



LIBRARIES

UNIVERSITY OF WISCONSIN-MADISON

Marquette iron region, Michigan, vicinity of Goose Lake: [specimens] 17361-17499, 17517-17629. No. 108 1890

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1890

<https://digital.library.wisc.edu/1711.dl/WTLJAQHRY2DB8R>

<http://rightsstatements.org/vocab/InC/1.0/>

For information on re-use see:

<http://digital.library.wisc.edu/1711.dl/Copyright>

The libraries provide public access to a wide range of material, including online exhibits, digitized collections, archival finding aids, our catalog, online articles, and a growing range of materials in many media.

When possible, we provide rights information in catalog records, finding aids, and other metadata that accompanies collections or items. However, it is always the user's obligation to evaluate copyright and rights issues in light of their own use.

Marquette Iron
Region
Vicinity of Goose
Lake
No. 3

U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 108

July - September, 1890

Marquette Iron Region.
Vicinity of Goose Lake

H. S. Bayley

17361-17499, 17517-17629

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 lines 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 $2 \times 2\frac{1}{2} \times \frac{1}{2}$ 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.

17361 - 17499 ~~4~~
17517 - 17627

Maps

sec 22 - p 43, 47

11 - p 59

13 - p 91

Marquette Iron Region

Vicinity of Goose Lake

by

W. S. Bailey

July - Sept. 1890

Geo. E. Luther

Assist.

J. H. Drummond
Compassman

Book No. 3.

Aug 28/90.

Took station at B and from it located Specimens in ledges to the south and South-East.

The easternmost Exposure on the long low hill south of the station, resembles in its weathering and other external aspects to gneiss. It is a dark colored, schistose rock with the schist bands contorted and apparently penetrated by granitic veins. It contains also nests of quartz and veins of iron ore.

17361 black schistose rock.

17362 granitic-like veins.

The general strike of the schistosity is 100° N of E and the dip is high to the S. W. These, however, change so rapidly that nothing definite can be learned from them.

17363 is from the same ledge.

Another ledge occurs at about 20 paces south, composed of rock like

17364 specimen

At 55 paces 20° N of S ledge, 17361-2

17365

is a coarse grained quartzite or graywacke.

At 35 Paces East of 17365 is a ledge of rock like 17362-3.

17366

The next ledge located is about $\frac{1}{4}$ mile south of station B on the East flank of the hill west of the above hill. The ledge is well shown in the valley. It consists of the gneissic or porphyroid like rock so common to the south of station A. At this place it is a talcose schistose rock with crystals of red feldspar arranged in line striking 20° N by N.

West of this point the country is broken into many small hills separated from each other by shallow valleys and from the large hill of station B by a wide plain. To the west of the hills above referred to and in front, (to the north) of a more lofty and uniform row of hills to the south is a small hill composed of the gneissoid rock, which has been regarded as a schistose chert.

17367 is from the Eastern End of this hill and

17368 from the Western End.

At 50° E of U and 28 paces distant from 17368 is a ledge down on the north side of the hill, where the rock is very similar to the gneissic looking rock No. 17361.

At 43 paces distant in the same direction is a ledge in plain. It is composed of a dark rock very like 17369 but containing large crystals of red feldspar in lines running N.W. Dip 7 layers 50° to SW.

gm

These rocks 17367-8-9-70 are the predominant ones on this hill. These, however, contain bands of dark purple gaseous schists and green quartzites or gray waxes.

At 120 paces in the same direction, on the south side of hill Station B. is a ledge at the base of the hill in which the rocks are inextricably mixed. A

few places to the East of this point the ledge is the porphyroid-like rock observed at other places. This

17371 here strikes 20° E of N and dips
 In at a high angle to the north-west.

17372 It is cut by veins of red feldspar
 In and contains masses or in-
 Above this in the hill and to the
 west of it are massive beds of
 In

17373 a light colored chert, mottled

17374 by red patches in places.

Q Between this and the porphy-
 roid-like rock is a bed of con-
 glomerate, measuring about 20 ft
 in width of its exposure. This
 probably marks the lower limit
 of the ^{light} chert, though the porphy-
 roid-like rocks have in some
 cases such a cherty aspect that
 they have been colored with the
 chert color in the maps. This
 conglomerate contains pebbles
 of granite, quartzite and gneiss
 and some that look like gray-
 wacke and others resembling
 dark chert, while comparatively
 large sharp fragments of black

slate are quite^d frequent.

17375 } Specimens of the finer grained
17376 } conglomerate^d.

17377 Specimen taken from midst of
conglomerate, probably represent-
ing the groundmass.

17378 From midst of conglomerate, prob-
ably a piece of a large boulder.
This conglomerate looks quite^d
different from the granite con-
glomerate to the west. It may be
merely a phase of the chert and
quartzite or it may be equiv-
alent to the chert conglomerate
of the hills in the N.W. part
of section 22 or of the cliff on
the north side of Goose Lake.

17379 is a large specimen of the con-
glomerate^d

17380 from very close to the conglom-
erate. Probably a phase of the
black slate.

South of the little hill from which
specimens 17367 and 17368 lies
the row of hills to which reference
has already been made. On the
north side of the hill directly

South from the above mentioned specimens are large exposures of Conglomerate and slate? the latter of which looks as if it occurred in patches in the former. On the extreme eastern part of the line and a little to the south of its northern escarpment the conglomerate is seen to overlies the slate? which here forms curved beds. is from this place took specimen of slate?.

17381

Further south in the line the conglomerate gives way to white? chert.

17382

The best conglomerate is exposed on the S. E. corner of the line in a little cliff.

17383

is the predominant conglomerate

17384

coarser variety. Some is too coarse to yield fair specimens.

17385 a.

b. c. d. e. f. g. h. i are pebbles from this conglomerate?.

17385 h. looks like the purpley-rod-like rock.

At the west end of the ledge, 50 paces W. of East end of the

hill, made a short run south. Found conglomerate at 20 paces south and ledge of brown quartzite at 105 S. This is on the southern slope of the hill, and is, so far as could be seen, the lowermost ledge on the slope. It extends east and west of this point, being continuous for some distance, or interrupted only by little patches of grass and bushes.

To the west of this hill and separated from it by a small depression is another one composed of gray and bluish quartzite. The two are not evenly interbedded but they appear as if patches in each other.

17387 is the light quartzite

17388 .. dark quartzite.

At 65 paces due south from these ledges is one of purple quartzite and ten paces west of this is one of brown quartzite cut by thousands of veins of white quartz. Just west of this ledge is a high bare knob of the brown quartz.

17389

is cut by white veins. On the north side of the hill the veins are not as abundant as they are on the south side, where the rock contains so many of these that it resembles a chess at some little distance.

Other ledges of this same brown quartzite are at 32, 50 and 72 paces S.W. of 17389. Two specimens were taken because they resembled so closely the rock 17389 that it was thought unnecessary.

The ledge at 72 S.W. is, so far as known the southernmost one on the hill.

North of the hill from which spec. 17389 was taken is a long narrow hill stretching some distance to the west.

17390 is from the Eastern End of this hill and is a brown quartzite. 10 paces S.E. of this is another ledge of the same kind.

Further west nearer apex of hill are other ledges, one a few paces to the west of 17390 being at

least 25 paces long. 10 paces north
of it is a perpendicular cliff of
the same rock.

- 17391 West of this is the top of the hill,
consisting of a more sandy
quartzite with imbedded mar-
tite crystals and veins of quartz.
At certain places, as if interbed-
ded with it are schistose bands,
but the rock in the whole is
too massive to give dips and
strikes. Other ledges of the same
rock crop out on the lower slopes
of the same hill.

