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Notes on geology of the Marquette Range: [specimens 24884-24952]. No. 172 1895

Bayley, William Shirley, 1861-1943

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

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen*. Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a shaly or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand pages is also arranged so that, if desirable, a larger or a smaller scale can be used, eight inches, two inches, one inch, or one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section and the dip and strike when observable, the latter always being expressed from the north; for instance 4025, 250 N., 300 W., Strike, N. 78° E., Dip 50° S. Then follow with a full description of the ledge. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of 2 x 2½ x ¼ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 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.

P. 22 Pon Plating. Monon

47

"

"

50

T 18, 1895

C-12

26 171

Notes on Geology
of the
Marquette Range

[with Index]

by
W. S. Bayley

G. O. Smith

Assistant.

Geological Index	Page	58
Place Index	"	56

1

Greenschists, especially those
in the vicinity of Ishpeming -

So far as was observed the green-
stones around Ishpeming are uni-
form in character. They consist
almost exclusively of a coarse grain-
ed mottled Diabase of nearly uniform
texture throughout. There are no
varied phases except that occasionally
the lustre mottling becomes sub-
ordinate to a porphyritic texture.
Of course on their edges these rocks
are rendered schistose, where they
may pass into chloritic Diabases, or
into chlorite schists.

So far as observation goes the Dia-
bases around Ishpeming have pro-
duced but little effect in surround-
ing sediments. On South side of the
hill E of the Old New York pit, near
NW cor Sec 11 - T 47 R 27, there seems to
have been a slight interchange of sub-
stance between the country and the
fragmental rock - for which see specimens
taken two years ago.

S. 4 + 3

T. 48

R. 27

NE 1/4, NW 1/4

H 3



4 3

SE SW

The exceptions to the uniformly met-
tled greenstones are -

1st - The little hill N. of Lake Bancroft.
The south side of this hill is composed of
slates. The north side shows a fine
grained porphyritic Diabase.

2nd The Long Hill on which is the W.
to base Loc 3. T 47 R 27, is likewise
of porphyritic greenstone. Small red
crystals are scattered through the green
24884 matrix in such a way as to resemble
a tuff. It is probably, however, a cryp-
talline scumpling.

This rock is separated by a sharp
24885 line, from a chlorite schist - but this
latter rock grades on the other side
into a Diabase. The line perhaps
marks a slight dislocation.

In other places on the S and S.W. side
of Long Hill the phenomena resembles
more closely tuff phenomena. The green
24886 matrix is here filled with what resem-
ble sharp edged fragments. The rock
24887 resembles a 'tuff' in texture, but the
fragments appear to be of a different
nature from the matrix. Some of them are

in all probability = quartzites - in
which case the rock is an eruptive
breccia.

No positive evidence of tuffaceous char-
acter was here obtained

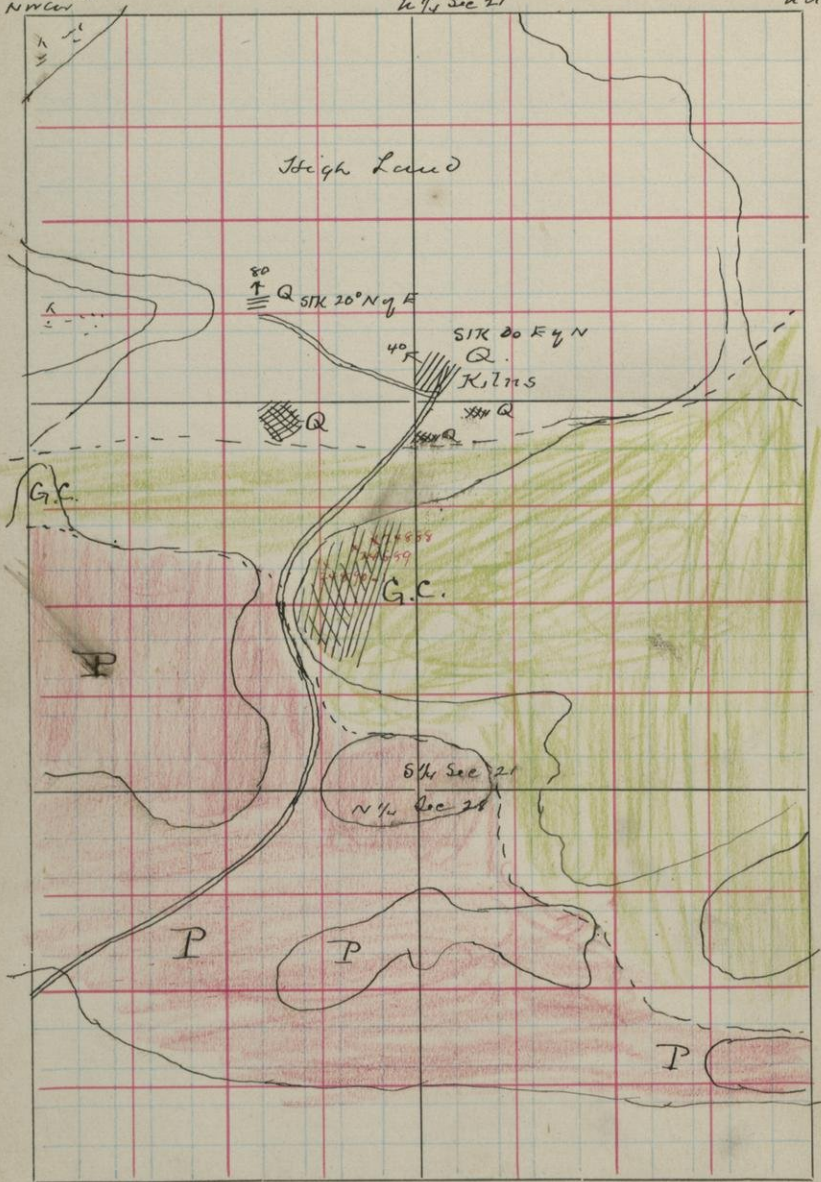
S. $\frac{21}{28}$
NW corner

T. 48

R. 27

2 1/4 Sec 21

25 Nov



44

Peridotite and Serpentine

in Seco 21 + 28

T. 48 N. R. 27 W.

Went up into Sec 21-48-27 to examine the greenstones and discover whether or not they are similar to the greenstone Conglomerates of the Deer Lake Series.

On the way out found two small ledges of greenstone Conglomerate in road, where it crosses along side of a hill near the farm in S.W. of Sec. 28. The fragments are sharply angular and thus differ from the prevailing fragments in the Deer Lake Schists. They are large, small, irregular in outline, sharp edged etc - resembling in every respect the fragments in a Reibung's Breccia. In composition they are like the rounded fragments elsewhere.

The peridotite was found in large irregular hills, with jagged outlines. It forms great gray or yellowish white, some times dark brown ridges, at whose bases are large accumulations of detrital material.

erial

North of the Peridotite are the graywackes, quartzites and slates of the Silver Lake area. The graywackes and quartzites are well banded, striking 20° to 30° E and dipping about 80° N. They are cut by quartz veins running perpendicular to the bedding.

In the center of Sec 21-48-27 is a belt of gneiss. North of these is quartzite. South of them the hill indicated on the

24888 map is apparently a tuffaceous greenstone a little to the east of the center line of the Sec.

24889 A few paces west it becomes very schistose and bears pebbles, boulders. Of like the greenstone conglomerate further south. In many cases the pebbles are angular.

A little further west there is interbedded with the green schist a white weathering one, which often wedges out into lenticles and rounded attached masses.

24890 Still further west it grades into a rock looking much like a conglomeratic slate, but which is probably a dark tuff.

Peridotite schists, like those in the southern

24891 border of the conglomerate area, are also met with at this place. Often they are mottled red and black rocks, passing into a dark, much broken black rock.

The hill in the O.W. Cr. of Sec 28-48-27 is greenstone conglomerate cut by large Diabase dykes.

Further west and south the tuffaceous greenstone is replaced by a massive one, with the usual Diabase features. Occasionally the Diabasic character is lost and the rock becomes schistose and chloritic.

24892₂ A fine grained pink rock cuts the prevailing greenstone, along the west side of the cliff, in the S.E. of Sec 29-48-27. It is marked by lines that resemble flange lines which strike 30° S of E. It looks not a little like the rock of the conglomerate pebbles.

