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Marquette region, Michigan: [specimens] 20301-20463. No. 134 1891

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1891

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

✓ 134

Marquette Region
Michigan
W. S. Bayley

20301-20463

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.

#134

In present instance have used instead of hachures, contour lines without definite contour intervals. In this way have avoided covering page with black lines. As for extent of ledges outside of the quartzite ridge the extent of ledges is noted. The Quartzite ridge is continuous ledge along the traverses made.

2231

Marquette
Iron Range

N.E. of Negaunee

By

W. S. Bayley

W. B. Lewis - Companion

July, 1892.

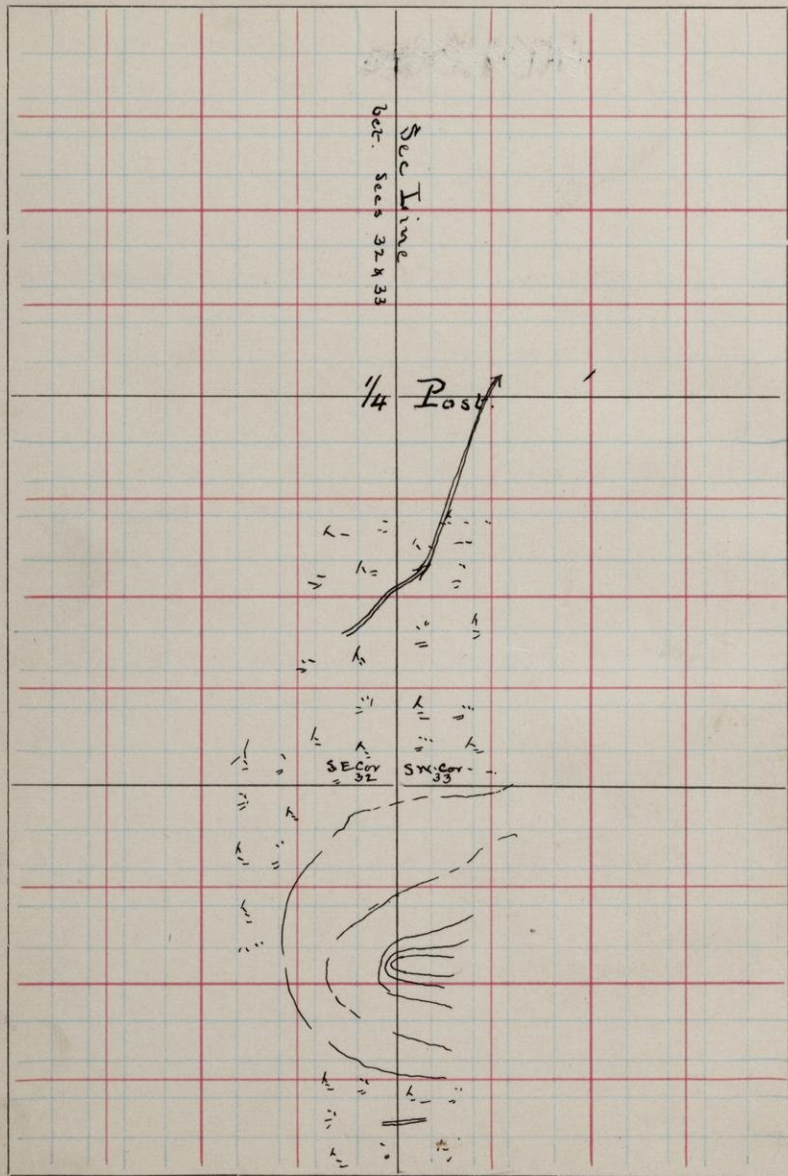
Specs 20311-20318 Sec 32-4826
are catalogued as per plat opp.
p. 4 and not according to notes
20319-338 not E.F.D.
catalogued

Since the notes recorded in this book are the result of a continuation of the work done in 1891 little need be said as to method employed.

After a preliminary examination of the country South and East of Ugannee most of the time spent near this town was devoted to the study of the quartzite range East of Seal Lake. On the corners, where found, traverses were made at short intervals across the range and many specimens taken. The hills of which the range consists all trend E.W., and the rock in them dips to the South - at an angle that is higher to the North than in the Southern portion of the ridge. To its South there are few outcrops, the country being thickly and covered in most places.

S. 32 & 33 T. 48

== Road
R. 26
++++ D. S. S. R. R.



July 3/92

On the Section line between
Secs. 32 & 33. T. 48 R. 26, from
the S. corner to the road 1575 N
there are no exposures. Sand
hills and sand plains stretch
the entire distance.

July 4/92

Started north on line 450 E of
S.W. Cor Sec 32. T 48 R. 26 and
from a point 400 N of the south
line, crossing in journey to N.
line of the section the great ridge
of quartzite?

20301 The first rock seen forms a little
hickock outcropping from glacial
deposits at 500 N. 470 E of S.W. Cor
Sec. 32. It is a schistose gray-
wacke striking about 20° N of E
and dipping 85° S.

20302 A little further East in the same
hill the same rock appears more
massive.

20303 At 750 N. 460 E of S.W. Cor Sec
32, is the East end of another
hill, on whose South side is again
exposed schistose graywacke.

20304 Further up the hill is a more
massive phase of graywacke con-
taining fragments of rocks.

Beyond this point the place

2

Anteeds to 1150 N. Here is the south,
steep slope of the quartzite ridge,
rising high and bold to the north.

20305 The south face of this cliff, at
1150 N 540 E of SW cor Sec 32.

is a white, schistose, talc-like
rock, that seems to be largely
chert, and containing

20306 bands of chert (conglomeratic)

20307 A little further up the hill the
rock is undoubtedly quartzite?

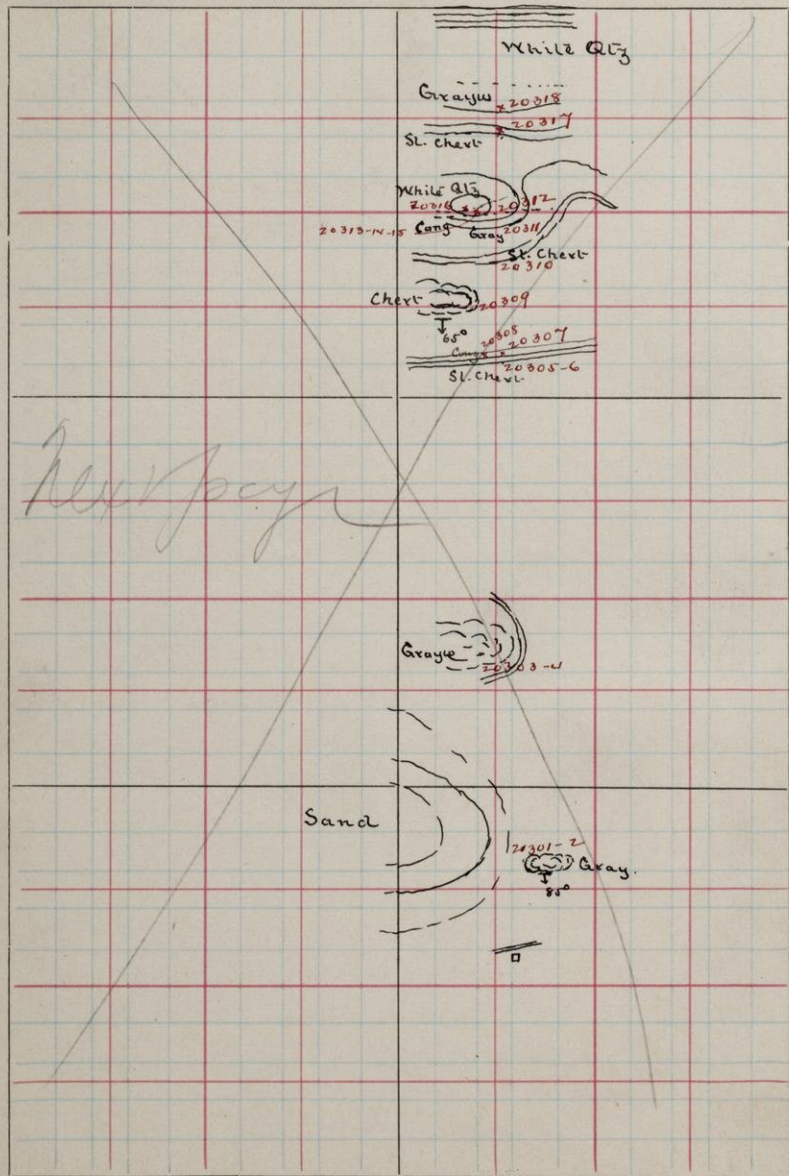
The chert like mass may be
only a very fine micaceous quartz-
ite? It is only a few inches wide
and on its weathered surface
shows pebbles.