- N.W. of this is another eleva-
tion in which the prevailing
17392 rock is white chert, which seems
to become more predominant
as we proceed westward, the
next hill to the north-west for
distance consist principally
17393 of white chert, although but a
few feet north of this is a strati-
fied brown quartzite forming
the face of a cliff. The quartzite
seems to strike N.W. and to con-
tinue the entire length of

the hill

- 17394 is a brown quartzite containing martite crystals from the N.W. end of the hill, while
 17395 is from a low ledge in the bushes 54 paces north of 17394.

Aug 28.

On this day took station at ledge 17393 of yesterday, and from it explored the south slope of the hill 'Station B'. Here is a large ledge exposed near the bottom of the slope and reaching far up the hill. A small ledge to the east of the principal one is a gray medium coarse grained fragmentar that may have yielded the Imphyroid-like rock upon being subjected to pressure.

17396

A few paces a little E & S of this, and lower down the hill side the rock contains red feldspar and

17397

small pieces of chert

The north-easterly exposure of the main ledge is a coarse gray sandstone or quartzite?

17398

17399

Just beneath it, a few feet lower down the side of the hill it is full of large pebbles, that appear to be of the same composition as the rock enclosing them, though in certain areas the cementing material is a greenish slaty substance.

17400

A few feet north of 17398 a low ledge peeps out from under the brush. This is conglomeratic like the rock at 17371-80. This extends westward where it broadens out and exposes a large surface. In places the rock is finer grained and the cementing material is slaty.

17401

At its extreme north western end the ledge is even more conglomeratic than at other places and some of the pebbles are granitic.

17402

From here went 70° E of N (up the hill) and found ledges of the same rock devoid of pebbles at 40 and 65 paces. At 90 paces the rock is more quartzitic. This

would indicate that the southern-
most ledges are the lowest.

At the very bottom of the hill,
south of 17401, conglomerate is
again abundant. In the East-
ern portion of the ledge the rocks

17402 } are quartzitic, resembling closely
17404 } the brown quartzite on the north
slopes of the hills to the south.

A little west of this the con-
glomerates are well developed.
They contain gneissoid-like peb-
bles, that may be nothing else
than the gneissoid-like rock
so common Easterly.

17405 a specimen of this rock.

17406 (4) fragments of pebbles.

In this ledge the groundmass is
finer than elsewhere in the hills.

West of 17393 on top of next hill
west, or, in reality, on a western
knob of the same hills, is an al-
most bare ledge, covered here and
there only with a low growth of brush.

17407 To the East the rock is white
chert. West of this is a quartz-

- 17409 ill^d with numerous pebbles of quartz
36 paces S E of this is a ledge
17408 that resembles quartzite more
nearly than anything else.

From 17409 ran South 100 paces
then East.

- At 60 paces East and 90 South
17410 found a large ledge of brown quartz
ill^d on the side of the hill. It
reminds me of the slate on the
north side of Station B hill, as
it is marked by numerous little
dols^d

At 80 E is another ledge of the
same kind of rock. At 100 E,
turned north and ascended the
hill which is covered on its south
side by drift. Except where, here
and there a rock ledge is exposed.

- The south side of the hill from
which 17409 was taken is bound-
ed by a perpendicular ledge
some 30 ft. in height and trend-
ing 10° S of E. The rock is a quartz-
17411 ill^d, whose position was located
by stadia from 17409.

Aug 29/90

In afternoon (rain all morning) located 17411 from 17409 and used this point as a station from which observed ledge on hill to the south, which slopes gradually to the south-east and is highest to the north-west. It is separated from 17411 by quite a deep ravine.

17412 is a white chert from the lower ledge on the hill, just across the ravine. Like all other cherts of this kind it contains veins of iron ore.

17413 is from another ledge of the same rock further east.

Other ledges to the west of this were located as indicated on the map (p 89 of Book 106)

17414 From top of the hill. Here the rock is more eminently a quartzite than it is further east, although it still contains much chert.

From this point westward ledge extend nearly the entire length

of the hill; but on its southern side which is gently inclined, the ledges are more or less scattered.

I saw the top of the next hill west which was located by the ordinary method. I continued west South and located the following ledges on the South slope of the hill.

20 paces South is a long ledge trending 10° S of W. It is 100 paces long and forms the southern Escarpment of the top of the hill.

86 S. and 22 East is another. Sumner Exposure, this time of well marked quartzite.

17415 115 S., trending 30° N of E is a white sugary quartzite.

17416 202 S. trend 60° N of E. Slaty quartzite.

17417 225 S. W. 15. Round Knob of quartzite.

From ledge 202 S (17416), went

17418 100 paces 40° E of E. where found another long ledge of sugary quartzite, running 200 paces

more 20° S by W.

The number of ledges observed was quite a good deal greater than those where fossils were located, but since they were all of the same rock they were not accurately located.

West of these hills rises the high bluff of white quartzite that is so prominent above all the surrounding hills by its height. On its eastern side is a long ledge of white quartzite, very similar in its main features with other quartzite. At this point, however, there are present numerous pebbles of various colored quartz, which show fine in a weathered surface.

1749 is a weathered fragment of this rock showing the pebbles. The ledge is 100 paces long, trending 10° S of W in its eastern portion and 20° N of W in the western part.

After locating from this point the little chest hill from which took Specimen 17168 etc, located

a few ledges on the west side of
hill on which is Station B.

17420

The westernmost ledge here is a
conglomeratic rock like 174405.
It has a fine granular ground-
mass and coarse pebbles of the
porphyroid-like rock.

17421

South east of this is another
small ledge in the side of the
same hill. It resembles the por-
phyroid rock and strikes 40° E of
N, while it dips 0° NW.

A few hundred feet west of this
is another ledge of the conglom-
erate and 35 paces 20° S of E of
the latter is another exposure of
conglomerate.

Aug 30/90

Went south from N. E. cor Sec 22 along the line which crosses the test-pit and the little chert hill already referred to.

At 740 S of corner passed along the side of a hill which exposes to the right of the line a low thin covered ledge some 15 paces long and 5 ft high. It is a dark gray cherty rock, resembling the black slate on a weathered surface. It is cut by the usual white quartz-veins.

Began here to ascend the hill, much of which is drift covered, and at 832 found another ledge of rock very much like the above.

17423 This is purer than 17422 but otherwise is similar to it.

N.B. It is barely possible that 100 paces ^{back?} were lost between deer lake and present position. If so 17422 and 17423 are each 100 paces further south.

17424 is at 1000 paces south, from a ledge of red quartzite.

From this point went west, ascending hill.

At 225 west passed Easternmost exposure of chert & quartzite located yesterday as lying S.E. of 17412. Continued over top of hill, crossing another ledge of quartzite at 390 west and others at various distances up to 500, where turned south.

In southern run at 45 paces south found small ledge of quartzite and conglomerate. The two are intermingled, and the conglomerate is more richly filled with pebbles in a narrow schistose bed than elsewhere. The pebbles are small and more fragmental, as than pebble like. They are apparently granite, iron ore and green talcose slate.

17425 is the coarse quartzite or graywacke

17426 Conglomerate.

At 70 and 90 paces south found others quartzites of which

17427 is a specimen of the ledge at

Go South.

At 200 S. 25 west. is a high bare knob about 15 ft high and 25 paces from N.W.S. It runs back into the woods and forms quite a hill which was left for further Examination.

17429 At the base of the cliff forming Eastern Escarpment of the hill is a comparatively fine granitic rock containing small fragments of granite.

