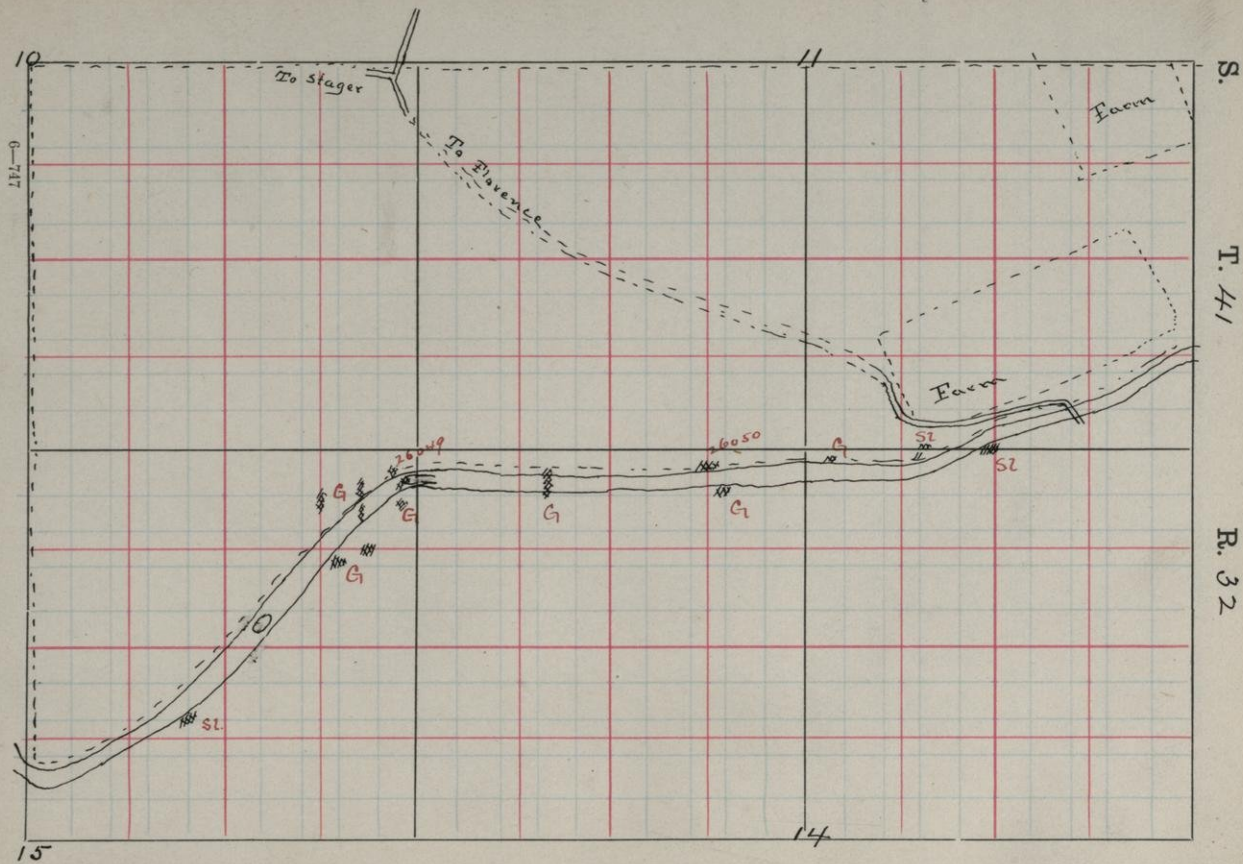
R. 32



T. 41. R. 32

Ran west on line between Towns 41-32 and 42-32. as far as rail road then South $\frac{1}{2}$ mile and East to Florence road, then $0\frac{1}{2}$ mile and West, as indicated.

26058 The only rock seen was a small quartzite ledge on Florence road at 900 ft. 250 W of S.E. corner Sec 3.



T. 41, R. 32

Drove W $\frac{1}{2}$ Sec 10. T. 41, R. 32 ran East $\frac{1}{2}$ mile then S. to Boule River, down this river to within a few hundred paces of its confluence with the Paint, then north to center of Sec 12, and west to road.

No rocks were seen until reached the Boule.

At about 600 E. 700 S of U. E. Cor. Sec 13, on W. side of river, is a considerable exposure of black slates, which could not reach because the river was flooded.

26049 Near the island, on both sides of the river, and at the west end of the island itself are exposures of greenstone, which is more or less schistose. In the more massive phase, a diabasic structure is noticeable.

Greenstone occurs again at about 350 East of NW Cor Sec 11.

26050 At 700-800 W of this corner is another greenstone ledge, whose aspect is that of a slate. It is fine grained and dark gray.

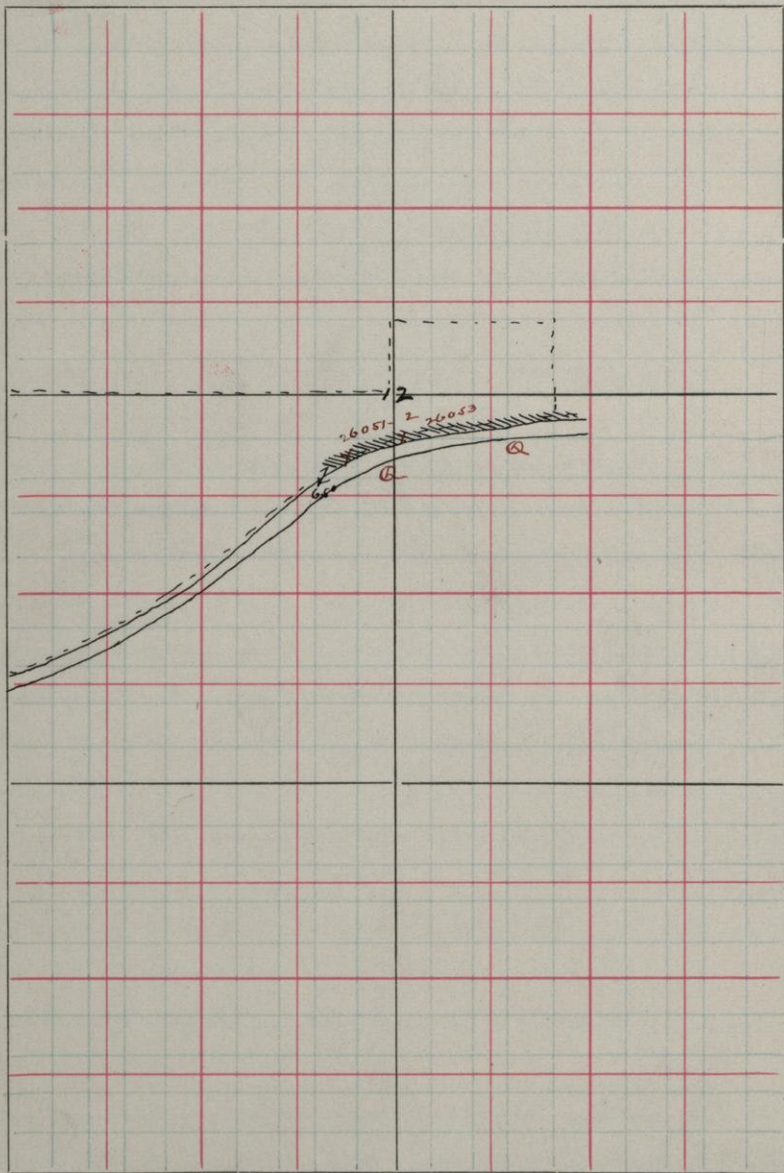
Further East black slates occur in small ledges on both sides of the river.