The predominant rock in the ridge is a Diabase that is shattered and broken, and always more or less schistose. It is cut by a few dykes of a fine grained, red weathering felsitic rock, which in the borders of the

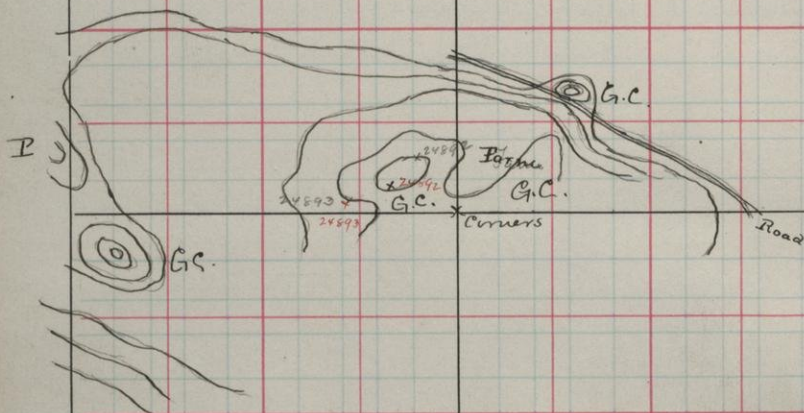
29.28
S. 32.33

T. 118

R. 27

29

28



dykes appear to feather off into the surrounding greenstone. Both the dykes and the greenstone are schistose, and the dyke material has obscure markings resembling flange lines. Near the contact with the greenstone this rock is often filled with fragments of the red rock, as though portions of the latter had been ripped off from the dyke by the pressure that rendered both rocks schistose. Other fragments are the severed portions of ^{the} small dykes.

24893 Dyke material

Examined the quartzite knots in the Peridotite, Seco 29 & 30, but could make out no relations between the two. The quartzite at its base, on the west side of the knots, becomes slaty. Within the slaty layers are others of conglomerate, fine grained, but otherwise like the basal conglomerates elsewhere.

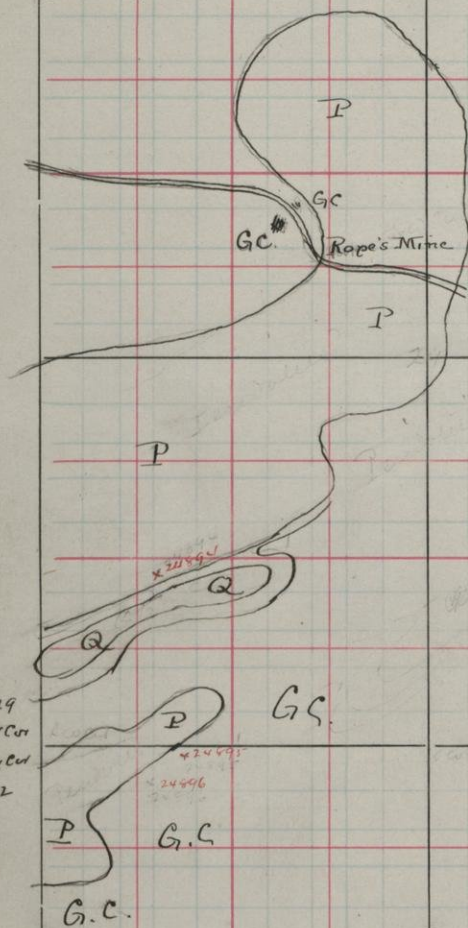
24894 Peridotite from S. side of bluff, just across valley from quartzite.

S. $\frac{29}{32}$

T. 48

R. 27

NWCut 29



24895 *Schistose greenstone*, near U. line
Sec 32

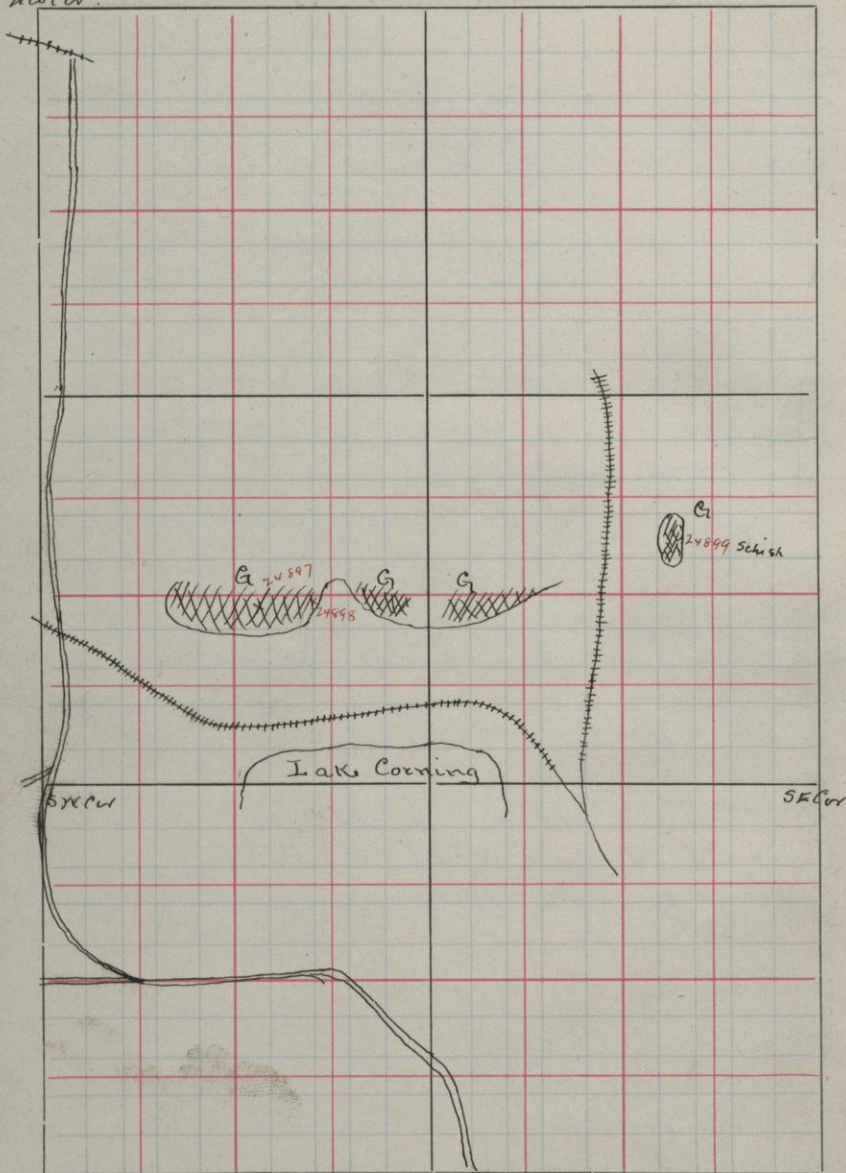
24896 *Specimen greenstone* - further south

On these hills the massive greenstones
seem to be more prominent than the
greenstone conglomerate, though both
are found.

S. 5
new.

T. 47

R. 27



North of Lake Cooring is a dyke of
greenstone described in former notes
as worthy of study.

The predominant rock differs some-
what from the greenstones around Idapene-
ing. It contains large hornblende

- 24897 crystals, lying in a dark green finer
grained matrix. The rock resembles
somewhat a Camptonite, though its dia-
basic structure is still quite pronounced.

- 24898 To the eastern portion of the hill the
Camptonite's character is much more
noticeable.

The fragments of a few years ago
seem now to be vein masses, geodes
and concretary mass, besides finer
grained portions of the prevailing coarse
Diabase. No inclusions were to be found.

- 24899 Mounted Ichish from S. side of Little
hill in Sec 5. E of R. R. track.