20308 At about 505 E of SW. Cor. Sec 32
the conglomerate is a little bet-
ter developed exhibiting as it
does quartz pebbles and quartz-
ite fragments in a cherty ground-
mass.

The relations between the quartz-
ite and the conglomerate are not
clear, but the latter seems to be
a band or bed in the former.

S. N.W. 1/4 T. 48
32

R. 26



6-747

SW cor

Another height rises lowest of line being followed, forming a little peak above the terrace on top of cliff from which above specimens were taken. This

- 20309 Knob consists entirely of a dark cherty rock that is more or less slaty. Its dip is 65° S.
Location: 1200 N. 500 E of D.W. Cr.
Dec 32.

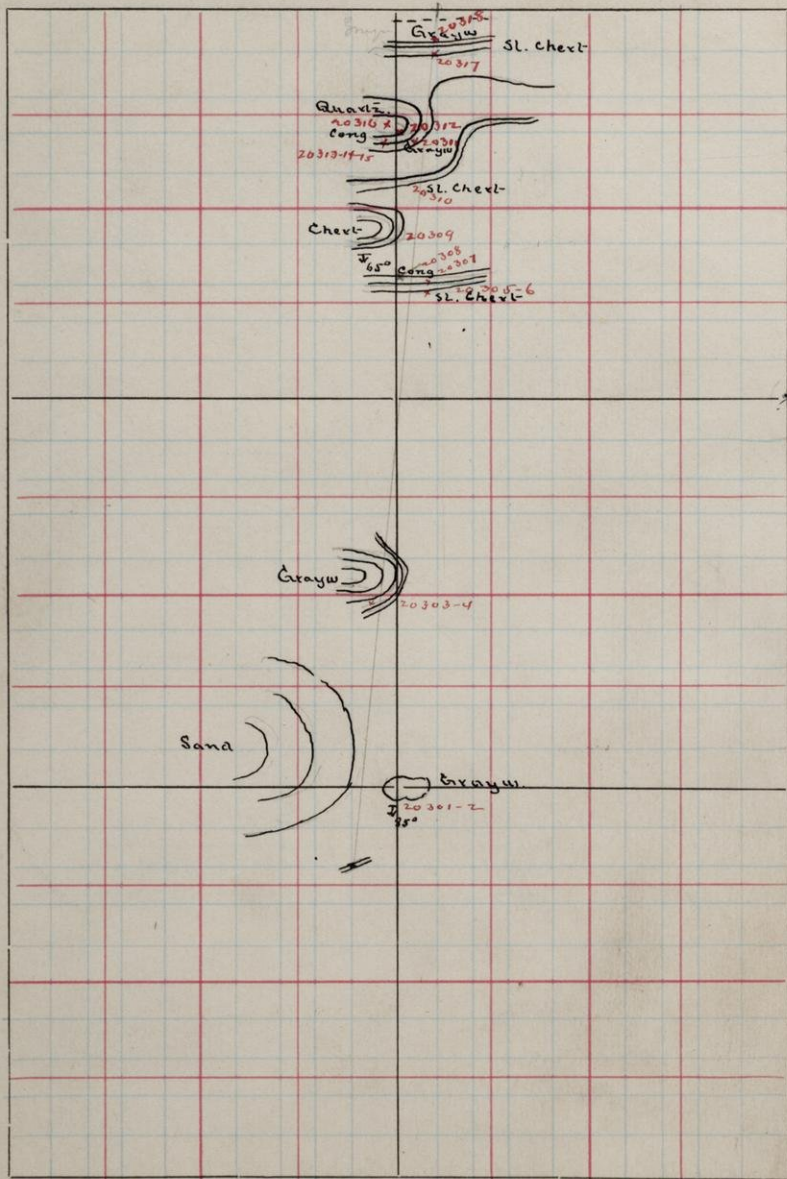
- 20310 At 1275 N. is the front of another cliff that forms back of terrace referred to. This cliff on its south face is schistose as are the rocks further south. The nature of the rock composing it cannot be determined with microscopic examination. It appears to be a reddish chert or a sericite or talcose schist.
Location 1275 N. 550 E of D.W. Cr.
Dec 32.

50 paces further north is still another south facing cliff, be-

S. 32

T. 48

White Quartzite 26



ground which the hill rises to an
E or W. trending crest.

- 20311 The rock at 1325 N. 550 E of SW
Cor Sec 32 is apparently a
gray wacke.

- 20312 This gray wacke grades into a
quartzite^d, which on south side
of the top of the hill is of a pink-
ish or red color. 1350 N.

- 20313 A few feet west of 20312 is a
conglomerate^d containing pebbles
of quartzite^d and some of jasper.
Conglomerate from 1350 N. 625 E of
SW Cor Sec 32.

- 20314 Small specimens same rock
20315 Another specimen same.

- 20316 A few feet west of the conglomerate^d the quartzite^d again occurs
in large mass, which appears
where under the conglomerate^d
and to have afforded pebbles to
it. The relations of the two rocks,
however are obscure. There may
possibly be an unconformity be-

tween them.

On the north side of this same hill is white quartzite and at the base of its north side, a black slaty chert

20317

Between this point and next ridge north is a shallow valley, bounded on the north by the steep side of another cliff.

20318

Here, at 1375 N. 640 E of Sec. Cor Sec 32, is again a schistose gray wacke, and north of this on top of hill and forming its main mass is the white quartzite.

No other rocks were seen on this run which extended to N. line of Sec 32.

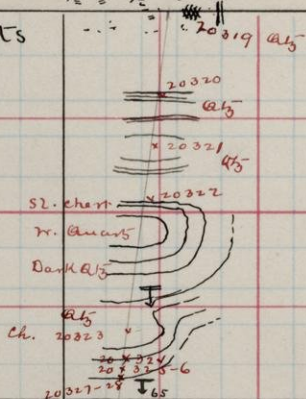
When reached N. side of the Sec. went East to 633 E of N 1/4 post and then South.

On the run East were in greenstone schist from 170 to 500 E of N 1/4 post Sec 32. few ledges of the rock were exposed at fire-

N.E. 1/4
S. 32 T. 48

R. 26

Green Schists



It was so evident that this run
is off that have not plotted
exposure.

It was run over again later.

6
great intervals. Beyond 500
E are quartzite^d knobs which
were studied later.

- At point where turned to go
South were consequently in
20319 quartzite^d? Specimens from 670 E.
At 100 S of U. line of the section
began the ascent of a hill of white
20320 quartzite^d whose top is at 130 S.
The quartzite^d is gray in the
fresh fracture and in many
respects it resembles the older
rock than the younger one over-
lying the jasper conglomerate.
20321 Further up the hill, in its top,
and as far South at 200 S. the
quartzite^d is of the talcose phase,
that looks something like a
chert.

- From this point descended a
small ravine and ascended
the north side of a much more
imposing eminence, on whose
20322 north side is the slaty chert, just
to South of which is chert white^d
quartzite^d and again further South
a dark quartzite^d? All the rocks

strike about 5° S of W, and dip high to the south.

20323 At 400 ft. is a series of banded rocks - quartzites etc - with several noticeable layers of containing cherty concretions. These bands may be the same as were called conglomerate a few pages back. The concretions resemble pebbles in some cases, and where not well defined might easily be taken for such. (See 20313 etc.)

At 450 - 500 ft. is the southern slope of the hill, where the alternation of quartzites and talcose quartzites is again to be seen. Here the series is composed of quite narrow bands, the quartzites often occurring as lenticular masses in the schistose rocks.

The general dip of the rocks is 65° S and strike about 10° N of E.

20324 The first layer to the north is a talcose schist - a white schistose rock such as a quartzite might become if squeezed. This is a layer not more than $1\frac{1}{2}$ ft.

thick.

20325

Next is at $4\frac{1}{2}$ ft. layer of white quartzite, and

20326

Next a 15 ft. bed of slaty schist. Some of these again the alternations are repeated.