No more rocks were seen until the center

S. 12

T. 41

R. 32



of Sec 12 is reached, where the river is bordered on both sides by rock cliffs of the micaeous quartzite, striking usually about 15° of E and dipping S.W. at about 65° .

The schistose quartzite is much more abundant than the massive variety, though both are common.

26051 Massive phase.

26052 Schistose phase.

26053 Massive mica-quartzite: 100' of center Sec 12.

S.

T. 4-2

R. 32

AS 077

For map R. 24

111.50

River

Road 2

2.5

2.4

6-747

T. 42 R. 32

From W. $\frac{1}{4}$ Sec 25, ran East one mile,
North $\frac{1}{2}$ mile, west 1500 paces, N. $\frac{1}{2}$ mile
and East to East line Sec 24.

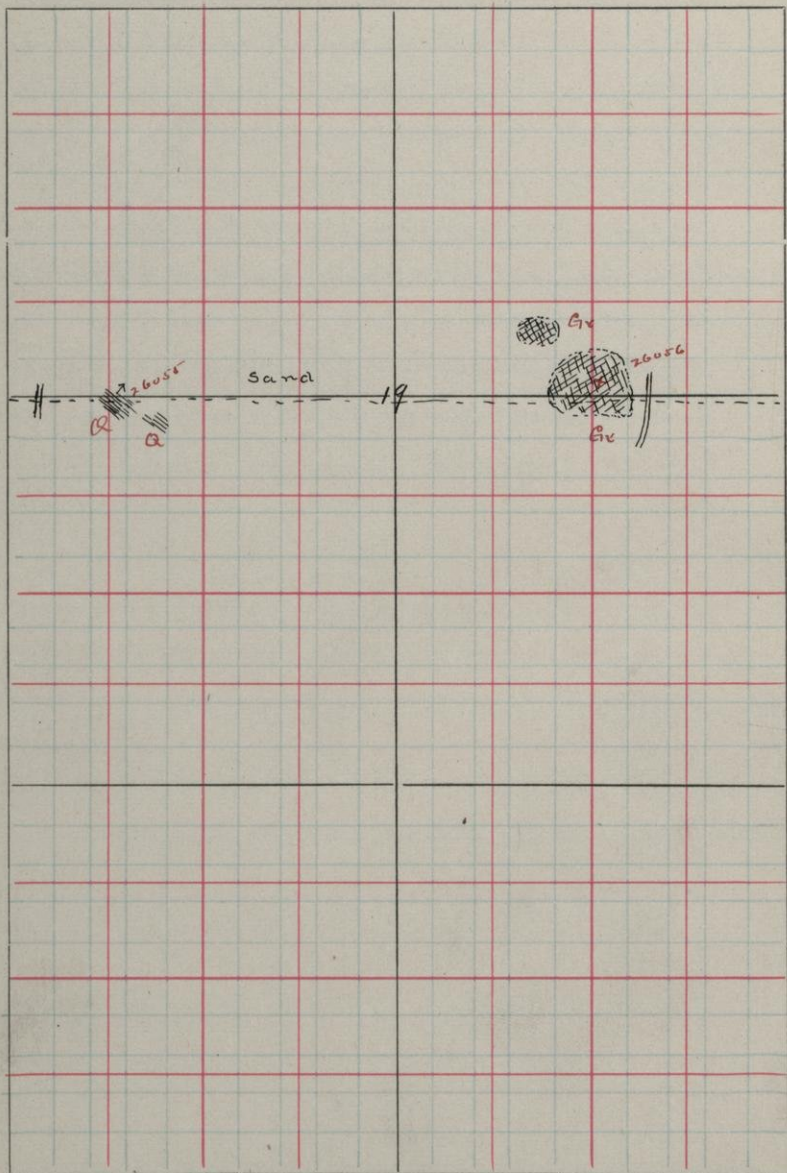
Found no rocks until reached Sec. 24.
Near the river in this section are a
few large exposures of micaceous quartz-
ite, and at

26054 180 N. 45 W of E $\frac{1}{4}$ Sec 24, is a ledge
of micaceous quartzite containing oolite.

S.

T. 42

R. 31



J. 42. R. 31

From W $\frac{1}{4}$ Sec 19 run East one mile,
then North 200 paces, East one mile,
North 200, East one mile and 300 paces
to Michiganumme River, then North to
N. line of Sec, and West as indicated.

In Sec 19, there are at 272 E & W $\frac{1}{4}$ post
several quartzite knobs in which ledges
show well banded rock striking 35° E of
S. and dipping N.E.

26055

1400 N. 1728 W of E cor Sec 19. 42-31

Although the rock in this ledge is mi-
caceous, that in the next ledge at
371 E 50 S of same $\frac{1}{4}$ post is more so.

26056

At 1400 E. 100 N of same $\frac{1}{4}$ post. is a large
knob of white granite? like that at Crys-
tal Falls. It is about 150 paces E to W,
and 90 paces N to S. Some of the loose
pieces contain inclusions of a black
micaceous schist, from $\frac{1}{4}$ to $\frac{1}{2}$ in in diam-
eters.

Map p. 35.

J. 42. P. 31

At 160 N of E 1/2 p. Sec 19, the relation of the granite to the quartzite shows plainly on the South side of a little knob. The granite is clearly intruding in the fragmental rock. Dykes cut the quartzite, causing long stringers of this rock to extend far out into the granite, being almost surrounded by the intruding.

26057 Granite from dyke near

26058 Quartzite

The dip of the quartzite on the South side of the bluff is apparently 45° into and under the granite, i.e. to the north.

Sketch of South side of bluff
showing relations between granite & quartzite



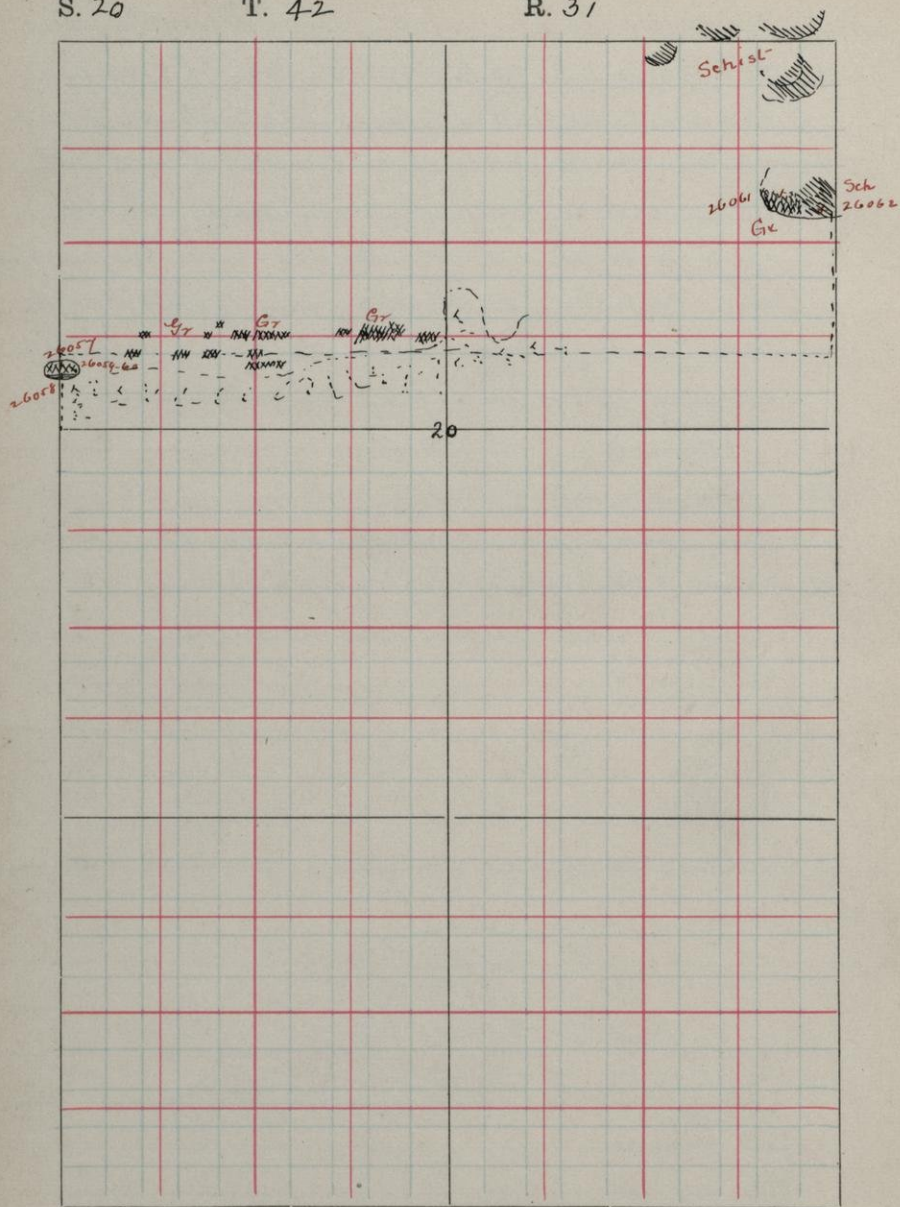
 Granite.