17428 On top of the hill is a good exposure of granitic conglomerate like that in the hill in the center of Sec. 22.

When reached 405 S. found a ledge that had already been located at 445 North and 100 west of the SE cor Sec 22. Consequently, it is evident that 100 paces were lost in running S.W. and that the point where turned from South is 100 S and 100 East of quarter post.

At any rate, faced north from this ledge 500 North and

from this point went west 500 paces. For 400 paces of this distance tramped through cedar swamp. At 500 turned south and skirted along the side of a hill whose top is to the west.

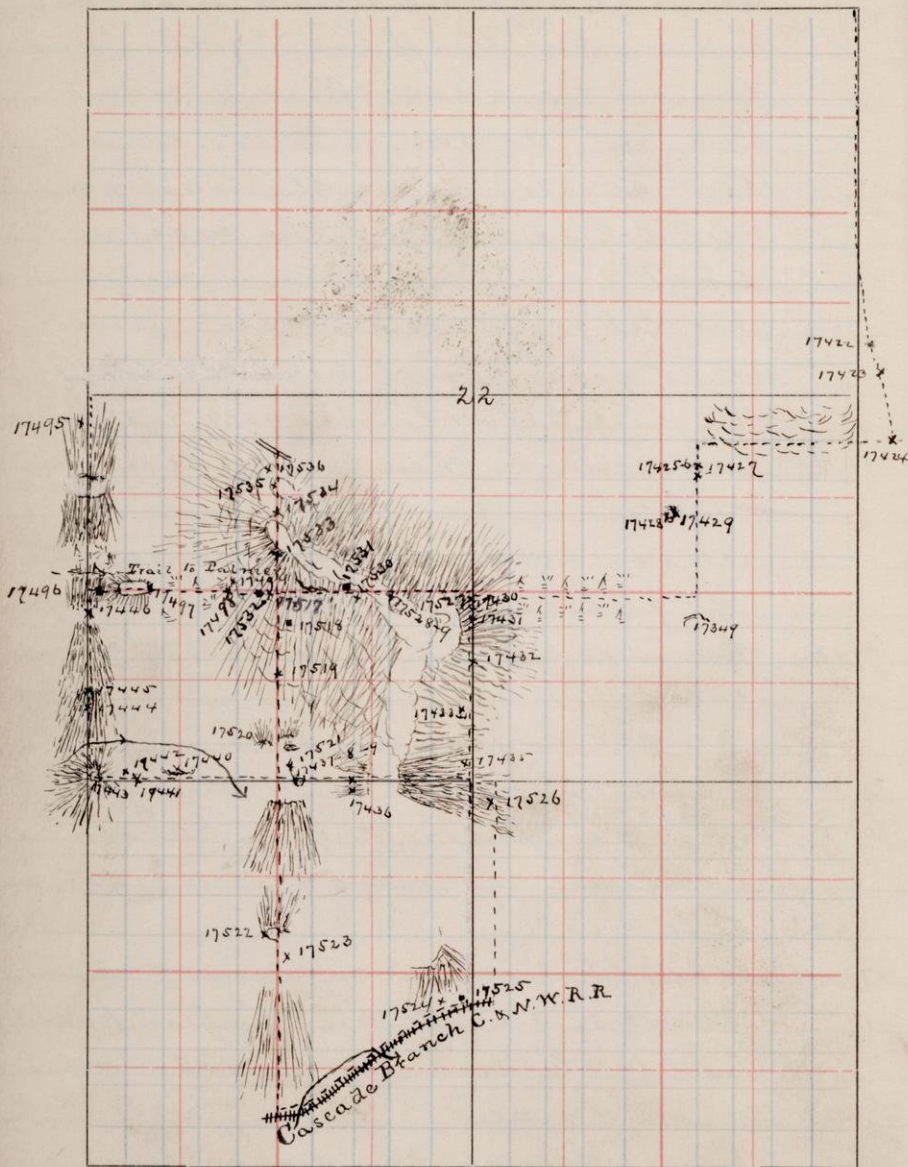
- At 46 paces south is a very smooth
 17430 flat ledge of talcose slate and
 at 90 paces south near the top of
 the hill another ledge of the same
 17431 kind occurs. This strikes N W and
 dips nearly vertical.

- At 200 south reached nearly the
 top of the hill where took another
 17432 specimen of the unaltered talcose
 slate.

At 325 south and 40 west is a
 round knob on the same hill.
 It is composed of gray slate cut
 by veins of quartz.

- 17433 Slate
 17434 slate traversed by quartz veins.
 At 445 south and a few paces
 west of the line is another mud
 17435 knob of slate.

When struck the south line of
 Sec. 22 went west, ascending



the hill and crossing it near the top.

17436 At 300 west of the $\frac{1}{4}$ part of this section had begun to descend when discovered a ledge of siliceous or talcose shale 12 paces south of the line.

At 425 west is a ledge with a rounded form. Upon close inspection it was found to be a very rotten conglomerate in which the groundmass is quite slaty and the pebbles granitic.

17437 conglomerate

17438 Coarse red granitic pebbles

17439 Fine red, ditto. (3 pieces)

At 500 W. and a few feet north of the line is a large ledge some 6 by 10 ft high with its vertical face turned to the South and a rounded prominence to

17440 the East. It is a light graywacke like that in the Gogebic region.

Further west it becomes more schistose for at 545 west found ledge from which took specimen

17441 17441 and at

17442 850 W and 10 N 17442.

On top of the hill at 885 west
found another conglomerate?

17443 whose matrix is graywacke stiff
and the pebbles granitic.

Found corner at 910 west (Location
in map adjusted to corner at 1000)
This is in a ledge of conglomerate
like 17443.

From this corner went north,
crossed stream at 100 North, and
ascended another hill in which

17444 found ledge of graywacke slate
at 190 N.

17446 At 420 N. and 10 East is a
fine grained slate conglomerate

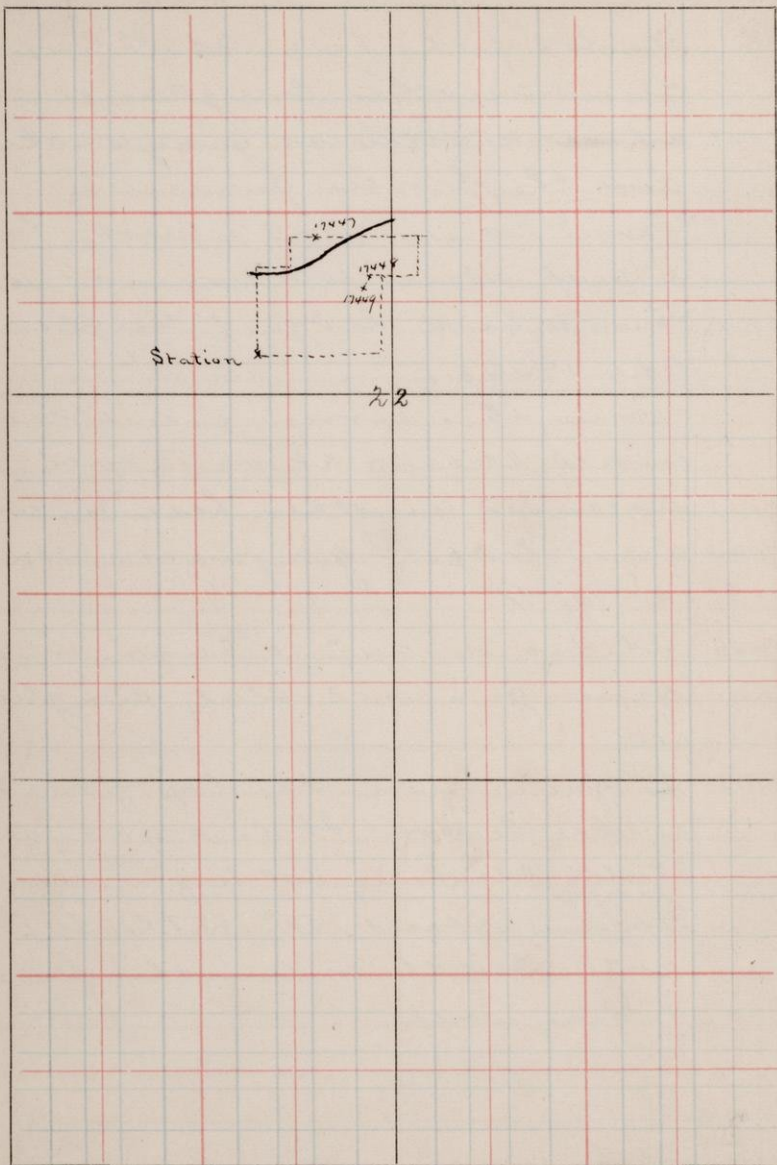
17445 is found near the top of the hill
at 215 North. It is a graywacke
slate striking 20° N of W and
dipping about 50° to the N.E.