20327

representing the quartzite, and

20328

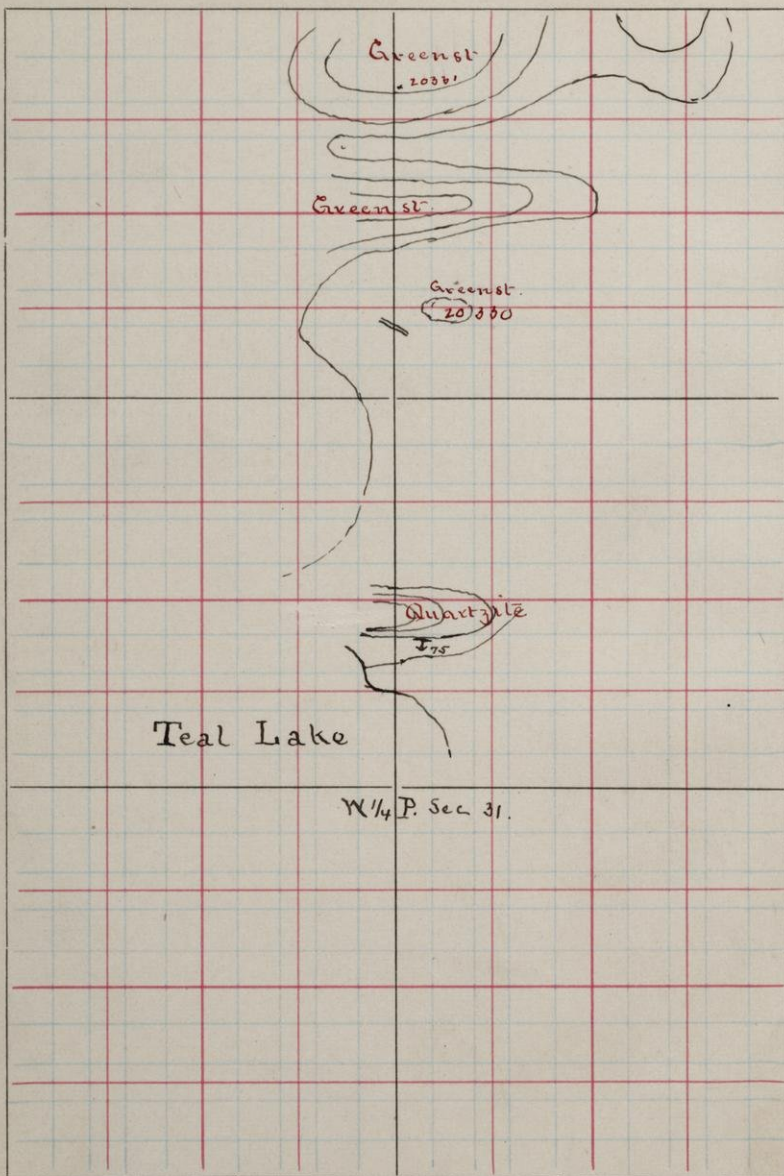
the schistose cherts or talcose beds.

The road was struck at 1050 S. 500 N of I.E. Co Sec 32. It is evident that did not follow the line as made westing 130% in 1000 paces. The line followed was probably straight as variation of compass was found to be 6.5° - 7° ^W where measured. It should have been 2° E. A variation of 9° from true S. would throw us 153 paces W.

S. 31

T. 48

R. 26



July 5/92

Found SW Cor. Sec 31. sighted across Lake Teal, crossed lake and continued north on section line bet. Sec. 36 T 48 R 27 and Sec 31. T 48 R. 26, allowing 1125 paces for distance to N. side of lake from SW Cor of Sec 31.

At 1160 N. crossed the mouth of the Slaughter House Creek (See Williams' Bulletin) which flows on the south side of a hill of white quartzite?

20329 Specimen of white quartzite from south side of hill 1200 paces N of S. W Cor Sec 31. 48-26. The hill extends East about 100 paces and then breaks off at a valley through which the creek flows south.

On the north side of the hill the quartzite is dark and is well bedded with beds dipping about 75° S and striking 10° N of E.

Beyond the quartzite is a hard-wood hill in which are no exposures.

mes.

20330 But at 1650 N. 75 E of SW cor Sec 31 is a knob of schistose greenstone, where strike seems to be nearly E.W.

20331 At 1925 N. is a 30ft wide band of a red weathering rock in the schistose greenstone. When reached N. line of Sec. ran East to N.E. cor then South.

20332 The N.E. corner of the section is in the N.E. side of a greenstone hill, whose northern face is almost perpendicular. The greenstone like the others crossed in north line of this section, is soft and talcose, and is cut by bands of light rock like 20331.

20333 Upon running south first crossed a sand hill, then a ridge of schistose greenstone from which took a specimen, at 1725 N. 25 N 75 E cor Sec 31.

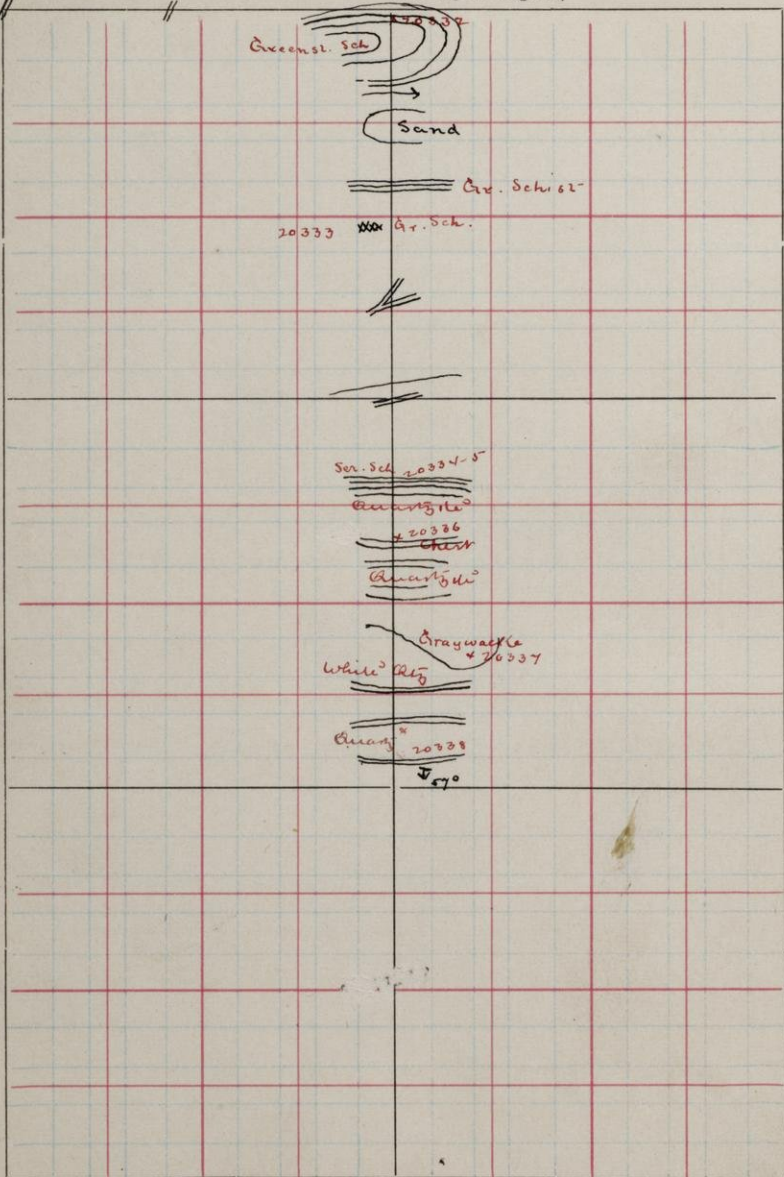
The north side of the quartzite hill was struck at 1450 N, where the rock rises precipitously. Large blocks have tumbled from the face and

S. 31

T. 48

R. 26

NE Cor. Sec. 31



lie at its base forming a coarse
taurus. The beds dip south but
at what angle could not be deter-
mined.

Under the quartzite is the series
is or talcose phase of the quartzite.

20334

a schistose rock, that appears
to line all perpendicular faces
of the quartzite whether they be
vertical or horizontal faces.

20335

The quartzite above 20334 is
the silicified rock resembling
closely the quartzite at the west
end of Seal Lake.