 Quartzite

S. 20

T. 42

R. 31



J. 42. R. 31

26059

Specimen showing contact of granite and quartzite. Both fragmental and returning rock near contact have become micaceous through contact action. The quartzite passing into a rock resembling a mica schist.

26060

Quartzite near contact on top of hill, at the N.E. corner, showing pseudomorphs of mica after an unknown mineral.

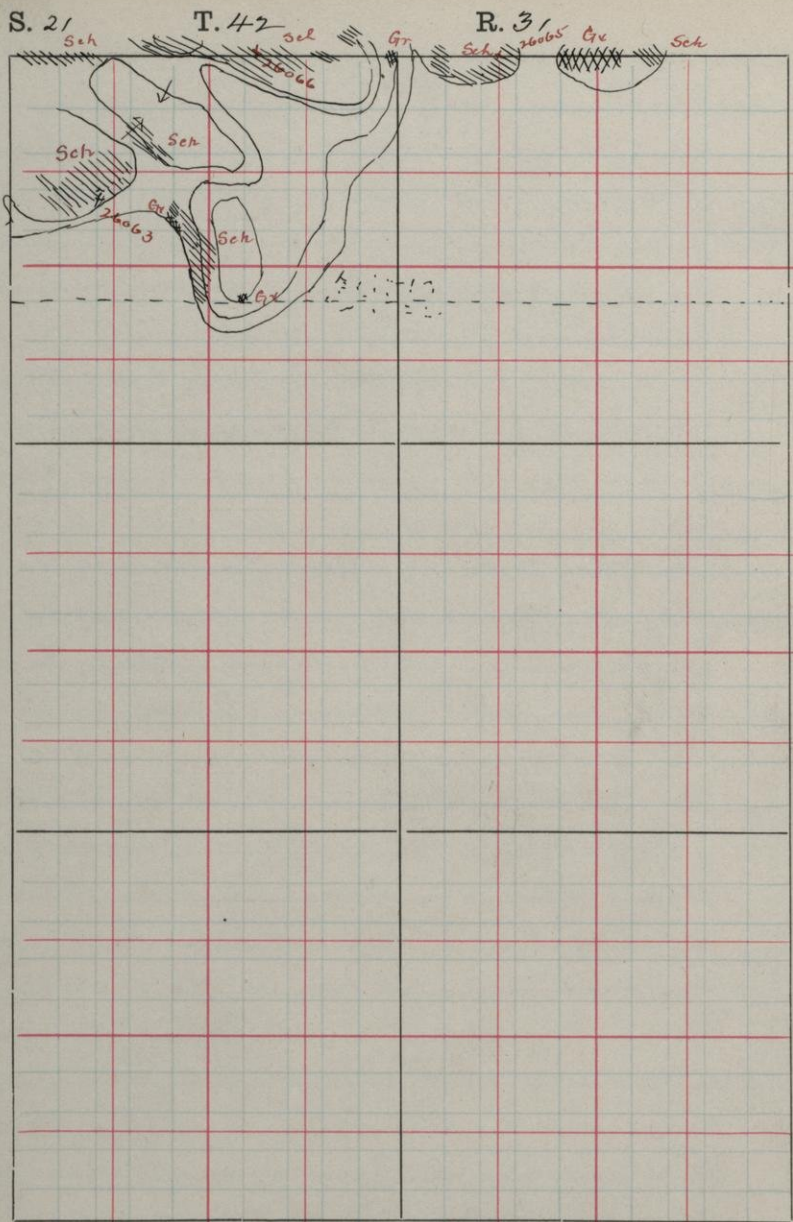
In the N.W. $\frac{1}{4}$ Sec 20 are a lot of small boulders and flat exposures of granite. Locations of these ledges are given on opposite page.

In the N.E. $\frac{1}{4}$ Sec 20 and in the N.W. $\frac{1}{4}$ Sec 21. is a group of large hills of rocks resembling the basement complex. White granite, like that in Sec 19, is the predominant rock in the Western Knob. East of this in the same knob is a banded rock marked by parallel ridges in the weathered surface. It strongly resembles a fine grained, gray gneiss. It is marked by eyes of quartz and of feldspar like an augen-gneiss. If it

S. 21

T. 42

R. 31



J. H. R. P. 31

were not for the Exposure 26056-60 showed clear these knobs in the basement complex. But the Exposure referred to (26056-60) shows clearly that the granite is younger than basement complex and hence, this granite may well be a young granite. The banded rock is undoubtedly fragmental, and is probably a micaeous quartzite like 26059. Dykes, veins etc. of the granite penetrate the gneiss and mica quartzite, exactly as the granite dykes and veins of the basement complex cut the mica schists of this formation. In many places the granite dissolves into white color and becomes red, thus resembling even more strongly than ever the rocks of the basement series.

26061 Specimen of red granite

26062 " " the schist, whose bands run S.E.