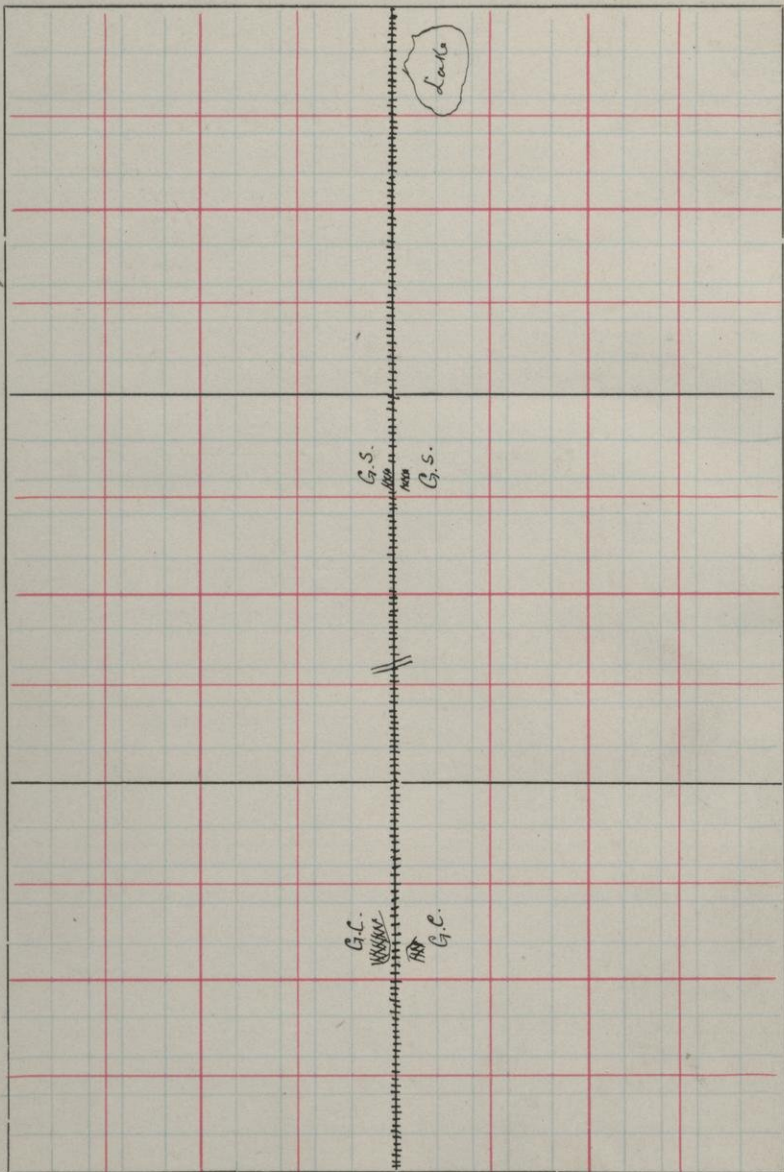
- 24900 Peridotite from knob on side of road.
Sec 36-48-28. About 300 S of Center of Sec.

S. 36

T. 48

R. 28

NA Looked up



S. line of Sec 36-48-28

Examine notes of W.S. Bailey T.W.U.
Greenawald - taken several years ago.
Railroad seems to be wrongly loca-
ted on map. As remembered by the
writer it is south of the Section line,
whereas the map places it north.

The relations of small lake, road and
ledges are shown on opposite page.

Clarksburg Formation

At the East End of the Clarksburg formation in Sec 18. T' 47. R. 27. The Conglomerate is markedly schistose. It is filled with red weathering pebbles, some of which are rounded and others sharply angular. The resembles fine grained pink felsites in fresh surfaces,

24901

24902

or red druse coarse grained granules

A little further from the contact and surrounding rocks the pebbles are small, or and resemble more closely slates, greenstones, etc.

24903

At the N.E. edge of the Extreme Eastern tongue of the formation the Conglomerate has been quarried, so that fine large pieces can be easily obtained. The rock is here much denser than the Conglomerate elsewhere. It is fine grained with small ore-like pebbles, slate fragments, and fresh white crystals of biotite scattered through it.

24904

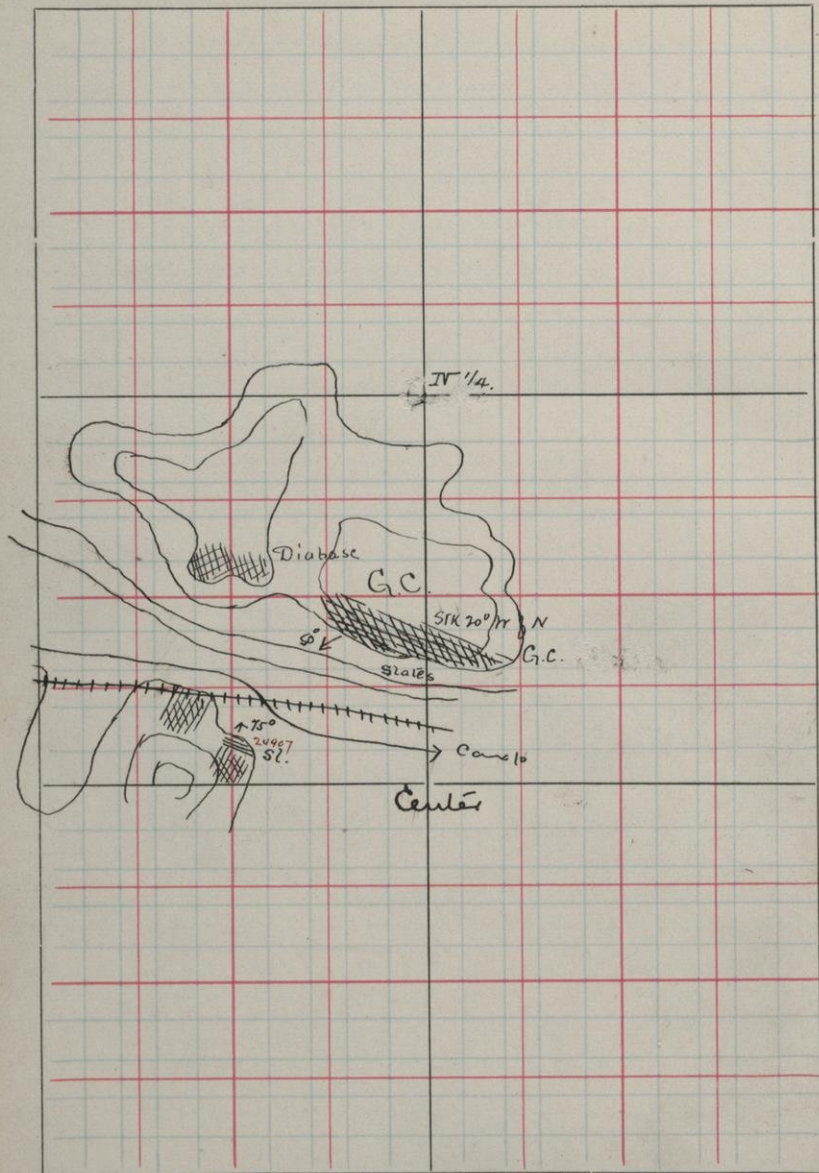
24905

A very fresh specimen from this point.

S. 13

T. 47

R. 28



The Clarksburg Conglomerate is darker, denser, fresher and less plainly schistose than the Deer Lake Conglomerate and its tuffaceous character is more apparent.

At the East End of the area no sedimentary effects were noted. There is no evident bedding and no unconformity -
 24906 upon underlying slates, except at extreme end (See Plane table map)
 A little to the west ^{in NW 1/4 Sec 13-47-28} slates are well jointed
 24907 in the South side of the Conglomerate dip about 75° N. and strike ESW.

one of the hoggs in the S. side of the tract in the NW 1/4 Sec 13 is slate cut by jointed greenstone dyke.

On the North side of the road about the center of the section is a cliff composed almost exclusively of well bedded conglomerate - striking 20° W of N and dipping SW 50° . Bands of schistose greenstone and of the tuff alternate, giving a ridged appearance on weathered surfaces. The schistosity is inclined to the bedding at high angles.

At the base of this bluff on the South side of the hill there are exposures of

Shale that are cut into thin or less. The shale appears to be interbedded with the conglomerate. But in this point cannot not decide positively.

Sabpeming Greenstone

On the North Side of the D. S. & A. R. R. track about $\frac{1}{2}$ mile East of Sabpeming Station is an exposure in a hill close to road bed. This is peculiar on its weathered surface and was thought by Thompson to be of a different character from the other Sabpeming greenstones.

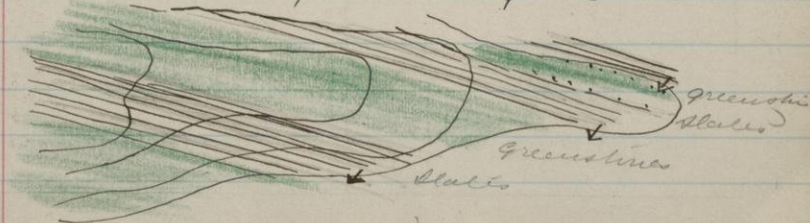
24908 So far as can judge it is an ordinary mottled greenstone, with markings due to globular parting. This markings consist of concentric cracks and depressions, or of spiral ones, due no doubt either to parting or to weathering. The rock is not a tuff.

In center of Sec 19-47-27 a specimen
 was found which under examination
 in the laboratory was found to be perido-
 tic. A visit to the locality resulted in
 finding no peridotite. The rock at
 the peridotite location is a coarse
 greenstone

Greenstones near
Esanaba River in U.E.N.
 Dec 28-47-27

The greenstones interbedded with
 fragmentals in the hills in U.E.N.
 Dec 28-T.47. R.27 were examined, but
 nothing was learned in addition
 to what was already known concern-
 ing them.