At 240 North is another ledge
of graywacke.

XXXXX

T. 47

R. 26



Sept 1

From station on East side of conglomerate bluff went 210 paces north crossing road at 200, then 75 E and 90 N, making 300 north.

The last ledge of conglomerate was found at 76 N. The rest of the northern run was through meadow land.

At 300 N, 75 E went East.
 17447 At 132 East found a very small ledge of dark weathering quartzite, with veins of ^{white} quartz and a few red veins of the same substance colored by iron oxides. The rock is a comparatively fine grained white quartzite with a cherty aspect.

Continued East 2100 paces, then South 100 over Driest and West 128 paces to small
 17448 ledge of quartzite very similar to 17447. The rock is cut by quartz veins and in places is brecciated.
 17449 20 paces 25° N 78° of 17448 is another ledge of quartzite, which

is mottled and brecciated.

Returned to our camp and ran south 200 paces further and west to place of starting. At 112 west is a ledge of conglomerate.

In afternoon visited the hills east of station G. in Sec. 22.

In addition to the two hills of conglomerate already noticed (17279 - 17306) there are two others belonging to the same group. These are east of the former two and are separated from them and from each other by little ravines. In all the rock is the coarse granitic conglomerate already mentioned. In the third hill from the west the rock is slightly more schistose than in the hills west.

17450 is from the top of this hill, near its north-western end. The rock here contains but little matrix, so that in many specimens

17451 it looks as if it were granitic.

S. E. of this is a very large ledge with immense fragments of the granite and gneiss in a granitic gneiss. The southern edge of the hill is a perpendicular cliff some 75 ft. in height. The top is covered with conglomerate, while the sides of the cliff are sandstones. Immediately under the granite is a granitic sandstone or recrystallized granite and below this 17453 is a dark sandstone or quartzite. 17453 is lower in the face of the cliff than 17452 and is about 10 ft. East of latter.

In the next hill East the conglomerate is again well exposed. It is here much more schistose and is very similar to gneiss, with the strike of the schistosity is N.W.

Dec

Sept 2/90

Messrs Luther and Drummond having been left in camp for a few days they made an Examination of Sec 11 north of Goose Lake.

Starting at the S. $\frac{1}{4}$ post of this section they went west to where corner should be. A portion of this distance is through cedar swamp and the remainder over a hill drift covered except at its top, where at-

17454 310 west of quarter post is exposed a ledge of quartzite?

Sept 4

Luther and Drummond left S.E. cor. Sec 11, ran north one mile, and then west $\frac{1}{2}$ mile to N $\frac{1}{4}$ post of the section.

17455 At 195 N. 20 E. is a large exposure of limestone like that on N. East shore of Goose Lake. The specimen taken was from ^{lower} upper part of ledge.

- 17456 From upper part of same ledge.
At 435 U. is another ledge
- 17457 of limestone from the top of
a hill.
- 17458 444 N and 40 W is from an
Exposure about 15 ft. high.
- 17459 is from the front of the cliff
and below 17458.
- 17460 Shows alternations of layers.
From the same cliff front
higher than 17458-9.
- 17461 at 25²⁵⁰ paces N. of W. from 17458
occurs a ledge of white lime-
stone
- 17462 444 U. 95 W. The lower
part of this Exposure is like
17458, the upper part like
17461.
- 17463 At 466 U. is a red banded lime-
stone much weathered.
- 17464 Small Exposure of limestone
at 545 U.
- 17465 } 600 N. 75 E.
All from same ledge. 17465
17466 } limestone, 17466 little higher, 17467
17467 } highest in ledge.

T.

R.

No Exposures along the north line
of section.

17468 Limestone from 940 ft.

17469 At 1545 ft. is a ledge of limestone near the top of a hill. The only ledge of quartzite observed. At the bottom of the same hill the rock is a little redder in color. Otherwise it does not differ from the Specimens.

Sept 5

From the S.W. cor Sec 11 ran N to N.W. cor, thence East to N $\frac{1}{4}$ part same section. Then went west 500 paces and South to S. line.

In going North along the west line of the section no Exposures were seen; nor were any observed along the North line.

The first Exposure was met with at 700 South, where a

17470 ledge of red quartzite was observed

17471 65 Paces 60° N by W of 17470;

17472 1285 South. Red quartzite

17473 1462 South. Quartzite

17474 1500 S. 170 W. Ledge extends

from about 100 to 200 W.

17475 Quarzited from 1910 S.

Sep. 6

Rain all day

Sep. 7.

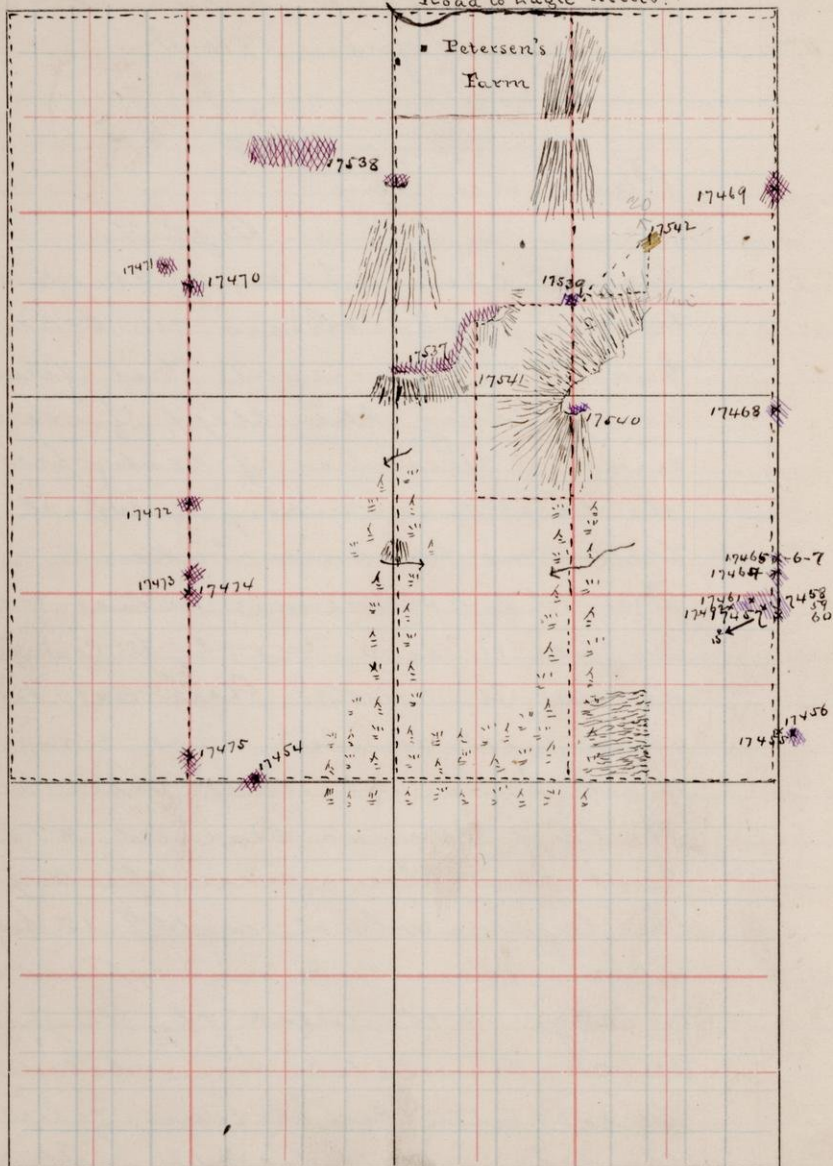
Walked along face of cliff overlooking Gauthier's in search of basic conglomerate but found none. Along the cliff face are quite a number of test pits in the chert. Found many of which a little one has been taken.