26063 In the more eastern hills the schists are more like the mica-quartzites in the Paint River.

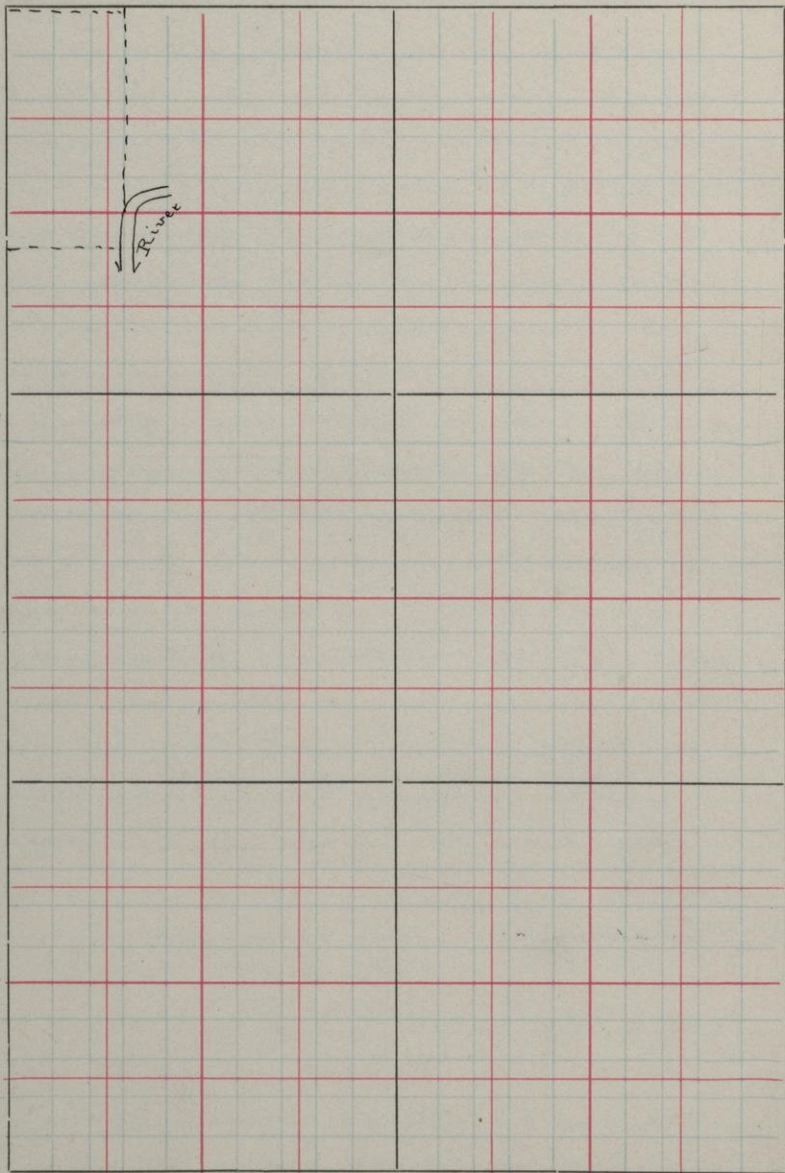
For locations of specimens see map.

S. 22

#2664

T. 42

R. 31



T. 42. R. 31.

26064

At 300 E. 40 N of NW cor Sec 22 is a small knob of gabbro or of micaceous Diabase, exposed on its East side.

In a boulder found a small dyke of gray granite that looked as though it were intruding in the gabbro.

From the N. E. cor Sec 21 are along the line to the N. W. cor are knobs of the dark micaceous schists, some ledges of which are quartzite-like and others micaceous and gneissic.

26065

is from the East side of a hill near the N. E. Sec 21. It is the fragmental phase. Granite occurs occasionally cutting the schist, but this rock is the predominant one.

26066

From ledge 1360 W of NE cor Sec 21.

Map. p. 36

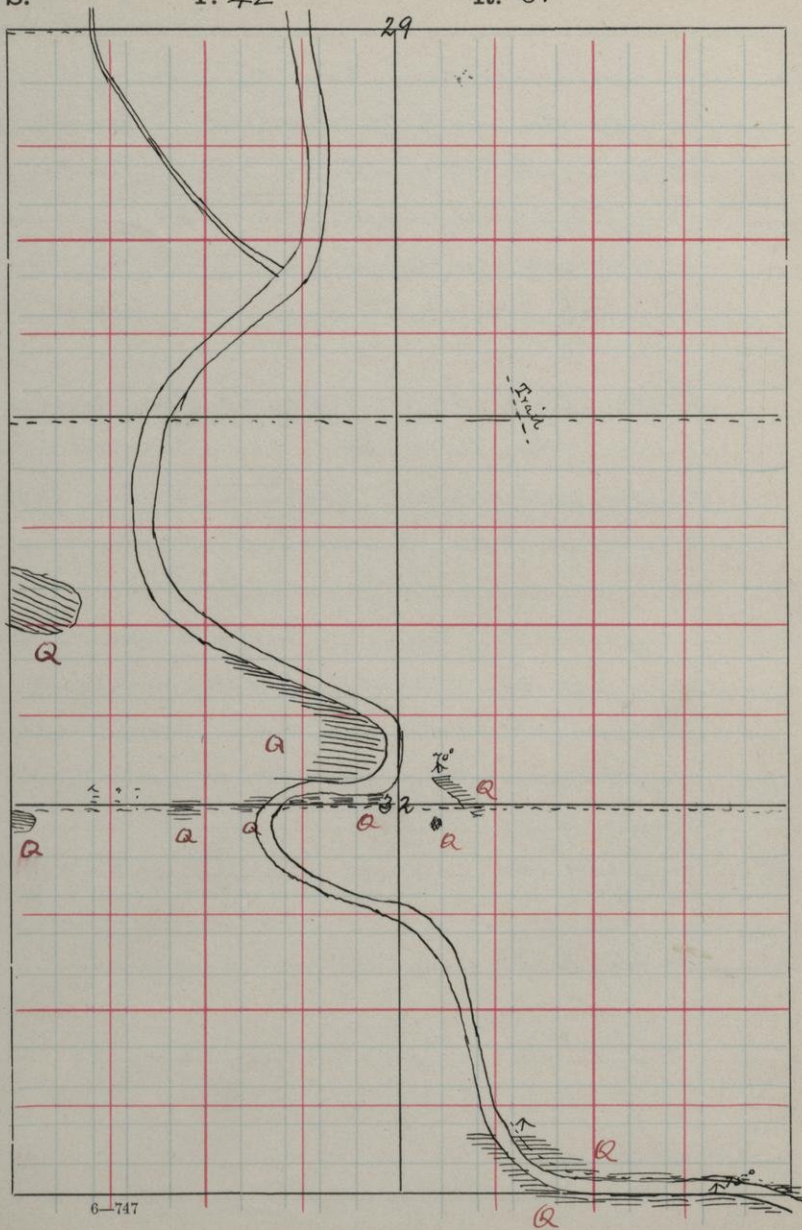
1111
1111111111

S. 1

T. 42

R. 31

29



T. 42. R. 32

Map. p. 39 + 40.

T. 42 R. 31

From W. side of Michigamme River
ran west along N. line of Sec 32 to
Point River, then $1\frac{1}{2}$ mile and
east to Michigamme River again.

26067

The run was over Oued Plains ridge
reached a point at 1600 W of N.W.
Cor Sec 31. T. 42 R. 31, when crossed
a flat ledge of grey banded mica-
quartzite, containing eyes and
strings of quartz and feldspar.

In Point River the same rocks were
seen. At the rapids (590 W of Center
Sec 36 T. 42 R. 32) and 300 paces N.
and 1000 paces S. of this point the
banks of the stream consist of mica-
schist and quartzite, striking S.E.
The two rocks are interbedded, and
the quartzite contains lumps of an
altered mineral in it resembling
staurolite.