20336

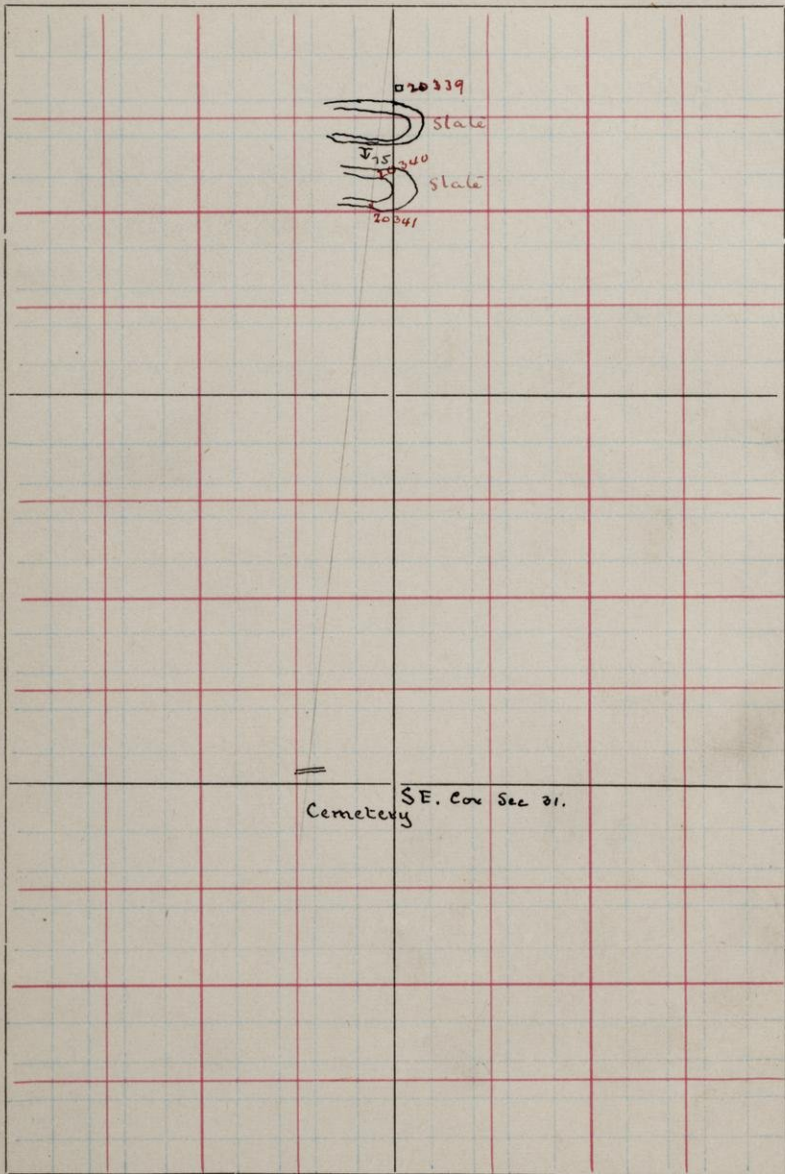
At 1340 ft on top of the hill there
is a strange association of a cherry-
rock and the quartzite. The former
weathers yellowish-brown
Beyond it on the south is the
white quartzite, with the contact
between the two very irregular,
like an amputine contact. The
yellow-weathering rock (20336)
contains fragments of the white
quartzite.

A little to the East of the white
quartzite, and again, under it

S. 31

T. 48

R. 26



12
near the bottom of the hill is the dark gray wacke, and here again occurs the igneous looking contact: with the addition of veins of quartz cutting the gray wacke.

20337 Gray wacke - 60 steps East of Quartzite?

From this hill descend into little valley and ascend another Quartzite hill, where the rock is quite well bedded, striking about Eto and dipping 57° S.

20338 Quartzite from north slope of this hill.

N.B. Can it be that there are two quartzites here. The northern hill with its cherts and talcose schists being older than the Southern one?

20339 At 1105 S. 15 E of S.E. cor Sec 31 is a little pit in a field, from which slate was taken on the South side of the field in which pit occurs is a low hill where the same slates are in position. They strike about Eto

and dip south at 75° .

Above them is another band of quartzite², then slate 10 paces wide and quartzite² of equal width.

20340

The north side of a second hill rises at 835 ft., exposing a ledge of slate², and extending south to 753 ft. where the rock is more massive.

20341

When reached south side of section found ourselves 100 paces too far west.

H.B. Great difficulty was had in locating corners and in running straight lines. Rarely could original corners be found, and compass for some reason not understood, refused to carry us due North or South. In every case compass was foremaned and line drawn in after correcting by pacing to known points.

July 6/92

From SW cor Sec 32 offset East
and north to point 500 N. 500
E of this corner. From here ran
Eurr 125 paces N. 300 paces,
and East to N. 1/2 line

20342 At 750 N. 500 E of SW cor. Sec
32. found south side of gray-
wacke hill in which the rock
is like those to the west.

At 1050 N 990 E of SW cor Sec 32
are two pits in which no rocks
were seen, but on whose dump
heaps is a large quantity of red
20343 sandy banded rock, not unlike
Horninger's flag slates

At 1250 N 1000 E of S.E. cor Sec
32, struck steep south side
of hill, in which the rock ap-
20344 pears to be contorted jaspers and
chert. Not unlike the contort-
ed rocks of the older formation.
The rock is very much twisted,
the bands running in all di-
rections, and being cut by many

quartz veins.

20345 From top of cliff at 1295 North.

at 1369 N. 1043 E follow Sec 32. is a steep rugged ledge in which the relations of the different rocks are as complicated as before. At this place there is contorted chert and Jasper and on its south side a schistose slate.

20346

The slate is a dark gray rock, whose contact with the chert is irregular. It occurs as stringers and lenticular masses in the chert, and its beds strike 20° N. E. and dip about 40° S.

20347

The chert, on the upper surface of the Knoll is quite regularly banded, but near its contact with the slate it is filled with what look like brecciated pieces of lighter chert.

North of the chert hill is a large hill of white and red quartzite.

20348 is from foot of chert and slate^d cliff at about 1375 N. 1050 E of Sec. 32.

At 1465 N begin ascent of another hill that is here composed of white quartzite. Beyond this at 1488 N. is a knob of

20349 slate^d

East of this is another knob of quartzite separated from the slate knob by a small gap.

20350 The slate continues north to 1590, where a light-pink weathering sandy quartzite^d, dipping at the usual southerly angle and striking 200 N of E takes its place.

20351 at 1680 N as begin to descend the hill find again slate rocks that extend all the way westward to 1737 N. Rock is very like what have been called sericite schists^d.

at about half way down this knob slope - say at 1690 N -

20352 is an exposure of conglomerate containing white quartzite pebbles.

Continued over plain to N. 1/4 part of section, then went East 250 paces and South.

20353 at 187 E of N. 1/4 part Sec 32, found ledge of schistose greenstone in small hill rising from the plain.

From 187 to 250 E. continued in this hill, and at 600 left it.

20354 at 1250 E. 1880 N of W cor Sec 32, is a small ledge of a light schistose rock, in which several pits have been dug.

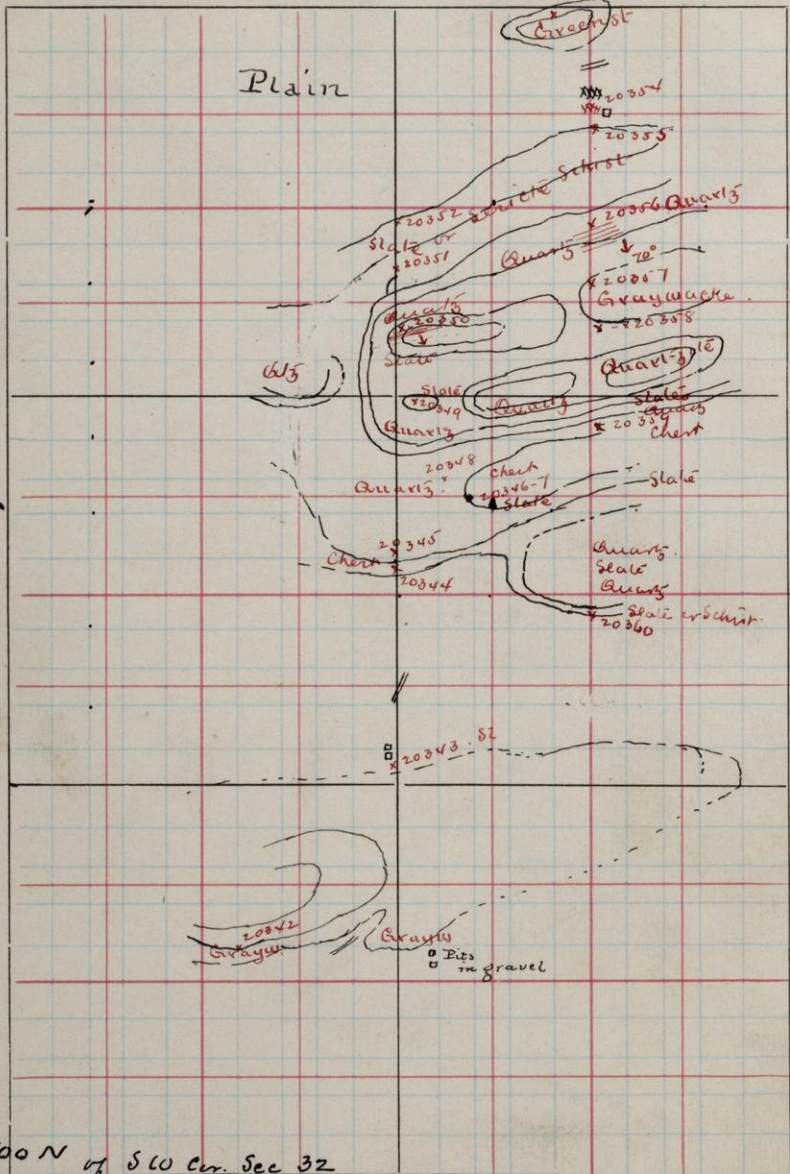
20355 Again at 1868 N. at the foot of the small hill are exposures of this schist, here apparently the rock that has been called the sericite or talcose schist. It is impossible for me to decide whether it is a schistose greenstone or a squeezed quartzite.