In the afternoon went WSE. On. Dec 11 and north to ledges at 1140 W. 90 W. There are lime stones well banded with narrow pink bands in dark blue beds. The cliff face is vertical to the East and shows well the dip of the layers which is 15° to 15° S. W. Above these beds and exposed in a ledge to the west the layers are much crumpled. Some beds are filled with concretions of calcite, chert and red greenspan. The chert nodules are light pink and often

T. 47

R. 26

Road to Eagle Mills.



Section 11

- are surrounded by narrow veins
 17476 of red feldspar (cf. sp. 17476). The
 chert was evidently deposited with
 the limestone. Section or cor-
 relationary section was subsequently
 set up as the feldspar was de-
 posited around cherty masses.
 17477 nodules in limestone. Specimen
 fragments.

In this ledge is also an area
 in which the rock is much brecciated. The brecciated portion is
 near the most contorted layers,
 and is evidently a movement
 breccia. (17462)

Upon returning south to the cor-
 ner crossed a meadow to which
 an old road from the north
 east end of Goose Lake leads,
 on the north side of the mead-
 ow is a ledge forming a ver-
 tical cliff in which are alter-
 nate layers of chert and lime-
 stone. The dip of the rocks is
 for the most part a little north
 of west. The layers show fairly
 in a weathered surface where

17478

the chert appears in hard, rug-
ged irregular masses of a gray
color and the limestone forms
depressions in which the rock is
light colored or pink.

278 The location of this ledge is about
300 E and 700 S of N.W. cor. Sec
13.

Sept 8.

From N.W. corner of conglomerate
lill in center of Sec. 22 located
ledges to East and North-East.

A little South of East of this hil-
lock is another smaller one,
nearly covered with woods. Here
and there on it ledges are ex-
posed. The southern ledge extends
14479 about 30 paces N.E., and is conglomerate?

On the north side of the hill is
another ledge of the same con-
glomerate? This is 30 paces long
in a S.E. direction.

30' S of E of this and distant from
it 72 paces another conglomerate
ledge occurs.

These ledges seem to be on

the lower slopes of the hill capped with white quartzite further East.

North of this conglomerate hillcock which is apparently a little westward spur is another spur from the same hill. In the northern spur, separated from the southern one by a little valley. The

17480 Southern ledge on the hillcock is a red, ferruginous quartzite.

17481 The next ledge north is a white chert containing veins of hematite, and brecciated areas. Two other small ledges of the same rock occur at 15 paces 20° N of E of 17481 and at 33 paces 10° E of N of the same ledge.

17482 North of 17481 again on the East slope of the hill is a brown quartzite ledge cut by veins of white quartz, and containing martite crystals. The ledge forms a little precipice facing west.

Very many other ledges of quartzite of various colors occur in this vicinity, but they were not located. The entire hill is under-

lain by the rock.

The next ledge located is ^{to} the north east of the brown quartzite and further up in the hill. It is nearly hidden in the wood and underbrush from which it crops out as a little precipice. It is the only quartzite ledge in this vicinity in which dip and strike was well enough developed to be of use. The bands are alternations of white quartzite, narrow seams of slate and narrow bands of red quartzite. The dip is about 45° E and the strike 10° N of E.

17483 Quartzite from this ledge

17484 Interstratified slate.

17485 Upon ascending the hill further a ledge of black slate was found a little to the S of E of 17483. It is cut like other sections by little veins of white quartz.

17486 The ledge near the top of the hill is a cherty quartzite.

East of this point is the high hill
quartzite " from whose eastern side

in top took specimen 17144 same days ago. On the west side of the hill the rock has the same character as on the Eastern side.

17487 It is a white cherty quartzite, that extend almost uninterruptedly all around the hill.

17488 The next ledge sampled was located north of 17487. Like this it is a ^{cherty} quartzite. It differs from the latter in containing areas of talc and reddish bands. It forms a precipitous ledge facing west, and is some 30 paces and is 20 ft high on the west side.

17489 20° N of S from this last mentioned ledge and 55 paces distant occurs another rock of the same general character. It, however, appears to contain more feldspar, and is marked by red martite veins. It looks as if intermediate between the quartzite and the sericite or talcose schists so common to the south.

Upon returning from this point

to station found another ledge of well banded quartzite at 46 paces 30° E of N of 17482. Its strike is 10° W of N and dip about 30° E.

Next went to south East End of same conglomerate hill and located ledges to south.

The N.E. top of the conglomerate hill is conglomerate, and the S.E. end is a bare prominence of the same rock. Upon climbing down the south side of the cliff, about $\frac{2}{3}$ way is a massive rock resembling granite. It presents no bedding marks but is schistose in places. Its contact with the overlying conglomerate was not discovered, although the entire face of the cliff is well exposed. It appears to grade into the overlying rock. It may indeed be a large fragment of fine grained granite, although chips taken from widely separated localities all look alike. On the other hand it might

T.

R.

Book I. f. 89

17490. Well be the recrystallized rock found on the cliff sides further west. South of the conglomerate hill is another bluff of conglomerate separated from northern one by a ravine.

17491 From the north side of the hill is a conglomerate from ledge running 140 paces a little N of W. From this place run south over hill. At 45 S. is another conglomerate and at

17492 75 S. a ledge of slaty quartzite dipping 45° W N.E. and striking N.W. It contains small pebbles of granite?

17493 East of this is a ledge of conglomerate or of a recrystallized rock, containing seams of limonite and

17494 Sometimes limonite covered pebbles. 30 paces 10 S of E of this is another conglomerate ledge, and 60 paces 30° N of E of this one still another. 90 paces 20° E of S of last ledge is another of same rock, 27 paces 10° S of E from this is another. Others represented on map.

flat

From W $\frac{1}{4}$ part of Sec. 22 ran south 500 paces. The $\frac{1}{4}$ part is on the west side of a broader river.

- 17495 At 75 S and 25 W of it is a hill of slate the dip and strike of which could not be taken. Mounted the hill and at 200 paces south reached its summit, descended to 400 south, where entered cedar swamp extending to 500 S.