It is probable that there are three
 beds of greenstones - the ground plan of
 the hills being something like this



Four specimens were taken as follows

- | | | |
|---------|---------------------------------------|--------------|
| 24910 | Contact between slate and greenstone. | |
| 24910 A | Slate near the contact. | |
| 24910 B | Specimen showing contact. | } for slides |
| 24910 C | Greenstone near contact. | |

Magnetic Observations
iii

Decs 35-48-26 and

2-47-26

Compass not working well on this day,
so figures for variation are only ap-
proximate. The result shows clearly
enough, however, that there is no
line of attraction at this place, which
is the Eastern prolongation of the
Vegamsee iron belt.

Palmer Gneiss (1)
Cascade Schists

17

The first Examination of the Cascade Schists^d was made by Thompson in Little Knob in Dec 28-47-27

On the north side of the Knob is quartzitic Conglomerate^d, and South of this a little further up in the hill is a rock resembling a Coarse quartzite^d; that has been squeezed and made schistose. A few indefinitely outlined fragments^d (or fragment-like bodies, may be here and there detected in it). This coarse schist is interbedded with a dark schistose rock that resembles a mica-schist, and South of these are squeezed granite^d, formed by gneissoid granite^d.

The Exposure teaches nothing concerning the origin of the Schists^d, which here appear to be fragmental.

South of Summit Mt. the facts are quite different. The Southern Exposures are Coarse pink and white granite^d and the Exposures immediately under the S. cliff of the Mountain are of

new formation. Between these are the Schists that have been called the ^{Palmer} Cascade Schists. They extend from Lake Palmer ^{Station} westward to the center of Sec 26-47-27. They include well banded, sometimes coarse, sometimes fine grained Schistose rocks varying in color between dark and light gray. The general appearance of these beds suggests a difference between them and the Schistose granule^s near Lake Palmer.

The beds as a rule dip N. about 50° and strike 30° S of E. In some places the rocks are well and evenly banded. In other places the banding is cut out. Parallel to the cut out planes are lenses and veins, and sometimes parallel walled dykes, of quartz and red granite. Sometimes the dykes are large, measuring 4 ft across, and in these cases they extend to long distances. As the granite is approached the quantity of granite increases and the Schists become more and more gneissic. No sharp line of demarcation can be detected between the

S. 26/25

T. 47

R. 27

N Corner

Summit
Mt

Iron Formation

Schist 750

Schists - Strike and Dip
as indicated

750

Strike 80 S 7 E

24913-14

Light-Dark
Schists Out by Gr.

Lake

Granite Veins
in

Gneissic Schists

Granite

S Corner

coarse granite & and the Schists? If the red granite dykes are intruding the granite is younger than the schists and the latter cannot be squeezed granites unless there are two granites in the region. If this is true the schists were laid down on a basement that has disappeared. It may be represented by the Hornblende schists of the Southern Complex, which are older than the granite.

If thus the schists are fragments squeezed, they may represent the base of the Lower Marquette, when the greenstone schists near Marquette might also be Lower Marquette. Since they are few, it may be that the Pine St. iron veins are interbedded with the schists as Lower Marquette, when the existence of such numerous dykes and bosses of greenstone as are found around Ishpeming would be explained as the necks of volcanoes that afforded the flows, now Marquette schists.

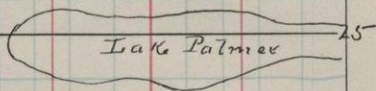
The lack of granite dykes elsewhere in the series seems to render this theory

S. 26/25

T. 47

R. 27
N Corners

26



S Corners

questionable.

The Ochiato have been looked upon as squeezed granites[?] and as squeezed fragmentals.

The problem is to decide if possible which of these notions is correct.

Just north of the center of Sec 26 at the base of a hill of dark Ochiato that look very clay[?], is a ledge of undoubted quartzite[?]. This was traced

24911 westward into a black quartzite[?], which northward passes into a gray
24912 Ochiato rock resembling very strongly
2 by the Cascade Ochiato[?]

There is no unconformity - between the quartzite[?] and the Ochiato[?], so far as could be observed. They grade into each other. The contact between the two is covered but the rocks approach within a foot or two of each other changing their characters as they approach.

South of the quartzite[?] is an area without exposures, then come the Coos ^{Palm} Cascade Ochiato[?].

The quartzite[?] may possibly be upon

the Schists^d and so have escaped the squeezing to which the Schists^d were subjected. In this case it would have no special significance.

On the other hand it does pass into a Schist, and consequently may be a quartzitic phase of the rocks yielding the Schist^d, that was too rigid to yield to the pressure which squeezed the less quartzitic rocks. In which case its^d existence would prove the sedimentary origin of the Schists^d in this vicinity.

It must be borne in mind that the Schists^d at this place are more slaty looking than the Cascade Schists^d in general, and are different from the Schists^d cut by granite^d dykes - which latter are found more abundantly North of Lake Palmer.

24913 Prevailing darker Schists^d from great hill N. of Lake Palmer. These rocks are interbedded with lighter ones and with a fragmental looking conglomerate Schist that resembles a decomposed

green colored with iron stains. The Schist in its lighter phases is traversed by numerous granite veins. When the two are squeezed to a greater extent they would resemble the typical ^{Palm Springs} Cascade Schist.

24914

In some places the rock is a dark fragmental graywacke-like one, which is interbedded with the Schists? It is also interbedded with red granite layers (possibly detrital) and is often cut by bands of red granite? This rock becoming schistose would yield the darker Cascade Schist?

The study of these Schists does not decide the question as to whether or not it looks as though certain ones were originally fragmental.

The plotting on photographic sheets in my possession is certainly poor. There are exposures in Dec 25 that are located in note books, but not on plat.

N. E. of Negamuc.

Greenstone Schists?

On the Unisance ground road are
 found the schistose greenstones (~~Unisance~~
^{Mona} ~~green~~ ~~schists?~~) often banded as though
 assorted by water, often massing like
 dyke masses, or like lava flows. Often
 the greenstones are broken into large
 rounded masses cemented by chlorite
 schist.

Nearly all the greenstone along this
 road as far north as the Center of
 Sec 19. 48-26 - are of this character.

24916- The rock forming the large hill in
 the South half of Sec 30 however is
 a greenstone conglomerate filled
 with a profusion of pebbles of a red
 schistose rock resembling a fine
 grained gneiss. At a distance the
 rock has a reddish tinge from the
 abundance of pebbles in it.

No contacts between the conglomerate
 and the green schist, so cannot de-
 termine the relations accurately. Prob-
 ably all belong to same series, but

Porphyrocrates and Schists are too near together and too marked in contrast to warrant conclusion that their only difference is in grade of alteration. They were probably originally different.

Along the road running north on the East side of the Camp River the green Schists are the same as they are further west.

Continued on the road northward as far as the north line Sec 20-48-26, and then went into the Dyenite to note its field appearance.

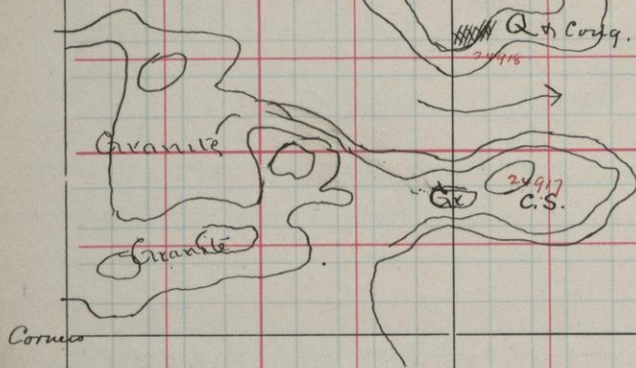
24916 The rock is a coarse granitic aggregate of feldspar and hornblende with almost no quartz. It is bright red in color, and forms large rough hills and bluffs with jagged crevices. It intrudes a hornblende Schist as dykes - and constitutes great boss like masses, which are more and more solely Dyenite as distance from contact with Schists increases.

The Dyenite appears to be younger

S. $\frac{30}{31}$
W $\frac{1}{4}$ Sec 31

T. 47

R. 26



N $\frac{1}{4}$ Sec 31

than the green. stone schists? Its age
with respect to the coarse granite has
not been determined.

Sericite Schist
North of Palmer

A visit was made to the little lake
of Seneca Schist (?) in Dec 30. T 47 R 26
north of Palmer (Volunteer Mine)

West of the rock north of the mine is coarse granite, but the little hill ¹¹⁰⁰ N. of the S. 1/4 of this section is very much like the Cascade Schists, and like those varieties resembling most closely the schistose quartzites.