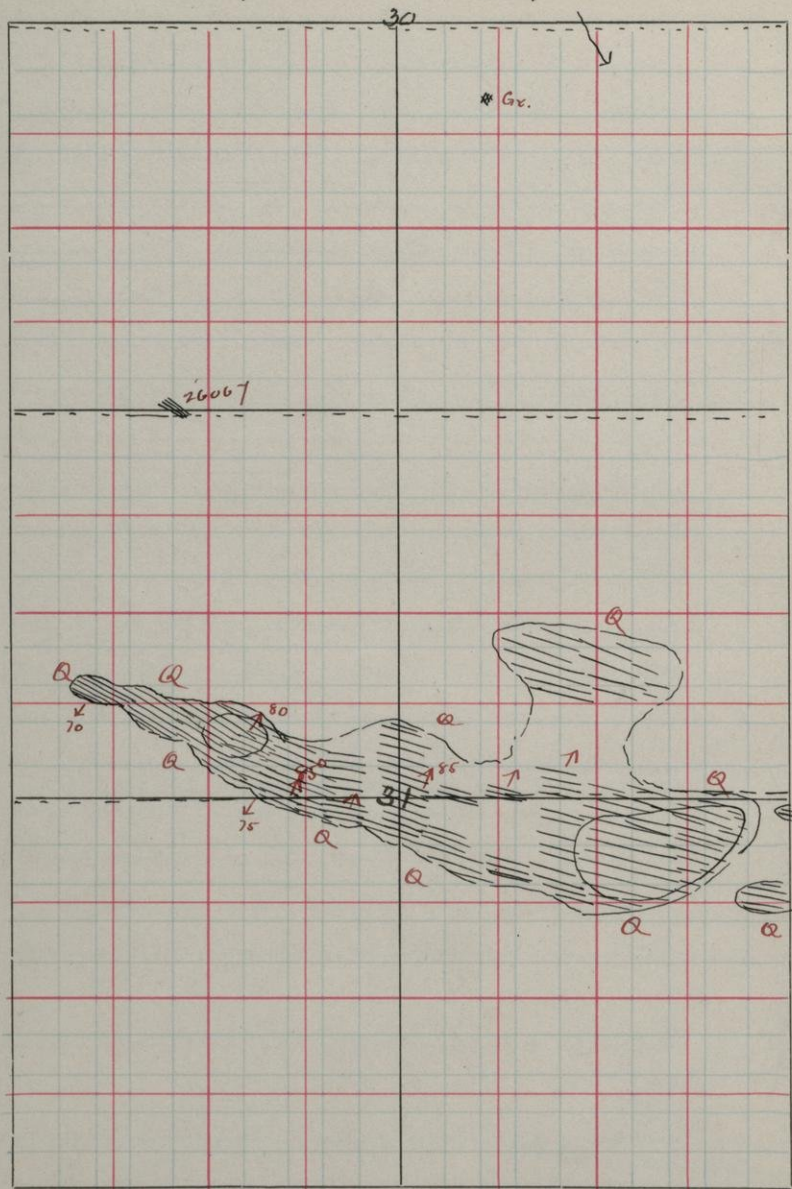
26068

Quartz veins cut the schist and
large lenticular masses of the same
mineral surrounded by concentric
layers of the rock.

S.

T. 42

R. 31



J. H. Z. P. 31

At 125 E. 150 N of W. N Dec 31, begins a long ridge of bare rock, which extends East to the East line of Dec 31, and indeed practically all the way to the Michigamme River, where it forms rapids and falls.

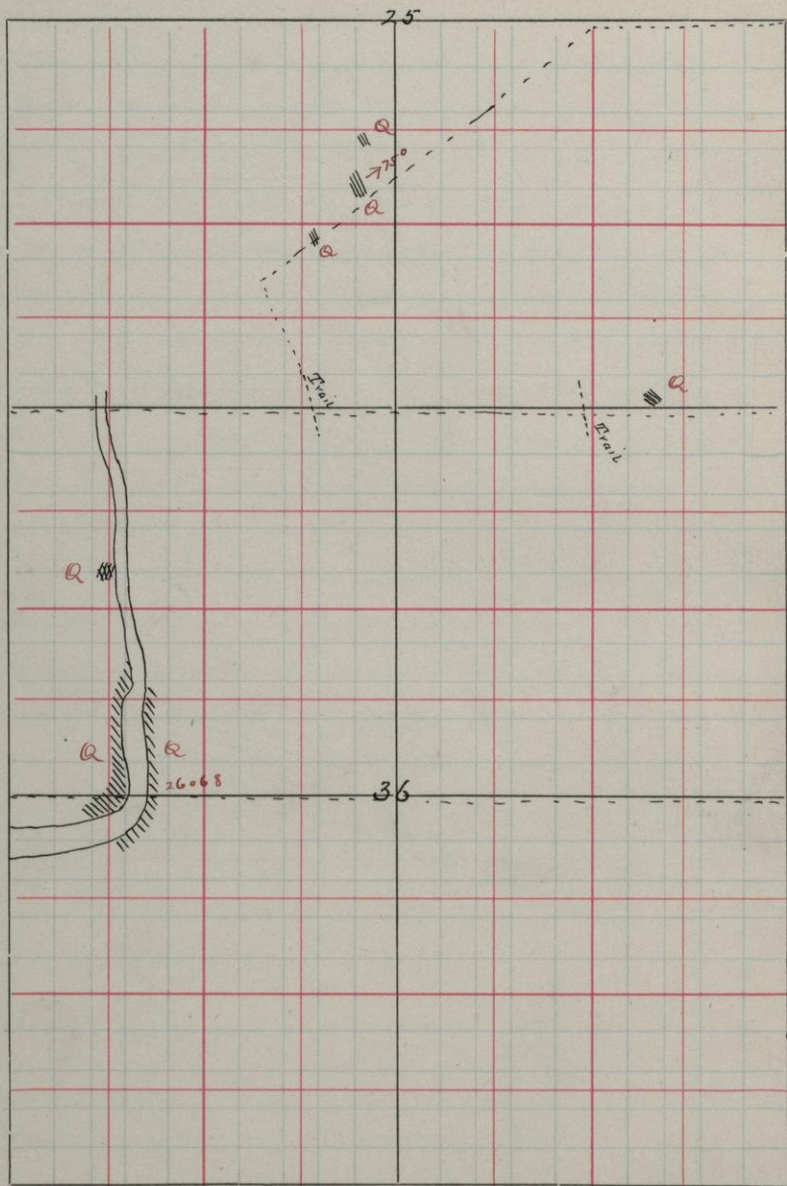
The rock is the quartz-mica-schist of the usual character. At its west end the strike is 30° S of E. This strike turns more to the East as it approaches the Michigamme river it is only 10° S of E. The dip is everywhere high. At the west end of the ledges it is to the South on the South side of the Knob and North on the North side. Further East the prevailing dip is North.

Map p. 38

S.

T. 42

R. 32



Map. p. 39

T. 112 - R 31 & 32

From E 1/4 p. Dec 30 ran west to Range
line then SW. to Michigan river.

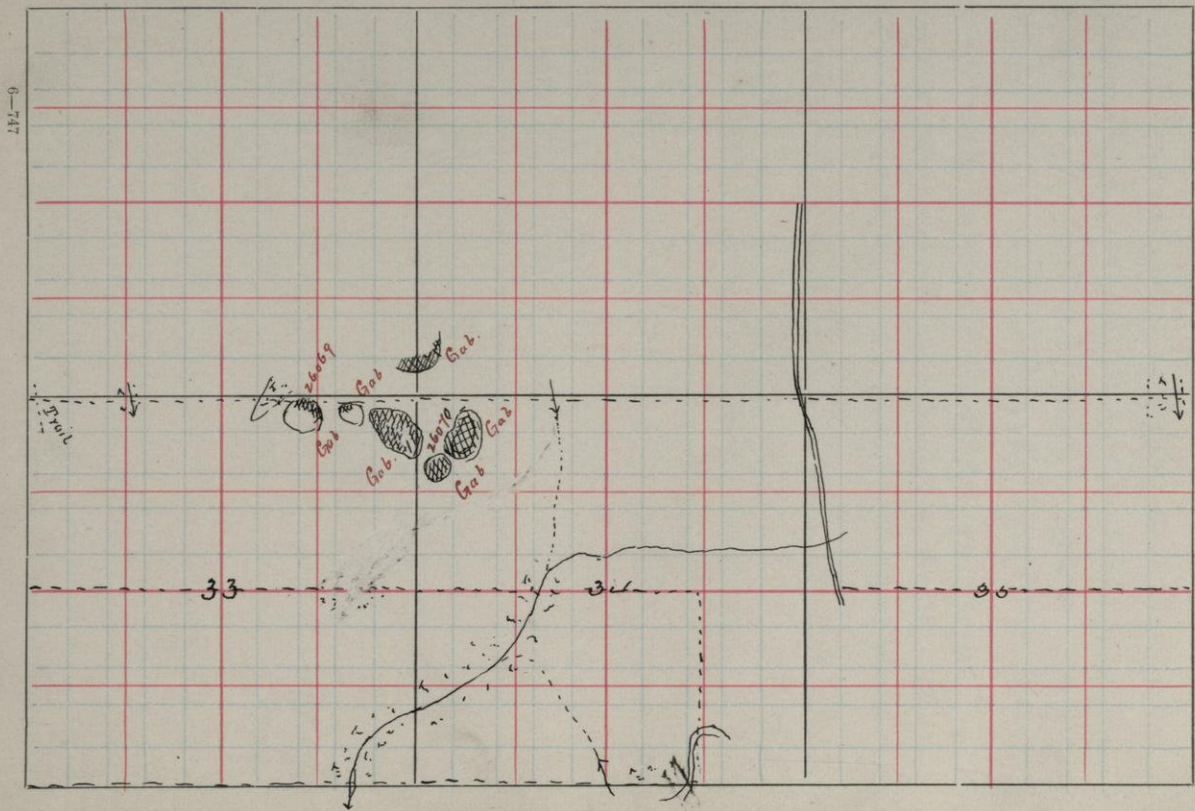
At 800 W. 1750 of E 1/4 p. Dec 30 found
small ledge of granite on side of hill
and at about 300-500 0 of center