- Went East from this point crossing a hill of slate containing pebbles of granite. The first ledge on the hill is about half way up it, at 28 East of the west line of the section.

Another ledge of the same kind occurs at 65 E. From this point to 185 E, ran along the top of a high precipice facing north. The material of this is a dark slate much ribbed and much jointed.

- 17497 The specimen was taken from

T.

R.

~~N.B. Numbers in note book from
17516 to end do not correspond with
numbers in maps~~

17516 corresp. to	17500 in map
17517 " "	17518
17518 " "	17519
17519 " "	17520

~~Etc.~~

See Letter book VIII
page 410.

~~W.L.B.~~

17500-17516 are numbers that
had already been assigned to
another series of specimens.

8

185 East.

17498. At 376 East is another precipitous ledge. Here the rock is a granitic looking material, evidently fragmental, and probably a recrystallized granite.

17499 Higher on the hill the rock is well exposed, but is darker in color than 17498.

17517 At 490 East reached nearly the top of the hill where found another ledge of the recrystallized rock.

At 500 East turned south. At 100 South and 22 East of cruise is a test pit on the south side of the hill. The rock in which the pit is dug is chlorite schist. No ore was seen.

17518

At 238 South is a precipitous ledge of recrystallized rock facing South. It weathers red and resembles granite on its exposed surface.

17519

17520

At 400 S., 25 West another

ledge of the same kind of rock occurs.

- 17521 In the East of the course at 480 S. in the same hill is a schistose rock that looks as if it might have been squeezed from an original conglomeratic condition.

Continued South, crossing south line of section at 500 South of Fruit where turned.

- 17522 At 400 South of the line is a small ledge of quartzite marked with brown mottlings.

17523. At about 470 S. is a high precipice on the North West side of a hill, which extends to 500 South. In this rock the slaty cleavage is well developed.

At 587 South struck the railroad (This distance probably not accurate as Woodman was not in good condition)

However, when reached the railroad went East.

At 6 1/2 miles East a stream flowing North crosses the road -

bed, and again flowing south
at 24 rails East.

17524 At 35 1/2 East found ledge on
north side of road and on the
side of a hill. It is a dark
quartzite, some of which looks
chloritic.

17525 At 40 1/2 rails on the north
side of the road is a small
pit from which some rock
was taken. On one side of
the pit is a mass of rock,
but on the other sides nothing
but drift was seen.

At 50 rails East went north
over hill 575-paces to section
line, which struck at 85-
paces East of the 1/4 post
Section 22.

17526 At 85 paces south of this line
took specimen of schistose quartz-
ite.

Started then from the 1/4 post
and ran north 500 paces, and
west 500 paces, then north.
The run north from the
Quarter Post was over ground

that had already been covered
so no specimens were taken
until reached the top of the hill
17527 at 475 North, where took speci-
men of Sericite Schist from its
North-eastern face.

On run west from this point
ascended a hill, crossing an-
other ledge of Sericite Schist.
At 63 W, and a large ledge of
the same rock at 100 W. 10 S.
on top of the hill. Specimens
were not taken.

At 160 W. 10 S. is the top of an-
other knob on the same hill.
The rock here differs from
that last taken although
a ledge of Sericite Schist oc-
curs at 150 W. The rock at
160 W and 10 S is a hard, chiefly
17528 quartzite, which in places is
17529 schistose, when it resembles
somewhat the Sericite Schist.

At 300 W is another knob
on top of the hill. In this
the rock is schistose and dark,
17530 so as to look like a Lamblede.

Schist.

- 17531 20 paces further west and 20 paces N. is a test pit in a schistose cherty rock, containing a little limonite.

³²
17532 At 509 west is an outcropping of the fragmental granitic rock. Ledge about 10 ft high and 30 ft. E & W. (Spec. prob. identical with 17500)

Returned to 500 W and ran north.

- 17533 At 102 paces north is a small precipitous ledge of quartzite or recrystallized granite.

At 200 N. reach top of the hill and are about descending it on the north side when find an

- 17534 Exposure of slate at 222 N.

At 278 North and lowest is quite a small ^{abandoned} mine from

- 17535 Dump heap of which took

- 17536 specimens 17535 and 17536.

50 paces 20° N of N from the test pit is a large Exposure of slate cut by chert veins holding fragments of slate and thus forming a breccia.

At 300 and 315 U are two other ledges of shale.

At 466 struck Extension phase meadow road, and followed it to camp.

Sept 10/90.

Ran north from S. $1/4$ 1st Sec. 11 through cedar swamp to 500 U. and 500 further to square tree marked 'Center of Section'. and continued north to north quarter first.

17537 At 1090 N 32 E near the top of a high hill is a quartzite ledge that forms a very high overhanging precipice & center East of the line. The quartzite is mottled red with streaks and blotches.

At 1550 north passed over another ledge of quartzite and continued over outcroppings of this rock all the way to the north line of the section.

At 1660 U. and 125 W. is the Eastern end of one of the hills put down on top. map. This is

- 17538 a fine grained pink quartzite
very massive and without bed-
ding planes.

When reached north quarter
first went 500 East then South,
but saw no ledges until had
traveled 700 South when found

- 17539 Small ledge of limestone on
the north side of a small hill
and another small ledge at
775 South on the South side of the
same hill.

At about 1000 S. began to
descend hill finding at 1040
S a ledge of cherty limestone
on the South side of the top of

- 17540 the hill. Continued South to
1250 then west 250 and north
250 paces. 85 paces north ^{west} of this
point is a high ledge of quartz-

- 17541 ilite. Continued north to 500
paces then went East 250 paces
Then ran N.E. 385 paces and found

- 17542 ledge of slate dipping about 20°
NW and striking N.E. This is on
a small hill extending E & W on
the Southern side of Petersen's

North of the 1/4 post on south slope
of the hill there situated are very
many ledges of limestone, of which
it was not thought necessary to take
specimens.

The country East of the 1/4 post is
gently rolling and drift covered,
with only an occasional ledge
exposed.

at 1250 E 32 north is a fine
grained cherty rock like others

hay meadow. From this point went south 200 paces and west 200 paces, then south to lake without seeing further rocks.

The relation of the little patch of slates to the quartzite is difficult to describe. It seems most natural to look upon it as a bed in the quartzite.

Sept 11/90

17543. From N.W. cor Sec. 13 ran East crossing cedar swamp in 350 paces, then ascending a hill on the south side of which at 410 E. is a ledge of fine grained purple limestone or chert striking about N.E. and dipping about 30° to N.W. The rock contains small red concretions.

17544. About 950 East and 40 N on the south side of a hill is a small ledge of the fine grained limestone striking 15° N of E and dipping to the N.W. From quarter past at 1100 so that locations of ledges must be corrected to this amount.

T.

R.