Further north, across the Swamp is
a ledge of coarse quartzite, which
24918 is conglomeratic on its South side.
The rock looks like 24914 that
has not been squeezed.

The great ledge south of the Platt River
in Sec 32-47-26 is composed of
four distinct rocks -

- 1" a yellowish Schist (^{Palm} Cascade Schist)
- 2" Jasper and iron ore
- 3" Conglomerate
- 4" Granite

The yellowish Schist is well exposed
on the North Side of the Hill. It is very
markedly Schistose - but resembles
24919 a Schistose quartzite rather than a
granite.

24920 To the west lies the Conglomerate
whose matrix is nearly as Schistose
as the Schist itself.

On the extreme W. of the Hill and along
its W. western side are the Jaspers
and Hematites, and on the

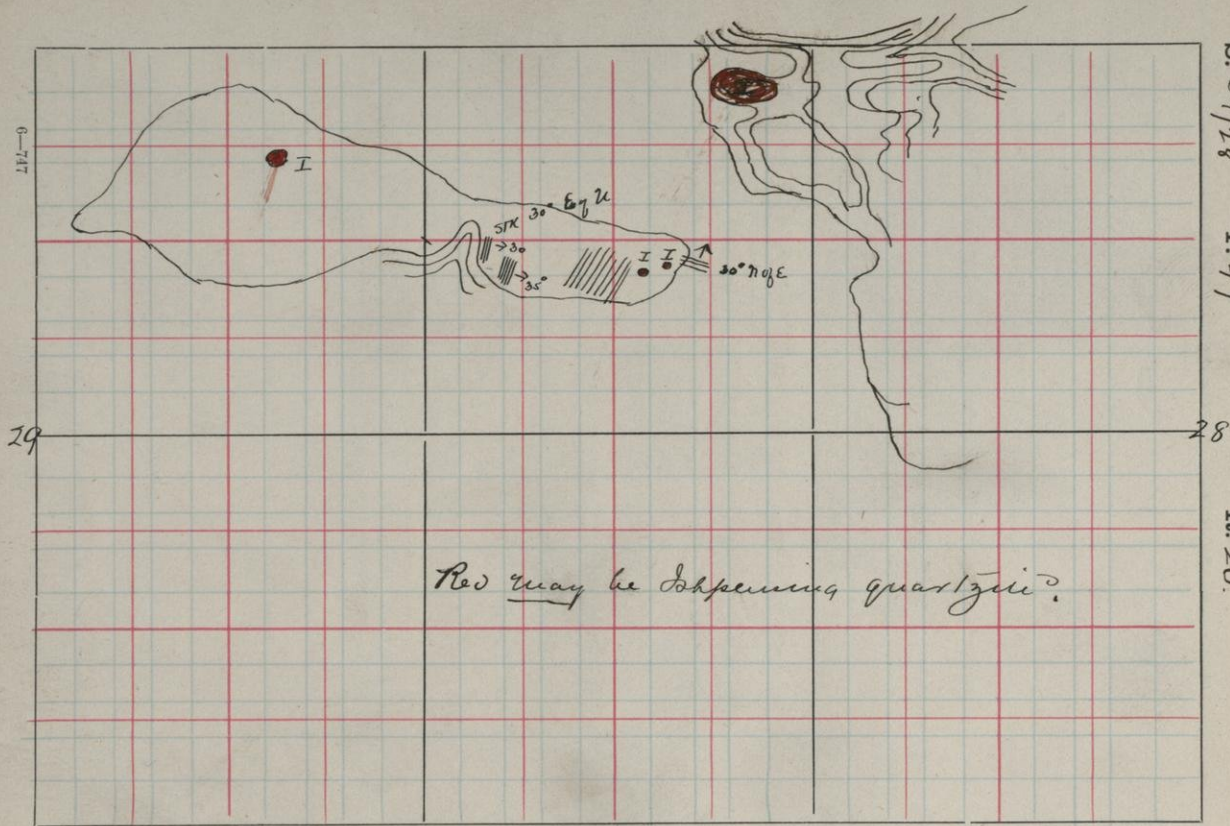
S.E. corner are the granites in two
or three ledges which are as distinct-
ly different from the Schist as is
the expected of two rocks, both Schistose

For further notes on Platt Hill
See p. Second Book.

S. 29/28

T. 47

R. 26.



ajibik

27

Kona Hills

The Areas marked ~~Openning~~ ^{ajibik} quartz-
ites on the map of the ^{ajibik} Kona Hills op-
posite are so marked because the
quartzite there is better bedded than
elsewhere in the region. The main
mass of the ^{ajibik} Kona quartzite is a cherty
brecciated quartzite without bedding
planes that are noticeable.

The supposed ~~Openning~~ ^{ajibik} quartzite is
well bedded striking 30° E of N, or some
other direction northerly, and further
East 30° N of E. Dip is 35° + norther-
ly in the East end of the hills, and
easterly further west.

Under these, and sometimes Sepa-
rated from them by a brecciated zone
lies the cherty quartzite. The character-
istic ^{ajibik} Kona quartzite? Not always ~~are~~
the two quartzites distinguished.
Often they seem to grade so that it is
quite doubtful if they are really dif-
ferent rocks.

At the base of the hills, a little N.W.
of the center of Sec 28, is a large con-
glomerate and to the south of the con-

granular & another quartzite

On the Eastern range of the ^{agibik} Kona Hills
no ~~Shpennig~~ quartzite was found
until the little Knoll at the west end
of the range was reached. This little
Knoll is composed of a white & ^{agibik} ~~crystalline~~
quartzite that is well bedded, where
as the ^{agibik} Kona quartzite in the neigh-
borhood is of the usual character.

For further notes see p. 42.

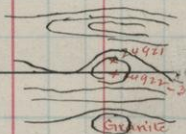
S. 32

T. 47

R. 26

NW cor

NE cor



W 1/4

E 1/4

SE cor.

Cascade Schists S of Cascade Range

Examined a section running S from 200 W of U.E. Cr Sec 32-47-26, as first here it was learned from the microscopical examination of slides that a very sharp line could be drawn between the schists and the squeezed granites.

The Cascade Schists are of the usual character, except that they appear a little more quartzitic than the average.

24921 is a quartzitic phase from 200 W. 200 S of U.E. Cr Sec 33 on the north side of a high bluff.

On the top of the hill the rock is more ochreous and in places looks conglomeratic with what appear to be quartz pebbles.

24922 and others that may be of granite. In some places the granite (?) is in large obscurely defined masses, cemented by schistose matrix.

On the hill beyond the Cascade Schists is genuine granite? No gradation between.

Ropes Good Time

On a visit to the Ropes Good Time and Dr Kemp - we learned that the gold occurs in pyrite, found in the peridotite and the green schist at the contact of the two. The schist seems to be cut by 'veins' or dykes of peridotite and here in embayments etc, between the two rock, the schist especially is impregnated with pyriteiferous matter. This pyrite contains the gold. Some of it free, but the rest combined.

- 24924 Fresh peridotite from dyke in altered serpentine. On road, just south of the Shaft.
- 24925 Greenstone schist from Dump Leaps
- 24926 Dolomite in the serpentine at the contact with the green schist. From Dump Leaps.

S. 33/34

T. 48

R. 25

33

*

34

next page

Vicinity of Marquette

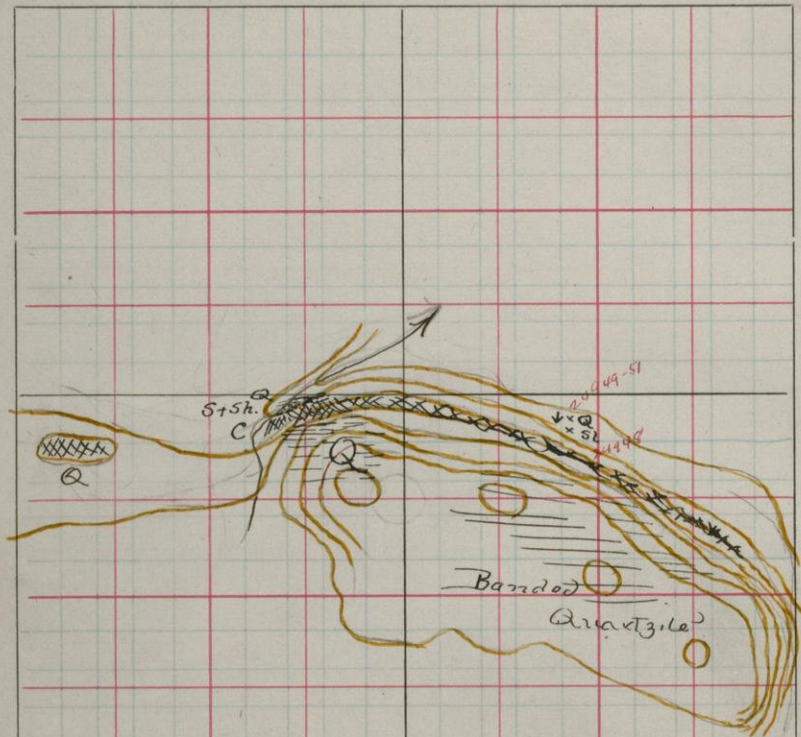
Judging by ripple marks - the South face of the Mesnard quartzite - E of the State Prison is the upper face.