S. 32

T. 48

R. 26

20353



500 N of SLO Cr. Sec 32
 500 E

20356 At 1720 N. 1250 E of SW cor Sec 32. is the north side of the main quartzite hill. The specimen comes from base of hill.

On its top 1687 N the rock strikes 25° N of E and dips South at about 40° .

20357 South of the quartzite at 1644 N. the red weathering gray-wacke reappears, the white quartzite apparently grading into it.

20358 At 1600 N 1250 E of SW cor Sec 32 is a facing of black weathering gray wacke on the South side of the hill. It contains a 6 ft. band of the brecciated chert.

Crossing a ravine we find on the north side of next hill some, a band of slate in quartzite. This quartzite extends to 1460 N. where the banded rocks noted further west again appear.

20359 They are the black slate, a band of pink and red quartzite, etc,

all twisted into a w. fold
but all dipping south.

At 1427 U the black slate and
the pebble chert are well exposed
in bands. These extend in almost
the broken ledge to 1331 U.

At 1288 U is a ledge of white
quartzite and beyond this, at
1256 U, black slates and red
quartzites, forming a band about
10 ft. wide in the quartzite.

At 1240 U. 1250 E of S.W. Cr
Sec 32. on the south face of a
20360 quartzite cliff, is again slate?

U.B. It again appears as though
vertical faces of these cliffs were
always lined with schistose
rocks, as though they were
thrust planes of faults.

July 7

From center Sec 32. 48-26 run
East 750 paces then north through
swamp to quartzite^d cliffs.

20361 At 1305 N. 350 W. of S.E. Cr. Sec 32.
is the south side of a hillock of
talcose schist in meadow

20362 West face of main cliff at 1580
N. 250 W. S.E. Cr. Sec 32, where
as usual a schistose rock forms
a facing. The schist and the

20363 quartzite^d here seem to be inter-
bedded, with the usual south
dip and a strike a few degrees
N of E.

20364 At 1612 N. 250 W. of S.E. Cr. Sec 32
is a ten ft. band of brecciated
chert, and to the west of it 10 paces
and at 1630 north begins the
20365 black shale.

This shale extends some distance
north, exposing at 1646 N. a ridge
of this material containing
nodules of chert.

20366 Further north the chert predom-
inates, for at 1675 the rock is

chert cut by quartz veins.

20367 At 1690 U. are great exposures of what appear to be white chert, but since it grades into a brown

20368 quartzite spangled with hematite scales it is more likely to be a fine grained white quartzite. The rock 30367 is brecciated in places. 30368 strikes N.E. and dips 45° S.E.

At 1717 U, on north side of highest stretch of hill, the black slate is again exposed.

U.B. The impression thus far received is that the quartzite ridge East of Seal Lake clippers from its extension west in that the former consists, not of a series of quartzites, but of an interbedded series of chert slates and quartzite. Whether the chert is a primary chemically precipitated, or a decomposition product like that cementing the grains of quartz in the

quartzite^d can not be determined until after microscopic examination of the specimens collected.

20369

At 1748 ft., on South side of another hill are again the same black scales, which extend to 1840 ft.

At 1848 ft. on the north side of this hill is the usual facing of chert, here brecciated.

At bottom of hill crossed road and at 2000 ft. found small hill of schistose greenstone.

20370

To make sure that had crossed the entire width of the quartzite formation ran north 100 paces further to top of South bank of the Carp river.

The gorge here is through schistose greenstone through which the river flows for at least 250 paces Eastward.

- 20371 Schistose greenstone from $\frac{1}{2}$ way down the bank - about 125' N. 250 W of S.E. cor Sec 29.

- Followed along south side of stream for 250 paces remaining all the while in the same schistose greenstone of which
20372 took specimen at 63 paces west of E line Sec 29.

Returned to point 250 W and 100 N of S.E. cor Sec 29 and from it ran East to Corner, which however could not find.

- 20373 At 100 N. 160 W of S.E. cor Sec 29 found small outcrop of greenstone schist and at

- 20374 100 N. 30 W of same corner a well characterized massive greenstone

From corner ran south on Sec. line between Secs 32 & 33. The first rock seen as southern run is exposed in a large ledge

20375

of white quartzite dipping 40° S
and striking 20° S of E. The north
side of ledge is 40 paces South and
runs from line 112 paces East.

In some places the ledge looks
brecciated, but in the whole it
is an evenly bedded quartzite?

20376

from pit at west
end of meadow. The rock is partly
by in place.

20377

At 100 S. on the side of a gradual
slope is a small ledge of siliceous
cherty slates

20378

At 200 - 215 S. is a brown quartz-
ite cut by veins of white quartz.

20379

This grades into a white quartz-
ite on top of the hill at 248 S.,
where there is an interbedding
of the white rock with a brown
one.

20380

At 290 S. the brecciated chert
reappears in a small ledge,
and at 360 S.

At 360 S. are large ledges of
reddish quartzite well shown in

20381

side hill.

20382

In places it is locally schistose. It is probably that the rocks are portions of two different beds, with the schist above the quartzite.

20383

Run near base of hill.

July 7/92

Ran to N.T. 1/4 line of sec 33-48-26, then north in this line to N 1/4 part of section.

20384

This part is in a schistose greenstone hill, south of which at

20385

21 S. is a ledge of white quartzite in the south slope of the same hill. The rock extends eastwardly just south of the section line and in places is schistose.

20386

At 75 E of this line the schistose

20387

greenstone crosses the line, striking 5° S of W. It is here very fissile, so that it strangely resembles a slate.

20388 At 180 E. the west end of a quartzite ridge is ascended, which ridge runs East as far as 425 E. The rock dips $70-72^{\circ}$ S and strikes 15° N of E.

A few paces further East and just north of the line the quartzite is coarse, so that pebbles of quartz and red feldspar may be plainly seen in it.

20389 North of this conglomerate is a schistose rock, a specimen of which was taken at 300 E.

20390 South of this quartzite ridge is a smaller one of the same rock where the dip, however, is only $50-60^{\circ}$ S. the strike remaining 15° N of E.

At 500 E ran north finding quartz-schist in small exposures at 25 and 63 N of the line. At 63 N. is a small pit that was dug in the contact of quartzite and gneiss.

20393 On its south side the former is

20392 Exposed, and on the north side greenstone. The quartzite is conglomeratic like 20389.

20394 At 90 N. are several small ledges of schist, striking 10° N. of W. These rocks are in all probably greenstone though they are so fine as to resemble slates.