Dec 25 a group of mica-quartz schists
striking N. 40 W and dipping 75° NE.

S.

T. 42

R. 31



J. 42. P. 31

From E. side of Michigamme River
 ran East along the N. side Sec 32 to
 N.E. cor Sec 35, then S. & E. to center
 Sec 36, and west from this point
 to road in Sec 35-

26069

At 575 W of N.E. cor Sec 33 on west
 side of Knoll are exposures of a fine
 grained gray gabbro

On the East side of the next Knoll the
 rock appears to be a little more mica-
 ceous than elsewhere, but no fresh
 specimens could be obtained

26070

In the NW $\frac{1}{4}$ Sec 34 are several knobs
 of the same rock, which however app-
 ears to be somewhat quartzose, and to
 pass gradually into a granitic phase
 like the Divide near Lake Tobie.

Map p. 42.

S.

T. 42

R. 31

Lake

36

Maps p. 38 and 41

T. 42 R. 31

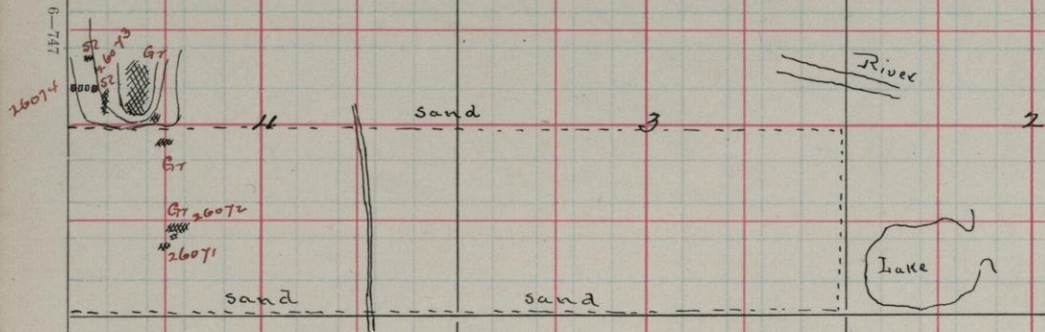
From center of Sec 32 ran East to
within 500 paces East line Sec 34, then
0 1/2 mile and west to Michigan
river, finding no rocks except
near the river where the usual
granulites were noted.

These rocks strike only 5° N. of E. They
dip 70°-75° to the North. They are especial-
ly well exposed along the river near
the S. line of Sec 32.

S.

T. 4²

R. 32



T. 42 R. 32

From railroad ran east along S. line
Sec 5. T. 42 R. 32 as far as Paint
River, then north $\frac{1}{2}$ mile and west
again to railroad.

In run East passed over sand plains
and saw no rocks except in the center
of the S.E. $\frac{1}{4}$ Sec 4, where are several lit-
tle knobs of a purplish granite, which
is schistose in places.

26071 Purplish granite? from 500 E. 350 N of
S.W. Cor Sec 4.

26072 The north-eastern portion of ledge seems
to consist of a fresher rock, that is red
on the surface - the color however may
be due to fire.

On return run, the same granites
were found forming large hill near
west $\frac{1}{4}$ post Sec 4. Here the rock is mass-
ive, and green platy, as a rule. Some-
times it is foliated with the schistosity
striking S.E.

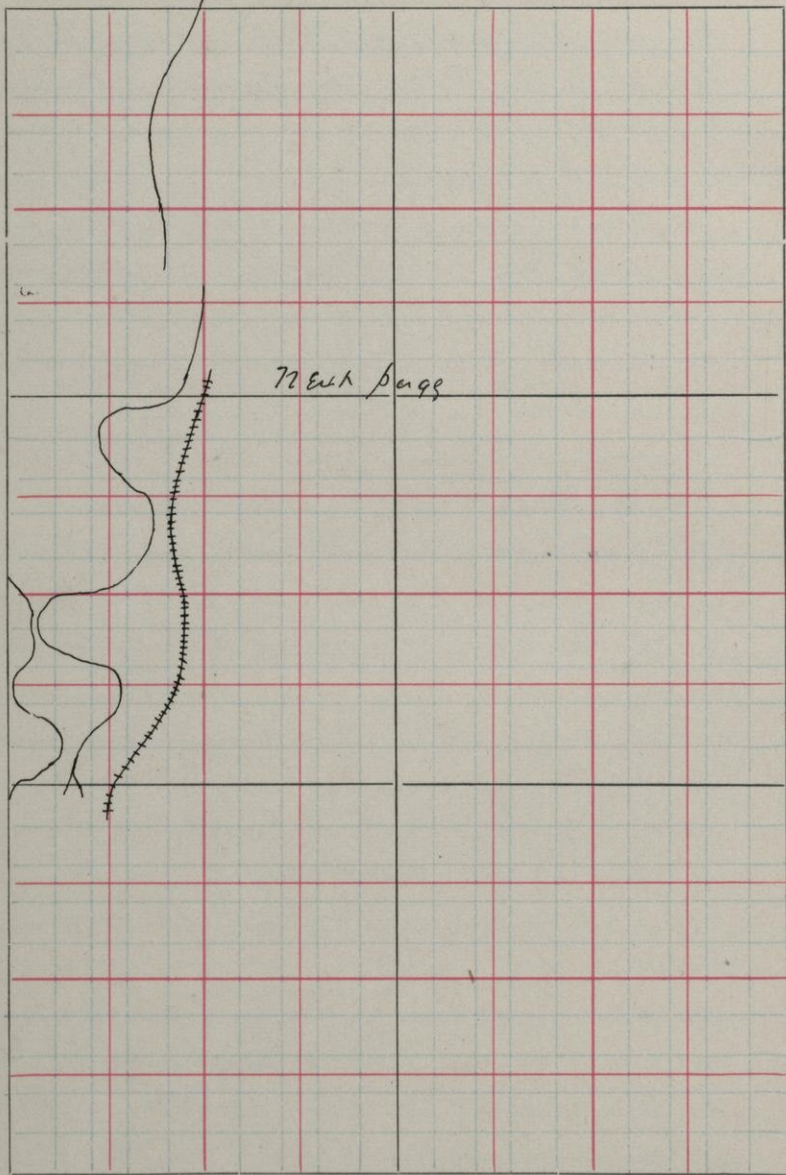
On the west side of the hill at 1500 W and
1100 N of S.E. Cor of Sec 4. are ledges of broken
slate and at 1845 W. 1200 N is the
easternmost of four pits in the slate.