Conglomerate

The Conglomerate in the North side of the Mesnard range, in Secs. 33 & 34, T¹ 48 R. 25 was followed for some distance along the range.

It is not found in the western part of the Section, where the rocks are all quartzite.

At about 500 W of E line Sec 33, the Conglomerate is first found in the N. W. corner of a high hill. To the north of it is a black shale, which seems to be interbedded with quartzite and graywacke. The Conglomerate varies in width between 10 ft and 40 ft and is nearly always faced on the north by the graywacke or black shale, or by a schistose rock of light pink or yellow color, resembling one of the marble shales. North of these



33

It is probable that the unconformity indicated on the map between conglomerate and quartzite does not exist. Though the conglomerate does seem to bow around the end of the hill. This bowing may be due simply to the deposition of thicker sediments to the east, together with effects of erosion.

34

is given a little quartzite? Unfortunately for accurate observation is lacking as Exposures are on the steep face of a cliff overlooking low ground, when the nearest outcrop to the north are of greenstone schist.

To the south of the Conglomerate is the great mass of evenly bedded Mesozoic quartzites.

At its western end the matrix of the Conglomerate seems like slaty - and very much like the black slate.

The quartzite north of the Conglomerate is interbedded with the slate.

It was thought from these observations that the Conglomerate was only an interbedded layer in the slate-quartzite series, but this view was overturned later.

See pages 53-52

Champion

Thompson's account of the existence of a younger granite at Champion gives his reasons for the conclusion that one of the granites is younger than the other, as follows:

- 1) The younger granite contains inclusions of actinolite schists, whereas the granite to the south of this is devoid of inclusions.
- 2) The granite intrudes actinolite schist.

The granite concerned in above discussion is a light brown, or gray, mediumly coarsely crystalline granite with no unusual aspects. It is similar in all respects to the 'older' granite to the south. No outcrops of the 'younger' could be seen in the 'older' rock, nor could any means be ascertained by which the two granites could be distinguished from each other in their isolated knobs when both were free from inclusions.

Moreover, near the W 1/4 part of Sec 6,

S.

T.

R.

See Thompson's Map.

it is believed, in Thompson's old granite inclusions were found like these in the 'younger' granite. This does not necessarily prove the non-existence of his granites in the neighborhood. It may mean simply that the 'new' granite extended further south than Thompson supposed.

24927 Piece of inclusion from this place.

Every where throughout both granites are dykes of schistose greenstones, large greenstone dykes and leucocratic masses of the same rock.

The special inclusions referred to by Thompson are no doubt true inclusions. They vary in size from a few inches in diameter to four feet or more. Rarely are they rounded. More frequently they are irregular in outline, with long and short axes, the longer axes being parallel to the schistosity in the fragments.

The rock in the neighborhood of the younger granite (U.W. Sec 6), best

Seen in the hill 600-700 E of the U.W.
Cir Dec 6, is that which guided the
fragments, and is the rock cut by
granite dykes.

24928 is a specimen from this hill

24929 The rock is very schistose in places,
Sometimes over whole ledges. It is
banded and contorted, the bands
showing as eyes of quartz and gran-
ite, lenticular in shape and often
strung out into long whips run-
ning often parallel to the banding.

The greater mass of the rock is a
dark micaceous schist, with a sheen
not unlike that of actinolite schist.

Large bands of granite parallel to
the banding of the schist, may be
dykes (see Thompson's photographs)
but if so there has been a differ-
entiation of the granite material
for the dykes? are more acid than
the normal granite.

In places these cut across the bed-
ding. They fray out at the edges and
in other ways comport themselves
like true Eruptive veins.

24930 More massive phase of the schist.



Schist cut by granite. See 6006 of
UW cat Dec 6. II 47 P. 29.

The Schists are so much like the
actinolitic Schist, while at the same
time they are different, that an ex-
amination of the Kew actinolitic
Schist in Dec 5, same town, was made.
These Schists are here well charac-
terized actinolitic Schists. The rocks
are well banded, with cherty layers
alternating with the actinolitic bands.
No dykes of granite, no eyes of quartz,
no cristallites, no micaceous sheen are
noticed in them; hence it would seem
that the Schist affording the granite
inclusions are different from these

actinolite schists? The latter appear
 as bedded schists and the former
 pressure schists? A contact between
 the two was sought but in vain. The
 two rocks approach each other but
 are not in contact.

Where they are nearest they differ
 as much as elsewhere, so that it is
 possible to draw a line between their
 respective areas.

24931 Black schist nearest the actinolite schist
 line in fork of road D.E. 11th Sec 31-48-29

24932 Black schist from near granite and
 actinolite schist. D.E. Sec 31-48-29

Assuming that the black schist is
 not a phase of the actinolite schist
 (and the microscope ought to determine
 this point) there is no evidence of the
 existence of two granites south of Cham-
 pion. The granite is undoubtedly
 younger than the schistose rock, but
 this is not an actinolite schist.
 It may well be much older than
 the latter - and indeed it seems
 to be a new schist.

Marquette

24903

The lufaceous deposit South of Marquette, on the Lake Shore was examined and in it was found a layer, or rather a number of layers of a cherty rock, that resembles in some degree the cherts in the greenstones on Pine St. Marquette.

Champion

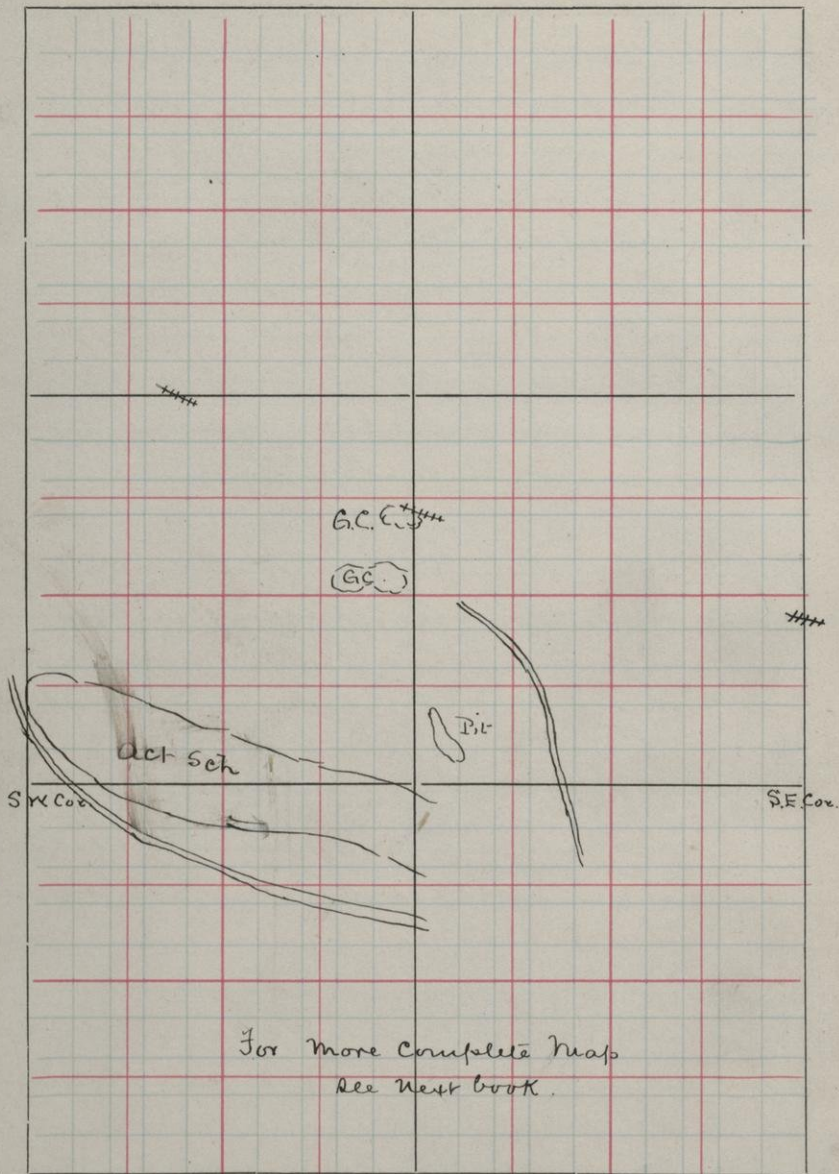
The greenstone Conglomerate East of Champion is so full of actinolite & schist fragments that it resembles a true conglomerate. It contains in addition to sharp edged pieces of this material, also large boulders of granite and quartzite. In the matrix which is schistose and crystalline, like hornblende schist are bands of fine quartzite.