20395 At 235 N. 500 W. of E. on Sec 28 is the south side of hill composed exclusively of rock like 20394

At 250 N. turned west and ran over greenstones to 650 W. of a line of section, then south to point 200 N. of section line, west to 750, south to point 125 N. of line where on north side of a hill is

20396 Exposed a ledge of characteristic greenstone

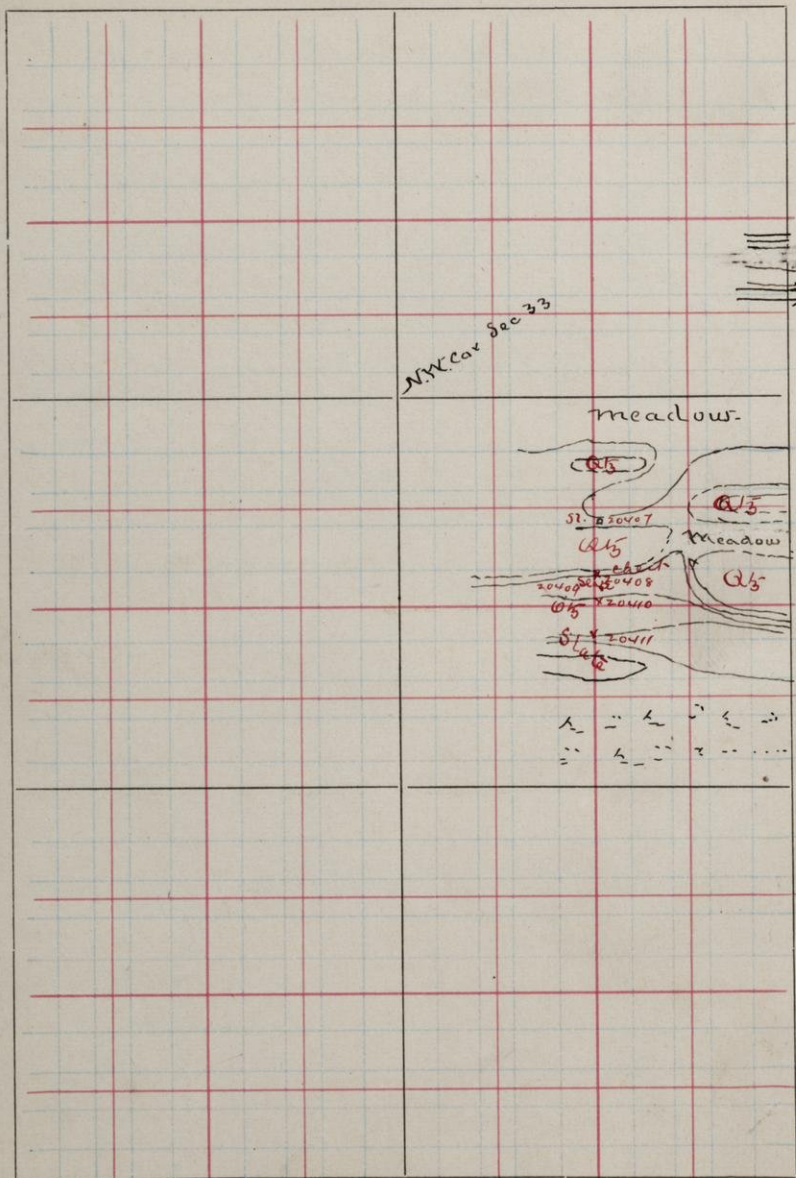
Continued south to 600 N. of section line, then west over greenstones to 1000 W. and south to $1/4$ post.

- Two specimens of greenstone were taken, one from south side of hill at 60 N. 844 W of SE cor Sec 28
 20397 and the other at 70 N. 900 W ...
 20398

- From the $\frac{1}{4}$ post there run west to river at 205 west and crossed it. On its west bank a little north of the line is the east end of the ridge of hills that run west to Clear Lake. The rock here at 220 W of $\frac{1}{4}$ post seems like a greenstone schist, though of this am in some doubt.
 20399

- At 250 W. 20 N of $\frac{1}{4}$ post Sec 28 is south side of large greenstone hill in which the rock is schistose as usual
 20400

- at this point run south making another section across the quartzite.
 At 96 S. 250 W of $\frac{1}{4}$ post meet the steep north side of white quartzite hill and at 123 S. the southern side of the same hill. Here the strike is about E-W and the dip
 20401



70° S. As in other occurrences the formation grades locally into brown quartzite?

20402 In the south side of a little ravine at 165 S. is the north face of another hill, composed here of slate and chert bands. To the East and north are other exposures of these same slates gashed with numerous quartz veins. The slate extends south to 200 S. ^{beyond} which there is a great south facing wall of quartzite overlooking the Swamp. On the lower portion of the face the quartzite is brecciated and in places is chert like.

When reached face of cliff ran west along its top to 500 W, then north.

20403 At 500 W 180 S of U 1/4 post Sec Sec. 33 is a south facing cliff of brecciated chert, which continues north to 150 S, where it is replaced by brown quartzite forming south face of high hill.

At 500 W. 50 S. of $\frac{1}{4}$ post Sec 33
 20404 is a low long ledge bordering
 north side of a terrace. The rock
 is the Seicite or talcose Schist.

20405 at 490 W. 10 N. of $\frac{1}{4}$ post is the
 west end of the hill from whose
 east end took 20400. Rock proba-
 bly schistose greenstone.

The Camp River flows at the north
 base of this bluff at 143 N. On
 its north bank at 230 N. is a
 high bluff of schistose greenstone
 20406 from which specimen was taken.

At 250 N. ran west to 750 W. and
 south, making another section
 across the bluffs.

At 40 S. 683 W. of $\frac{1}{4}$ post Sec. 33
 is the East end of the northernmost
 quartzite bluff in which the rock
 dips 70° S and strikes about E.W.

20407 At 150 S. 745 W. is a pit from
 which slate was obtained, as rep-
 resented in specimen.

- The next hill south is composed of quartzite on its north side, but at 215 S. on its southerly slope is a band of cuttled chert, followed a few paces further south by slate.

Specimen 20408 exhibits well the brecciated surface of the chert band.

- At 241 South, lower down on slope of the hill is a coarse brown quartzite and at

- 20411 300 S. further down the hill a black slate with chert bands.

At 350 S. is the last ledge of black slate.

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Ran north on line 250 N of $\frac{1}{4}$ line
 of Sec 32 - 48 - 26.

- At 1192 N. 730 N. of S.E. Cor Sec 32
 20412 is a small ledge of schistose gray-
 wacke and at
 1250 N. 800 N. the south side of
 large ledge of massive rock of the
 same character. This cliff extends
 20413 eastward some distance forming
 bluff overhanging the plain.
 At 1225 N. 900 N. of S.E. Cor Sec 32
 20414 is a small ledge of black slate
 on the SW edge of slate hill. The
 rock is exposed to 950 N, beyond
 which point there are no others
 until reach the south side of
 20415 of the quartzite bluff, at 1145 N
 1235 N of S.E. Cor. Sec 32, where the
 rock is white and massive.
 at 1165 N. the ridge is more
 prominent, running as it does
 E-W as far as eye can see. The
 rock in it dips at 65-70° S and
 strikes 10° N of E.

At 1213 U. is a small ridge of interbanded slate and chert, striking 20° N of E, and at 1245 U. is another.

20416

At 300 U. is the south face of a quartzite ridge from which took specimens to compare with 20415.

20417

At 1350 N. begins a large ledge of gray slates that extends as far north as 1420 U.

Again at 1480 U. is more black slate with interbanded chert and at 1485 begins quartzite.

20418

At 1554 is the southern side of a great ledge of coarse white quartzite, a rock that stretches far to the east on the north side of the top of the hill. At 1600 U. it changes to the more usual quartzite.

At 1645 U. cross the cliffs on the north side of the ridge, where the rock is mainly quartzite that is interstratified with slate, the latter forming the facing of the cliff. The bands of the two rocks are

narrow and the slate in each case is different from the black slate to the south and more like the sericitic or talcose variety, called so frequently talcose schist.

At 1700 N. on road, just north of which is a hill of schistose greenstone from which two specimens were taken, one at

20419 1735 N. 1260 W of SE cor Sec 32
and the other at

20420 1735 N. 1317 W " "

20421 At 1700 N. 1345 W of SE cor Sec 32, on north side of the road is a pit in a very schistose, slaty rock, with no recognizable dip other than its vertical schistosity.

The greenstone is just East of this, and in some of the small pits in the neighborhood, it forms the hanging wall, while slates comprise the foot wall. From the exposure here it would be difficult to determine whether the greenstones and slates

are unconfusable, or whether
the former are deeper in the latter.

20422

The north side of the hill north of
these pits is certainly green-
stone of the usual character, and
north-west of it is a small knob
of characteristic greenstone schist.

Continued north section line,
ran 250 paces west and west-
south on line 1500 N of Elsie
Sec 32.

No rocks were seen until reach-
ed point 450 S, where is the front
face of the cliffs, composed of
interbedded quartzite and ser-
icite schist.

20423

is the schist from the base of the
hill.

20424

At 450 S. further up on the hill is
the white quartzite well developed,
and at

20425

525 S. a very coarse variety of the
same rock that is more or less
schistose.

At 570 S. in the same hill is black or dark gray slate weathering reddish.