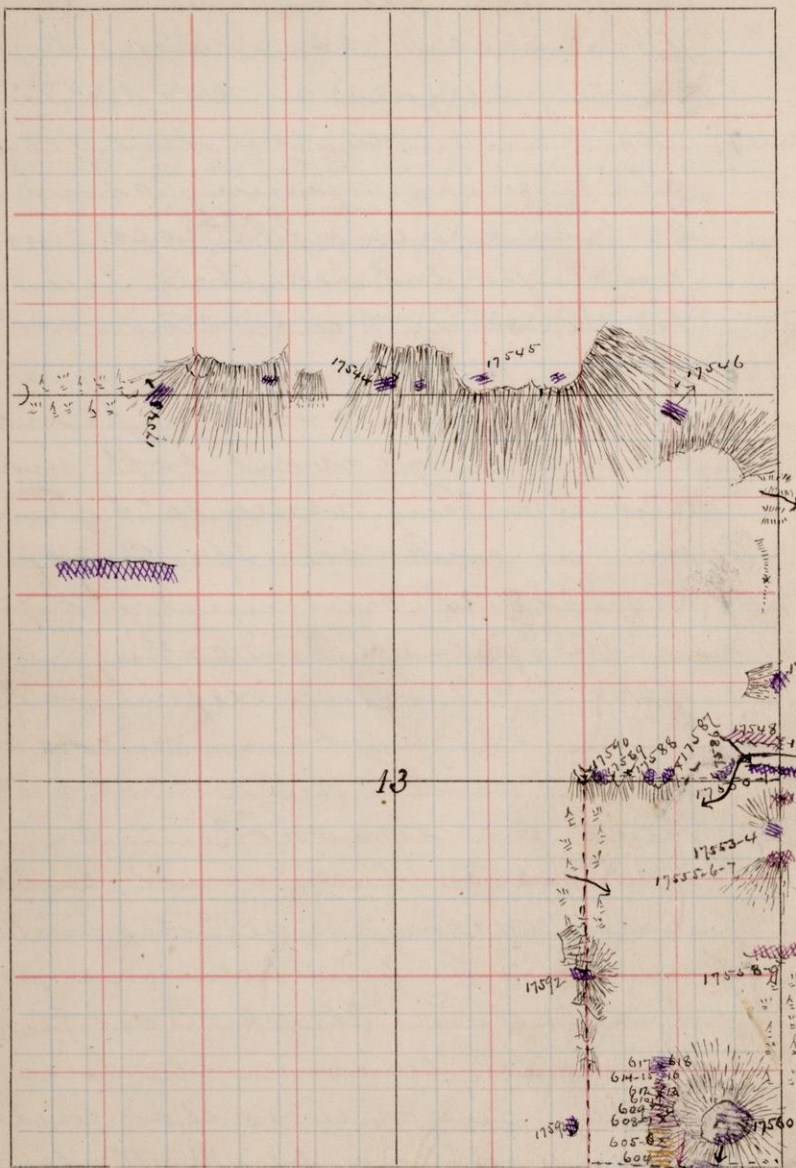
of the same character
17545 1250 E. 32 N of S. W. Cor.

17546 is at 1470 E 25 S. where the
ledge forms a precipice about
50 paces long and 20 to 30
ft. high. Rocks strike
25° N of W and dip 25° E of N.

- Continued ~~East~~ to the N.E. corner of the section then went South crossing stream at 240 s. At 17547 720 s and 100 w. is a low ridge of exposures running about N. & S. for 50 paces. The rock consists of a light colored cherty limestone too massive to yield strikes and dips.
- 17548 At 900 South is ledge of quartzite and at 942 s a perpendicular ledge about 20 ft in height and extending about 20° S of E as far as could see. The rock is
- 17549 a quartzite containing obscure bedding planes indicating a strike of 40° E of N. and a dip S.E. This forms the northern side of a small ravine in which a stream flows. On its southern side distant 30 paces south, and 50 paces north of the quarter post is
- 17550 another perpendicular wall, but of limestone. The limestone is evidently lower in the hill than is the quartzite, so that latter may well be a bed in the limestone series. The bluff is a little

T. 147

R. 26



east of the line, the specimen having been taken from 950 S. and 25 E.

- 17551 Further up near the top of the cliff, which is 10-20 ft. high, is one of the quartzitic beds in which the rock is midway between the limestone and quartzite. Its strike is about E-W and dip to the north.
- 17552 50 paces S of $\frac{1}{4}$ post is a small ledge of cherty quartzite and at 70 S. is a well bedded ledge of slates and limestone. The strike of these is 10° N of W and the dip about 15° to the north.
- 17553 Slate
- 17554 Banded slate.
- At 115 S. is another ledge of slate like 50-54 and at 175-195 a second ledge in which slates and quartzites are well banded.
- 17555 Small spec. of slate.
- 17556 180 S. on hill higher up than 17555. Quartzitic chert.
- 17557 Quartzite from 195 S.
From the variety of the rocks here met with it is very evident

that the edges of an upturned series of layers is being traversed. In some places it looks as if the dips of the rocks were southerly.

At 235 south on south slope of the hill is another ledge of white cherty quartzite? Below this the slopes are covered with boulders.

17558 At 1465 S. From a bare knob of cherty quartzite of dark color.

17559 Lighter chert from side of the cliff at whose top took 17558.

From 550 to 800 cedar swamp.

17560 At 1925 S. and 10-25 E rises a little knob of cherty limestone, with a strike 15° N of W and dip 40° to the S.

At what supposed to be the corner (where blazed trout stump) turned west. At 200 W on a

17561 Bare hill is a gray, probably cherty limestone.

17562 And at 238 west are black and

17563 red slates. (17562 = black slate).

At our point on the Eastern end of the top of this hill is a small fault, on one side of which

at the surface horizon is a black weathering slate, and on the other side a red weathering rock of the same kind. Between them
 17564 is a cherty or talcose breccia - Rocks strike 10° N. of W. Dip, 15° to the S.
 At 250 W. turned south passing over same kind of rocks for 100 paces. At 50 S. is a test pit in
 17565 chert.

Sept 11/90

Worked outline of hills on north side of sand plains in Sec. 24

17566 Coarse red limestone } From the
 17567 fine " " " } S.E. end

of the escarpment, at the southern end of low photographed by Prof. Van Hise, and very near the place at which took series 17096-17108. A little west of these the dip is about 55° 20° N. of W. and strike 20° E. of N. At the N.E. end of the bluff the rocks strike $10-15^{\circ}$ W. of N. and dip about 10° N. of E. The layers are much contorted in places but the general strike is as described. The trend of the cliff is N.E.

Between this cliff and the one next to the East is a deep ravine. On the East of this the cliffs trend more nearly E and west for some little distance. They are made up of layers of various colored limestones with occasional beds of chert and quartzite.

- 17568 is from the crest of this hill, near a bed of breccia. The strike of the rocks here is 10° N of E and the dip about 10° W of N. South east of this in a little foot hill to the cliff the strike is 10° S of E and the dip about 10° E of N. South east of this point, and W. N. W. of Section House on the railroad is a very small hill in the midst of the plains. The rocks comprising it are dipping 20° 10° - 15° N of N and striking 10° - 15° S of E. About 15 paces S. E. of this is a small test pit in sand at bottom of the hill.

From this point located the East end of the cliff from which took 17568. The rock on the top of the

17570

of the cliff at this place weather
white? It dips 15° to the SW and
strikes 20° S of E.

N.E. of the little hill used as sta-
tion is an outcrop or oval bare
knob of slates and iron ores, cherts
etc. It is the only occurrence of
the cherts in this vicinity, and so
was studied rather carefully.

On its west end well toward the
bottom of the western slope is a
test pit from which some ore
has been taken. From the

17571

dump heap took a specimen.
The rocks in the pit are well
bedded, dipping about 40° to 60°
N of E and striking about 40°
S of E. The one very clear oc-
curs as a thin band between
slates and quartzites, but not in
sufficient quantity to warrant
mining. No ore was seen in the
pit, but the place from which it
was taken is easily discoverable
is a banded slate from the low-
est bed in the pit. It is far
down in the south wall.

17572

- 17573 from the next higher bed; also
from the south wall.
17574 black slates }
17575 quartzite } both above 17573.