Just under the Conglomerate portion, on the C & N. W. R. R. the matrix looks very much like an actinolite & schist, or like the black schist included in the granite. The bedding is much contorted and the

S. 32

T. 48

R. 29



bands are marked by little garnets?
These are very common.

Clarksburg

Formation

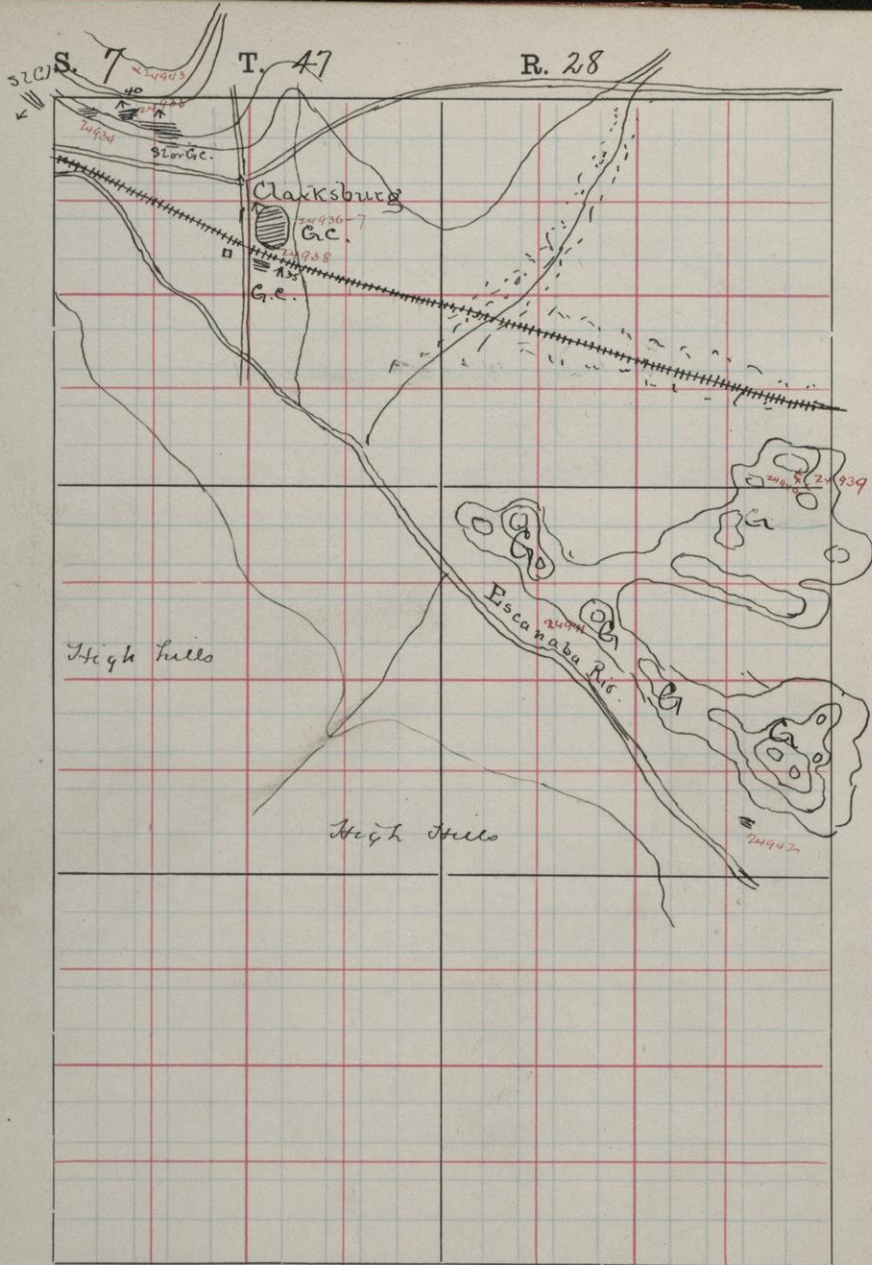
Some general observations were made on the Clarksburg Formation at Clarksburg for information as to its character in the interior gale area.

The rock north of Clarksburg is a hard, dense black slate, which, to the west of the town strikes about N.W. and dips S.E. In many places it seems more like a tuff than a slate. It is well

24934 Banded in the whole, the bedding planes standing out on exposed surfaces.

East of this point (24934) the general strike is N of E and the dip W. of N. at 40°

24935 Further East it is denser and in here appears the quartzite in character. The surface is well marked with bands that are more or less



Contorted.

24936

In many places the rock becomes conglomeratic as in the knob near the R. R. track, where the dip is a little W. of N. and the strike a few degrees N. of E. Here the conglomeratic rock, which weathers like greenstone,

24937

Contains pebbles in abundance of apparently the same substance as constitutes the matrix. This is conglomeratic and is full of little cavities like amygdaloides, but which are more probably pseudamygdaloides, and are the weathering of light spots - perhaps calcite?

24938

In places thick bands of slate occur, and again bands of a very dense, gray rock resembling the dense schists of Massachusetts.

The northern limit of the Clarkburg formation in general map is too far south at Clarkburg.

The next hills south of Clarkburg in the S.E. $\frac{1}{4}$ Sec 7, is composed mainly of a coarse greenstone, locally veined and otherwise like the Johnson's Rock

Sometimes however it is fine grained,
and sometimes is more campyrite
than Diabase.

24939 The Hill at the East 1/4 post of Sec 7
is a medium fine grained leucite
crystallized greenstone, which on the South
side of the hill is amygdaloidal. It is
in contact here with banded slates like
those north of Clarkburg. In places
the slate is crumpled, and there seem
the large fragments of the latter in
the greenstones, though the two rocks
may be interbanded.

24940 From the contact.

24941 The row of hills nearest the river is of
very fresh Amphibolite?

24942 and near their northern base is the
banded rock dipping very fast to the
north. It is marked graywacke on
maps.

The slates on the north side of Clark-
burg extend northward some distance.

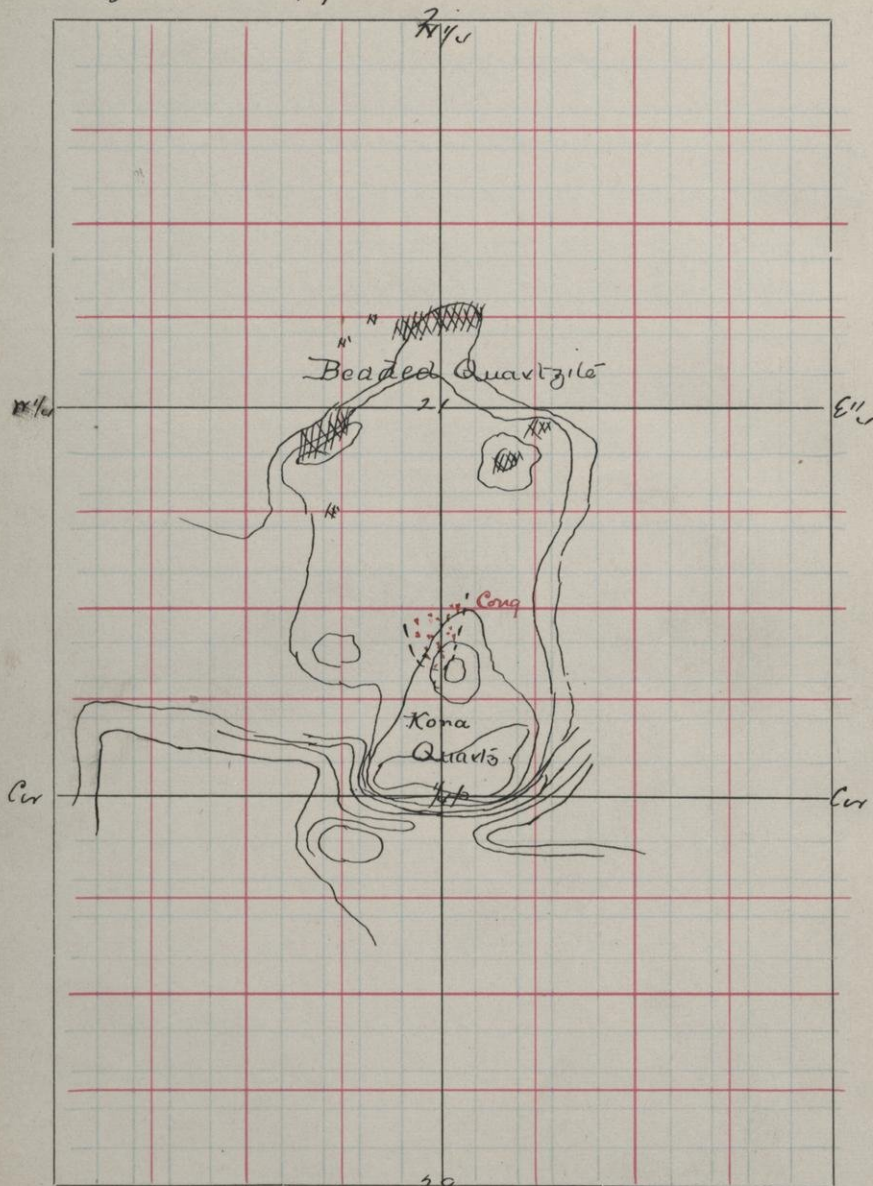
On the south side of a field, at
about the N. section line is a fine grain-
ed dense rock resembling greenstone