26073 Slate from eastern pit.

S. 5

T. 42

R. 32



T. 112. P. 32

26074

In the westernmost pit the slate resembles a tuff. It is much decomposed so that its true nature is not clearly discernible.

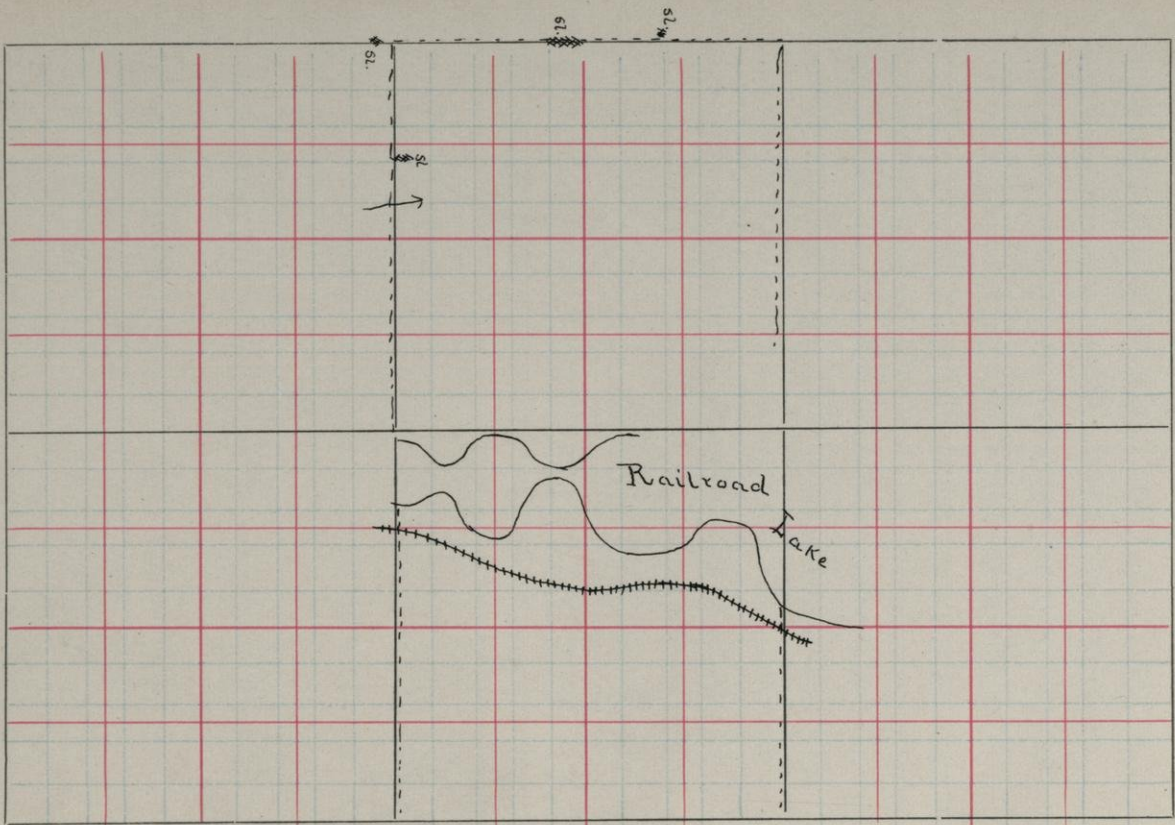
Ran also around the four sides of ^{5 1/2} Sec 5, finding in the west and south lines of the section several ledges of slate, whose strike and dip could not be obtained.

Map. p. 25.

S. 5

T. 42

R. 32



Map p. 47.

J. 41. P. 32

From Boule river ran north along
U.S. Center line of Sec 12 as far as
500 ft of Center Sec 1, then East $\frac{1}{2}$
mile and south to ^{Boule} ~~Washington~~
river.

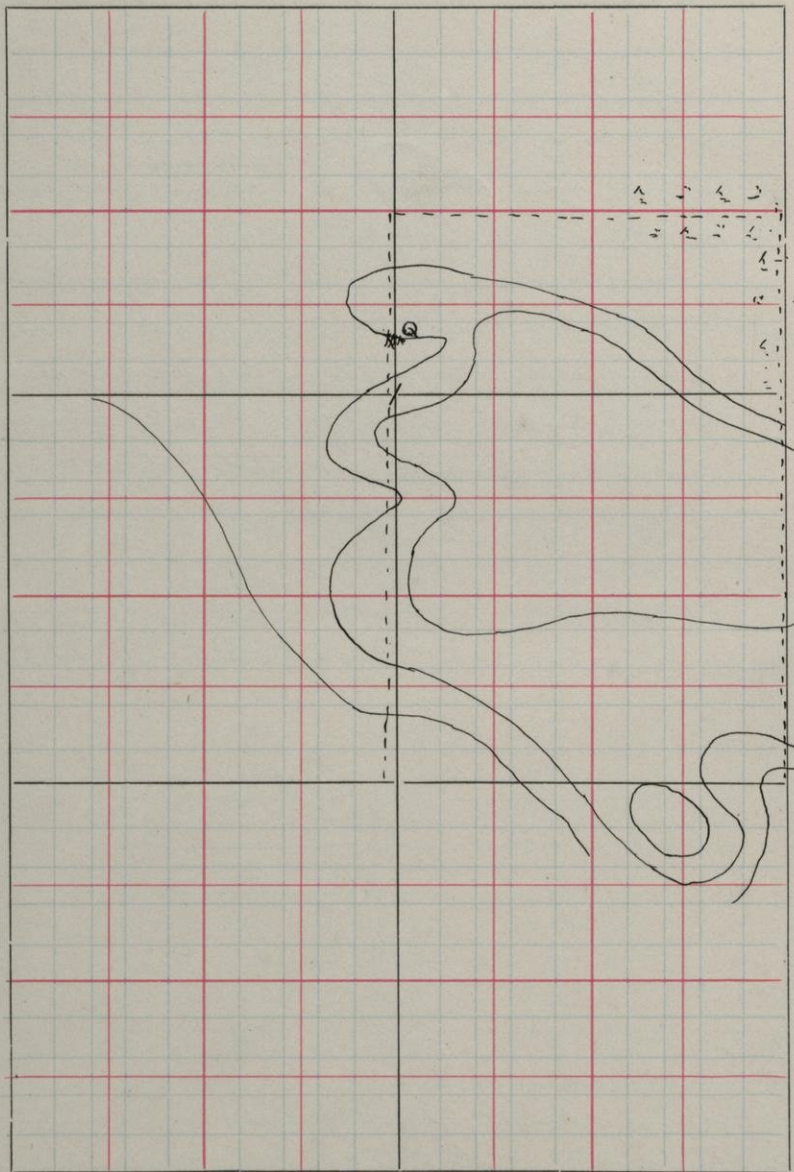
In Boule found the quartzites already
referred to (p. 31.)

At 470 ft. 125-225 W of Center Sec 12
and at 175 ft center Sec 1, found
knolls of quartzite^s like that in river,
but otherwise found no rocks until
reached ^{Boule} ~~Washington~~. These latter
rocks are discolored talus.