At 740 S. on the south face of a white quartzite bluff is the usual interstratification of quartzite with the chert or schist, here weathering greenish yellow.

At 480-510 S. bands of the black slate are interbedded with chert bands forming part of the hill.

At 552 S. the white quartzite dips S at 70° and strikes 10° N of E.

20426

50 paces west of there and a few paces N. is a small bluff of brecciated chert and at

20427

900 S. the extreme south, south-facing cliff of chert.

20428

From 900 to 1200 S. there are no exposures, but at 1200 S. struck foot of graywacke hill, getting specimen of rock at

1250 S. 5-75 W of N 1/4 post Sec 32.

From point 250 E. 400 N of S.W. cor
 Sec 32. 48-26. ran north, crossing
 20429 line of arenaceous slate at 730
 N. The rock is a sandy slate or
 schistose graywacke much like
 20428

at 1095 N. is small ridge of
 white quartzite running some
 distance west. It is an outlier
 of foot hill of main range at
 1150 N.

20430 The top of the southern cliff of this
 ridge is at 1175 N, where there
 is a facing of brecciated chert,
 with banded bands, and north
 of this a few paces white quartz-
 ite.

The brecciated chert is such a
 persistent band on the south of
 the quartzite that it would ap-
 pear to indicate some sort of
 break here. It is possible that
 the southern face of this quartz
 ridge is a fault scarp as has
 been suggested before.

20431 Every banded chert from same

Exposure.

Continued north over white^d
20432 quartzite^d on the north slope of
the hill, where at 1471 N. the north
face of the cliff is again lined
with sericite^d slate or schist.

20433 At 1864 N. in S.E. corner of hill
is a small ledge of greenstone,
that extends west some little
distance.

When reached N section line were
25 W of 250 W.

20434 From here went west to 250 W of
N.E. cor Sec 31. and south, find-
ing small ledge of greenstone at
1460 S. 203 W of N.E. Cor Sec 31.

20435 At 720 S. on south side of hill
north of gully a white^d quartzite^d
ledge, that stretches south as far
as 813 S. being interstratified in
places with the schistose sericite^d
rock.

The same white^d quartzite be-
gins again in a ledge a few

paces further south and end at 930 S. Throughout this 100 paces and more the rock is exposed almost continuously in layers dipping as usual about 70° S and striking 20° E of E. With this white quartzite are often interbedded layers of the brown rock, like the upper quartzite above the Jasper conglomerate.

Between the last quartzite ledge at 930 S and the little hill at 1100 S is a meadow in which are no rocks.

20436

But at 1100 S at the west end of a little hill are thinly bedded slates dipping at various angles to the North, while the slaty cleavage dips South. In places the dip is to the North as indicated, in consequence of distortion of the beds, but generally, in other parts of the hill it is high to the South. The strike is 20° S of E.

Thin layers of quartzite are interbedded with the slates, and veins

of quartz cut them.

20437

At 1200 S. cross another small hill, in which the rock is an arkose or a granitic quartzite?

20438

At 1250 S. is the south edge of another exposure in the same hill. This too consists of slate intercalated with quartzite?

July 9/92

20439 Ran north on line 500 N of E line
Sec 31 crossing west end of little
quartzite^d slate ridge at 800 N of
J line of section.

The quartzite^d ridge rises in two
cliffs one at.

20440 1170 N. and the other at.
1235 N, where on the East side
of the road to the refuse ground the
bed dip evenly at 65°-67° S. and
strike 15° N of E.

At 1335 N. is the north side of
the ridge, where both

20441 talcose or sericitic quartzite^d

20442 and schist are both exposed

At 1425 N. 450 N of E on Sec 31
at the East end of a small hill
is a conglomerate composed of a
20443 talcose base and pebbles of
quartz. The band is not more
than 3 ft wide at this place. On

20444 the north it is followed by black
slate^d and beyond this a yellow-

20445 weathering schist, that may

belong with the green schists?
or with the cherts. The strike
of all these rocks is about E.W.

At the west end of this ridge
the same relations are observed.

20446 1425 N. 565 W of E cor Sec 31 is
a small ledge of greenstone schist.

20447 from 1425 N. 606 west is also
greenstone and at
1385 565 W is a ledge of the con-
glomerate.

20446 on the north side of this
hill is a very staly rock that
has been called a schistose green-
stone. It may, however, be a sericite
schist which is believed to be a
member of the quartzite series.
The conglomerate (20447) south
of this, on the south side of the
same hill contains large, white
quartz pebbles and south of this
again is a selvage of white quartz-
ite dipping S at the usual high
angle.

Another little hill is NW of this

me. on its^s S-E. side, at
 1425 N. 606 W of S E Cor Sec 31
 is a schistose greenstone ledge.
 And at 1460 N. 650 W on the north
 20448 side of the top of hill is a massive
 greenstone

20449 At 1605 N. 755 W of S E Cor Sec 31
 on the north brow of the hill, on
 a lower level than 20448 is
 a very typical greenstone

20450 At 1500 N. 796 W is the S. E. cor-
 ner of another schistose green-
 stone hill.

There can be no doubt that
 we are here in greenstone north
 of the quartzite?

At 1375 N. 790 W. is another
 small ledge of conglomerate a-
 bout 30 paces long and 10 wide.
 on its^s north side is black slate(?)
 separated from it by a narrow
 band of greenish yellow slate?
 There seems to be an unconfor-
 mity between the black slate(?)

and the conglomerate², with the latter rock the younger, but no pebbles of the former could be found in it. The supposed unconformity is best seen in the little pit at the west end of the ledge.

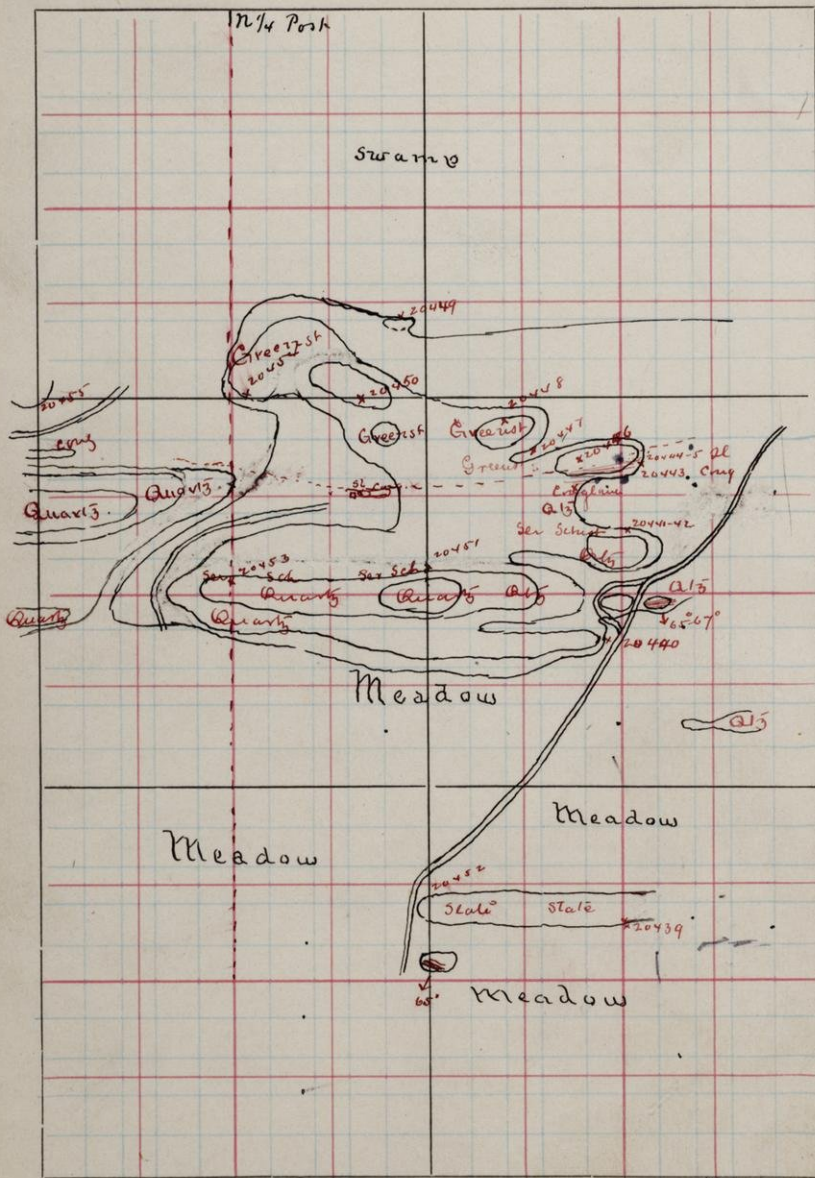
20451 At 1280 U. 750 N of E on sec 31 is the north face of quartzite², with the usual covering of schistose rock. Further south, at 1232 U, the schistose rock passes into normal quartzite² with the usual southerly dip.