10 ft nearer the station on the
top of the hill just south of the
opening of the pit. is a band of
breccia with Jasper pebbles, like
the band at Cascade. The con-
tinuity of the bed precludes the possi-
bility of deciding positively as to
the relations of the rock to those
in the pit. As a venturer should
pronounce it the lower portion of
the bed from which took 17572, the
slate which believe to be upper
portion.

- 17576 Large specimen of Breccia
17577 Smaller " "
17578 Pebble from "

- 17579 from the S.W. End of hill, near
bottom. Rock in small ledge,
striking about 15° S of E and dip-
ping 15° E of H. at a small an-
gle.

- on the south slope of the hill
about half way to the top is a
second test pit. But in this work-
ing was found but quartzite

at various places on the south
slope are outcroppings of a rock
weathering like Jasper. On its
inner surfaces on fresh face.

times it looks more like the
 pebbles found in the breccia (17578)
 17581 is a small fragment of this rock.

on the top of the hill is another
 exposure of conglomerate? At
 this point and probably else-
 where in the hill there is a vein
 ore in the breccia so that it
 may be that the test pits
 were sunk to test the abun-
 dance of it.

17582 is a breccia from 20 ft. S.W.
 of highest point in the hill
 (Station X).

17583. Spoiled chest from 15 ft. N.E.
 of Station.

At 45 N and 10 E of the Sta-
 17584 tion is a test pit in quartzite

a low exposure north of the
 hill in which Station is loca-
 ted is composed of black and
 17585 red scales dipping 20° S.E.
 and striking 20° N of E.

Sept 13.

Went to E $\frac{1}{4}$ first Sec 13 and
 from there west 500 paces, then
 south 1000 paces and east 250
 paces, to back spot. That was reach-
 ed a few days ago in running
 west 250 from S.E. corner.

17586. At 118 paces west of $\frac{1}{4}$ first, met
 with a small exposure of lime-
 stone, from which took very small

specimens.

From this point west as far as went the country is very rough and ragged. Outcrops of limestone and chert are common, but no other rocks were seen. Specimens were taken as follows:

17587 260 W. 10 U.

17588 330 W.

17589 460 W 10 U.

17590 470 W.

17591 492 S.

At 500 W. went south as stated finding ledges at following localities:

17591 492 S

17592 510 S.

17593 900 S.

These are all limestones, and are from the most prominent ledges. Others of the same character were found but these are not at all unlike those above sampled.

In the afternoon went while in N.E. $\frac{1}{4}$ of Sec (Station X) and sampled the beds of chert, limestone etc., which are so well exposed north of this. For a quarter of a mile north the rocks are exposed in very low step like hills, devoid of

veridene of every kind. They all slope to the south at a low angle and are more or less precipitous on the north. In structure they are miniature facsimiles of the 'Saw-tooth' mountains in Minnesota, except that the horns are not produced by the weathering of a softer rock than that in their apices. Since all the beds dip nearly south the section across them running north is a section from highest to lower beds.

From south to north specimens were taken in the following order.

- 17594 Black slate, Dip 70° S. Strike Clearage striking 30° N of W, and dipping 80° S N.E.
- 17595 Next bed below. From a few feet north of 17594 on the side of a small cliff.
- 17596 Black slate. 35 paces N of 17594.
- 17597 A foot or two north of 17596. A British-slate. Dip 10° S. Strike E.W.
- 17598 Red slate from near 17597.
- 17599 Drab slate from " "
- 17600 Black slate 65 paces N. of 17594
- 17601 Red " " " " "
- 17602 Red slate. 75 paces N. Dip 16° - 18° S. Strike E.W.
- 17603 Black slate. 92 paces N.
- 17604 Dark slate. 115 paces N.

17605 Black slate. 142 paces N.

17606 Red limestone from a few paces north of 17605 and therefore beneath 17605.

17607 Red limestone } 225 paces N.
17608 Black "

A little to the west of this point the hill is covered with a reddish quartzite in which the dip is almost horizontal. At 205 north the dip of the bed is slightly inclined to the north, so that we appear to be at the top of an anticline.

This dip, however, is only local, since a few paces further north the usual southerly dip again occurs.

17610 At 260 north is a ledge covered with red quartzite, and beneath

17611 is a much finer pink rock. Strike S of E. Dip 18° S.

17612 At 290 north is a well banded rock underlain by a pinkish purple chert.

At 314 the rocks strike E or W and dip 28° to the south. They are plainly marked by ripple marks at various places. The rocks exposed are a reddish quartzite and a

17614 black slate, the lower part is

- of which appear to contain quartzite or chert pebbles, and a rock consisting almost exclusively of chert. This is probably a large vein in the slate.
- 17616 Bedded chert from little precipice forming north edge of this exposure.
- 17617 Limestone from S. 60 N. with strike nearly E. W. and dip about S.
- 17618 5 paces N. of 17617 is a limestone underlying a more granular rock of the same kind.

Letter 12/29/90

Photo. 1077. Anticlinal on C & W Ry. near center
See 8-47-26. The massive beds are chlorite. The
shaly beds are slates interlaminated with very thin
beds of chlorite. See sketch beyond (p 115)

Photo 1078. another view of same

Railroad Cutting

Chic. & N.W. Road, about
3 miles S.E. of Ugansee.

The cut is pictured by Rominger
as occurring in the Escanaba

R.R. (p. 49). It is a beautiful
anticlinal of chlorite schists and
gray ones. The schists together with
the slaty oceanic beds dipping
N and S on opposite sides of the
bow and striking E.W. The rela-
tions of the beds to each other and
the locations from which speci-
mens were taken are represented
in the next two pages.

The specimens number

17619
17620
17621
17622
17623
17624
17625
17626
17627
17628
17629

The figure and description given
by Rominger does not correspond
with the phenomena observed by me.
Instead of two anticlines, only one
was seen, and no dykes of chlorite
were observed cutting transverse.

across the head ab series.

The specimen numbers differ from the numbers on the face of above sketch by me. They are one less.

Specimen 17672 for instance corresponds with number 17623 of sketch.

N.W. Cor. Sec 15

Center Sec 15.

$\frac{1}{4}$ P. bet. Secs. 15 & 14

S $\frac{1}{4}$ P. Sec. 14

E. Line Sec 23

N.W.



Slate



Quartzite



Marble



Chert

S.E.

1. Section along Chicago and Northwestern R.R.

E. Line Sec 23

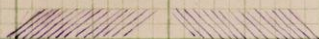
Center Sec. 24

E. Line Sec 24

Dip ~

Dip S of E.

N.W.



chert



gneiss

sand

S. E

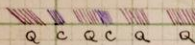
Section 1. Continued

E. 1/4 P. Sec. 13

S.E. Cor. Sec. 13

E. 1/4 P. Sec. 24

N



q c q c q



m a c s b a m



gran.

S.

2. Section along E. sides Secs. 13 and 24

N. Line Sec 22

Cent. Line Sec 22

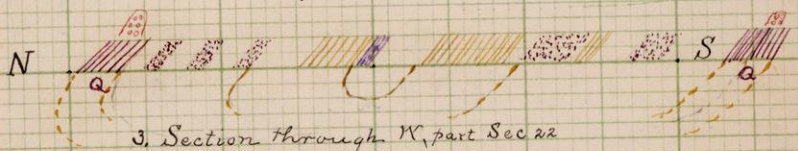
S. Line Sec 22

Dip N. E.

N

S

3. Section through W, part Sec 22



Sequence

Slate
Breccia.
Quartzite
marble
Chert