S. 1

T. 41

R. 31

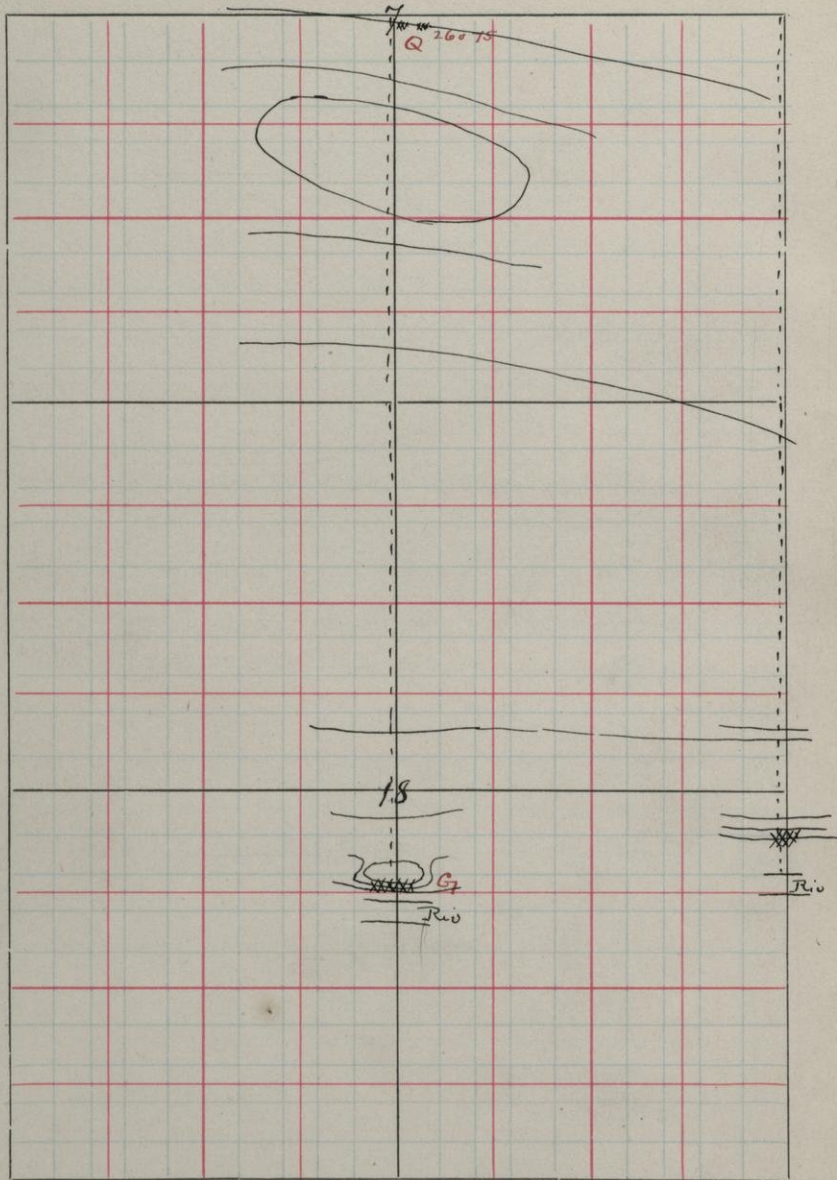


See previous page for description of
"neaps".

S.

T. 41

R. 31



J. 41. R. 31

From Boule' River ran north along
center line of Sec 18. J. 41. R. 31 as far
as center of Sec 6 then East $\frac{1}{2}$ mile
and South to Boule' River.

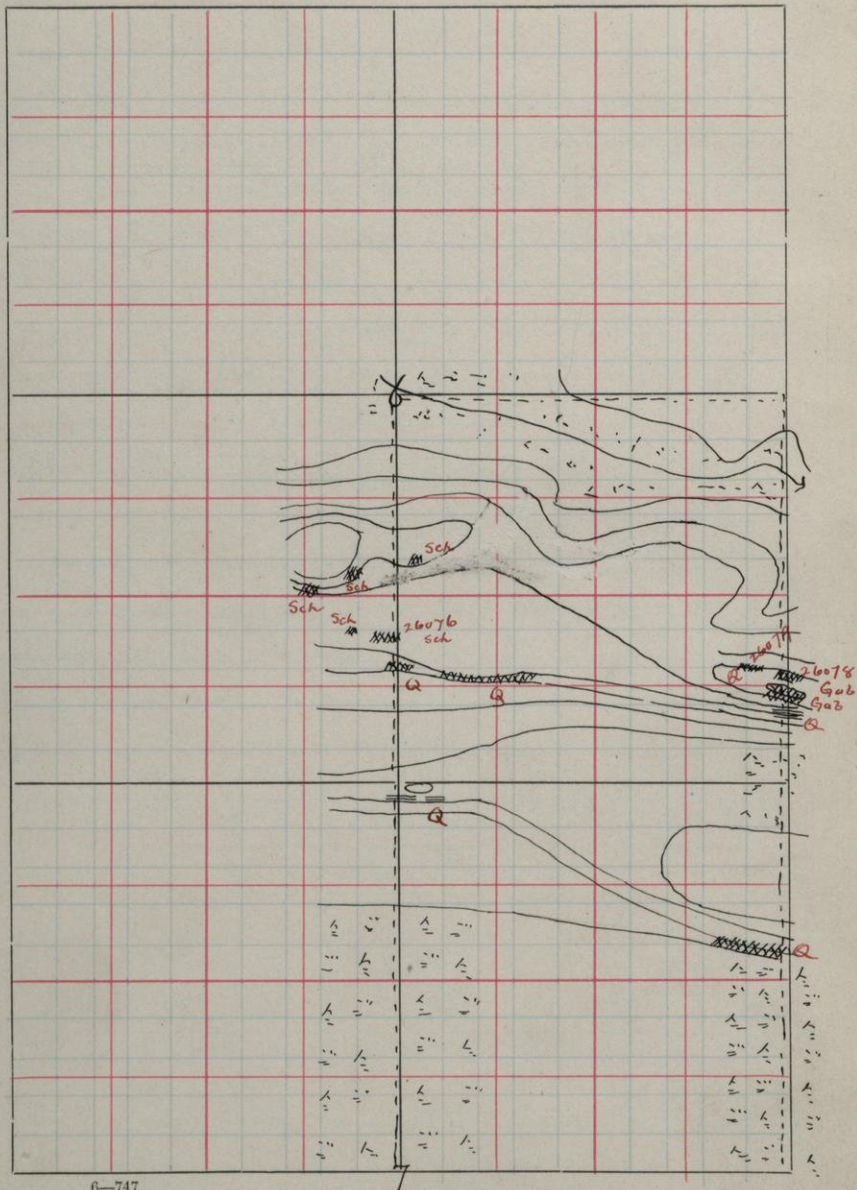
At the river bank where started
(250' S of center of Sec 18) found hill
of greenstone schist.

26075 No other rocks were seen until
reached center of Sec 7, where on the
north side of a hardwood hill, are
several large moss covered ledges of
the usual micaceous quartzite. No
dip or strike was obtainable here,
but at the N $\frac{1}{4}$ Sec 7 across swamp,
from 26075 are other ledges of the
same rock striking about 30° of E,
and dipping vertically.

S.

T. 41

R. 31



at 325 ft of S.W. p. Sec. 6. on south side of large, rough hills in old choppings are other exposures of the quartzite, which near the top of the hill is in contact with a black hornblende schist. Both rocks are much sheared, but the contact between them is irregular as though an igneous one, in which case the black schist is an altered basic eruptive.

26076 The schist a short distance back from the contact is more greenish in appearance than 26076 and is marked by parallel bands of quartz. Other ledges of the schist occur scattered over the hill.

26078 At 300 ft of S.E. cor Sec. 6. are several knobs of a heavy, coarse grained rock that is taken for gabbro, although very rotten and micaceous. May this not be original of black schist?

26079 At 50 paces west of this is a ledge of micaceous quartzite, and on the south side of the gabbro bluff there is

Map. p. 49

J. H. R. 31

a facies of the same quartzite?

Fresher specimens of the quartz are found along the bluffs. Sometimes the rock is massive, at other times it is schistose like the hornblende schist, and then again, it is very fine grained and dense.

26080 Coarse grained phase.

26081 Schistose phase.

Other ledges of quartzite and greenstone are indicated on map.