At 844 U. struck extreme west and of slate here from which took specimen 20450. At its west end the slate is schistose with its schistosity dipping S. as a rule, but the bands are curved so that locally they have northern dips. Interstratified with these slates are not infrequently bands of quartzite²

S. 31

T. 48

R. 26



A small knob south of this
one is composed of the same
slates dipping S. at 65° and
striking 150° of E.

At 750 U went 250 W to the
center line of Sec 31. and then
north. Here the quartz ridge
is quite narrow. Its south side
is not reached until 1200 U.

20453 At 1252 U. on its north side
is the schistose rock, called seri-
cile schist.

North of this is the west end of
another quartzite ridge, whose
highest point is at 1375 U, and
whose quartzite is sometimes
white and sometimes pink.

20454 At 1500 U 1000 W of Sec 31.
is the S.W. edge of a greenstone
hill.

20455 1500 N 1205 W is the N.E. end of
another greenstone hill.

At 1250 W. ran south crossing
west end of little hill of fine
grained conglomerate at 1428 U.

On the north side of the ledge the rock is coarser than on the south side; it grades into still finer material and then into quartzite?

20457

A little further south, on the north side of the main hill, is Lincoln Schist. The top of the hill is sand covered, but at 1215 U reach its southern brink where quartzite is again exposed.

At 1185 U another small ridge of quartzite is met with, beyond which are cultivated fields.

20458

Ran to 1000 S. then west to 1500 W. of E line of Sec. crossing end of quartzite hill at 300-350 N. and greenstone bluff at 500 N. Specimen from this hill.

From the point 1000 U. went west to corner, which found at only 300 W. instead of 500 as it should be, thus falling 200 paces short in our E-W run. Whether this is due to the shortness of

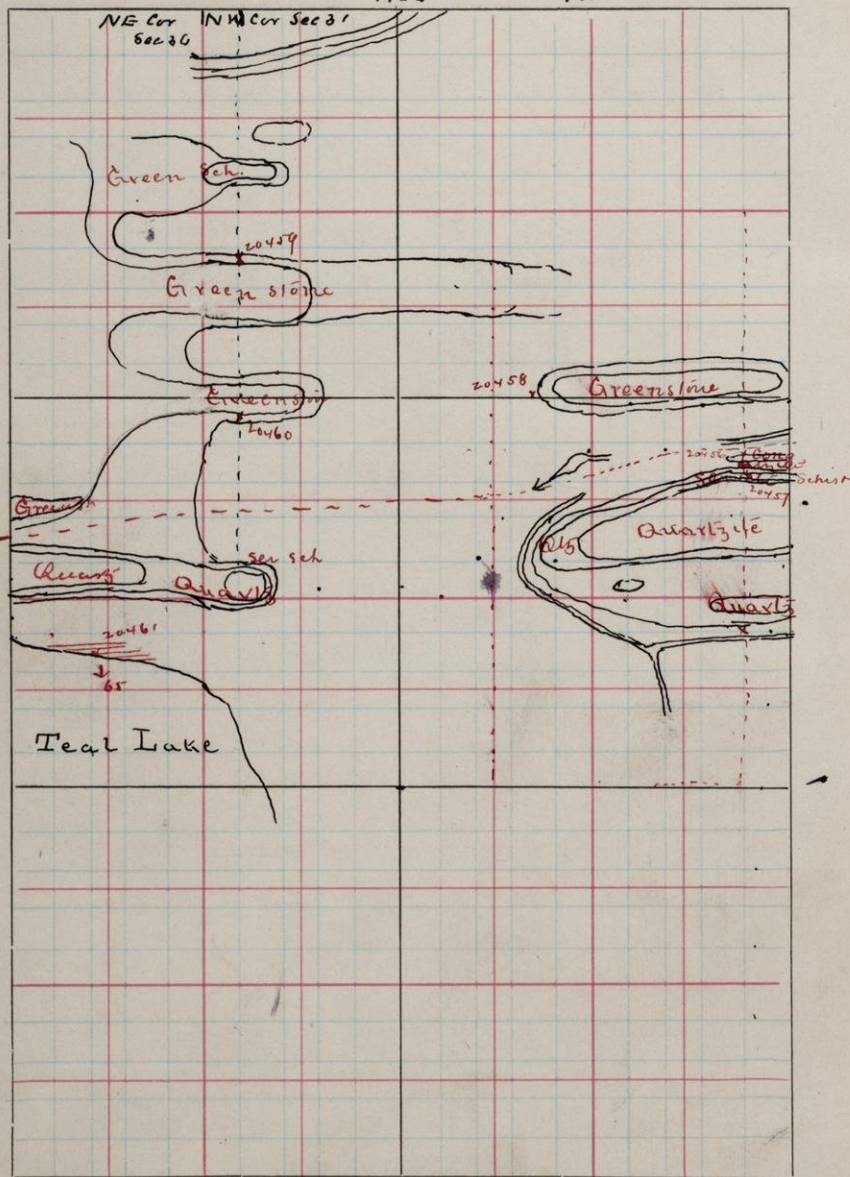
S. 31

T. 48

R. 26

1750

1500



The section which is one of the west tier or not was not discovered. Other traverses, however, showed losses of 200 paces, so that, until I find some reason for believing the section of normal length, I shall assume it was short.

Ran south on the line 50 paces E of W sec. line, continuing on greenstone knobs as far as 560 f.

20459 Schistose greenstone from north side of hill at 325 f.

20460 Schistose greenstone from ^{south} north side of hill, at 525 f.

The north side of the next hill, at 700 f. is the usual sericite schist and its top and south side quartzite.

The north side of Teal Lake at 200 W of E line Sec 36 is bordered by black slate whose bands dip south at about 65°

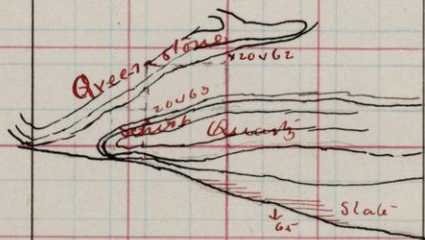
20461 Specimens from 200 W. 142 N of E

S. 36

T. 48

R. 27

NECov
see 36



Teal Lake

quarter past 7 sec 36.

At 250 W. ran north crossing
white quartzite at 250-275 U,
and reached schistose greenstone
20462 at 360 U.

From here went 100 N and
south, striking greenstone a-
gain at 320 U.

At 375 U went west to 400 W.
and south.

On north side of hill south of
ravine (see map), at 400 N. 300
20463 U. met again controlled scales
interstratified with quartzite.

The west end of this quartzite
hill is 400 N. 255 U of E 1/4
past sec 36. Beyond it are
my schists?

49

Remarks

The Quartzite^d Area East of Seal Lake covers parts of four sections. It comprises a stretch of hills three miles long and from 100 to 600 paces wide. The shape of the area is that of an mustang bow with the curved-
if-turned south.

The hills are rough and rugged and are practically bare of vegetation.

The predominant rock is white quartzite, overlying a conglomerate containing quartz pebbles. Interbedded with the quartzite^d is a black shale in narrow bands, and more or less chert. What has been taken for chert seems to grade into the shale. It is brecciated in places, thus indicating either some kind of physical break in the series, or movement after its formation. I incline to the latter view, though the series

is almost uniform in dip, with perhaps higher dips on the northern side, near its contact with the green schists, than further south - the dips varying between 70° and 57° .

The peculiar feature of the series is that on nearly all vertical cliffs the quartzite has given way to a talcose or sericite schist. On the south sides of the hills this seems to be a schistose chert. On the north side it appears rather to have originated from the quartzite.

Above the quartzite, and in places interstratified with it are beds of graywacke. The layers or layers to the south are very thick. They occupy low ground. The quartzite under them rises abruptly from this low ground with a precipitous face south, and indeed many of the quartz hills present similar precipitous faces both to the north and to the

scrub.

This fact indicates to the writer that many of these faces are fault escarpments - a view that is rendered still more probably by the schistose character of the rock facing them.

by sea 9 -

State - n -

Cherry - l. blue -

Sage skin - blue

Blue - yellow -