24943

$\frac{21}{S. 28}$

T. 47

R. 26



and further north in the hills is a
Schistose slate? Speckled with rust
spots and looking like a schistose
greenstone. It is probably a graywacke.

apthk
Kona Hills

in N. 1/2 Sec 28 and Cen. Sec 21. 47-26

It is as difficult to distinguish be-
tween the Kona and the Dolomitic
quartzite here as it is further south.
The Kona quartzite is brecciated and
shattered so that it resembles very
closely a conglomerate.

A true conglomerate was found in
the little hill just north of the south
1/2 p. Sec. 21. North of the conglomerate
is the well bedded quartzite of Sec 21
and south of it is the brecciated quar-
zite of Kona qqs. The relations of the
three rocks to each other in this par-
ticular here was not learned.

All the quartzite is well bedded. This
is the quartzite that I have always
thought must be different from
the Goose Lake Quartzite because of

its great difference in appearance
This quartzite is over the Goose Lake
Dolomite.

May not the Kona quartzite be
under the Goose Lake Dolomite? If
so it may be the equivalent of the
Mesnard quartzite or it may be
older than the Mesnard and Equiva-
lent to the quartzite under the
Crysomela underlying the Mesnard
quartzite in the Mt. Mesnard Range.
I think this unlikely.

The large scale blocks with mapped ex-
posure are not at hand so cannot dis-
cuss the idea more fully.

Palmer Gneiss
Cascade Schist

in Sec 35-47-26.

The Schist in the hill in Sec 35
are easily distinguished from the
granite. There is no evidence of a gra-
dation as there would be were the Schist
shattered granites. It is true that the
two rocks are separated by a small
area without exposures, but the Schist
near the granite is no more like

the latter rock than the Schist near the quartzite? Moreover the Schist in many places has the appearance of a sheared quartzite & rendered by a little pink feldspar. I can find no intrusion of the Schist by the granite?

The conglomerate between the Schist and the quartzite on the west side of the hill contains pebbles of ore.

May this quartzite not be a small patch of Upper Devonian quartzite? Prof. Van Dine found a small patch of upper conglomerate a little west of this point - in Dec 27.

45-

Fault in Sec. 6-47-25-

Work here simply mapping the rocks around the fault supposed to extend inward from the Camp River.

1st trip from S.E. Cor Sec 6 - then 1000 paces North, west 500, South 1000, E. 500 to S.E. Corner.

The rocks noted were

2.944 Core of one from old pit at 935 N. 500 W of S.E. Cor Sec 6.

Red quartzite and slates are found in other cores taken from the same heap - and red quartzite occurs in small Exposure west of pit.

At 600 N. 500 W of S.E. Cor. Sec 6 is a small broken ledge of red slate striking N. 30° N of E. and dipping ^{to the} N.W.

On the river bank at 500 W. found slates of the same character dipping as before but striking a little more to the north.

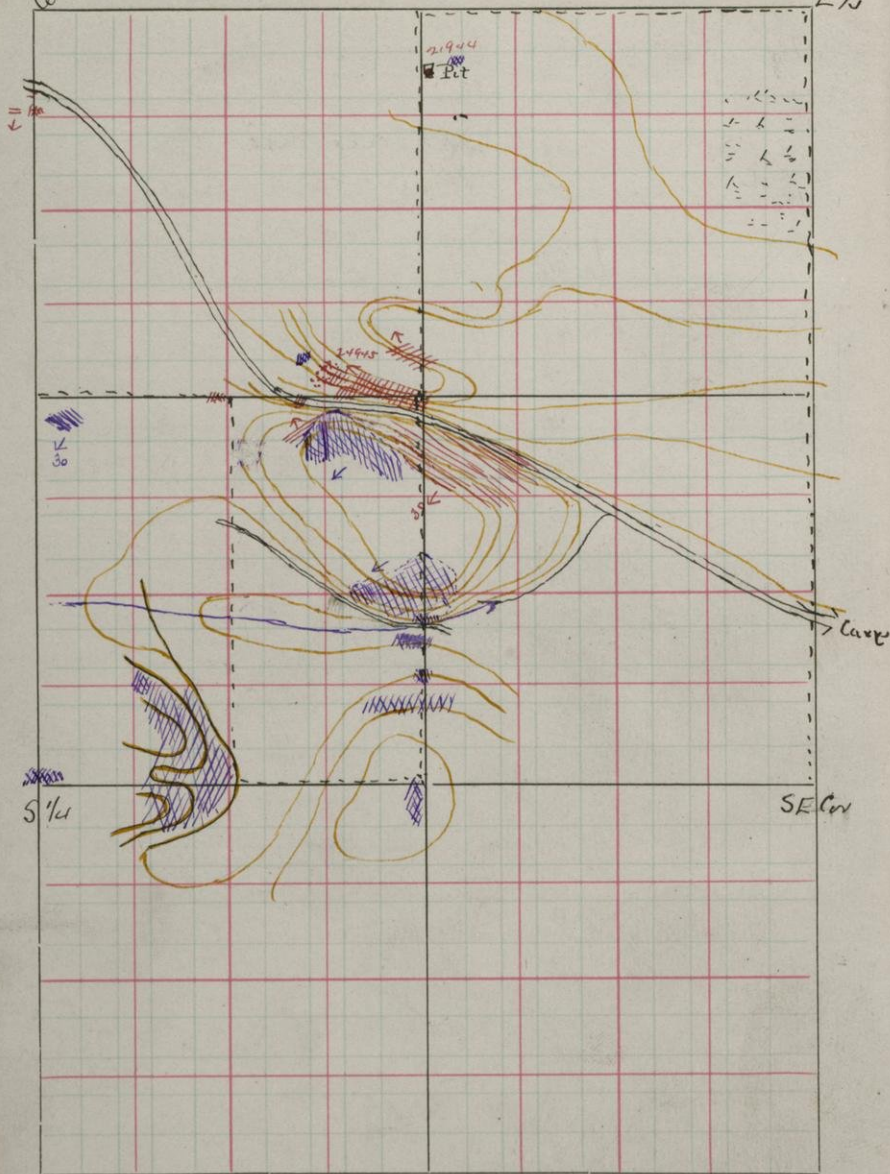
24945 A little west of this point on the high bank is an Exposure of the red -

S. *Centis*

T.

R.

E%



rocks holding pebbles, and west of
this is quartzite?

The other ledges are all of quartzite
In the west cases this is massive
and so is without bedding planes.

At the big hill on which is the facet. Run-
over the dip is to the S.W. and in the
ledge 500 ft of the S. 1/4 part it is the
same.

Cf. notes of last year (Book No 152)

In the S.W. $\frac{1}{4}$ Sec 6-47-25 - the only exposures noted were of slate°. In the northern portion of the section they strike 20° S of W. and dip N.W. at 25° , where they are well exposed. In the small ledge at 1060 W. 920 N of S.E. cor the dip seems to be south, but the observation is on bad exposure.

In the southern half of the $\frac{1}{4}$ section the dips are north in general. The slates in the high knoll 250 W. of S.W. post strike 20° E of N on the east side of hill, then 30° N of E and 20° N of E as we proceed westward, indicating the end of a great fold opening N.W. The dip of the slates is about 25° N.W.

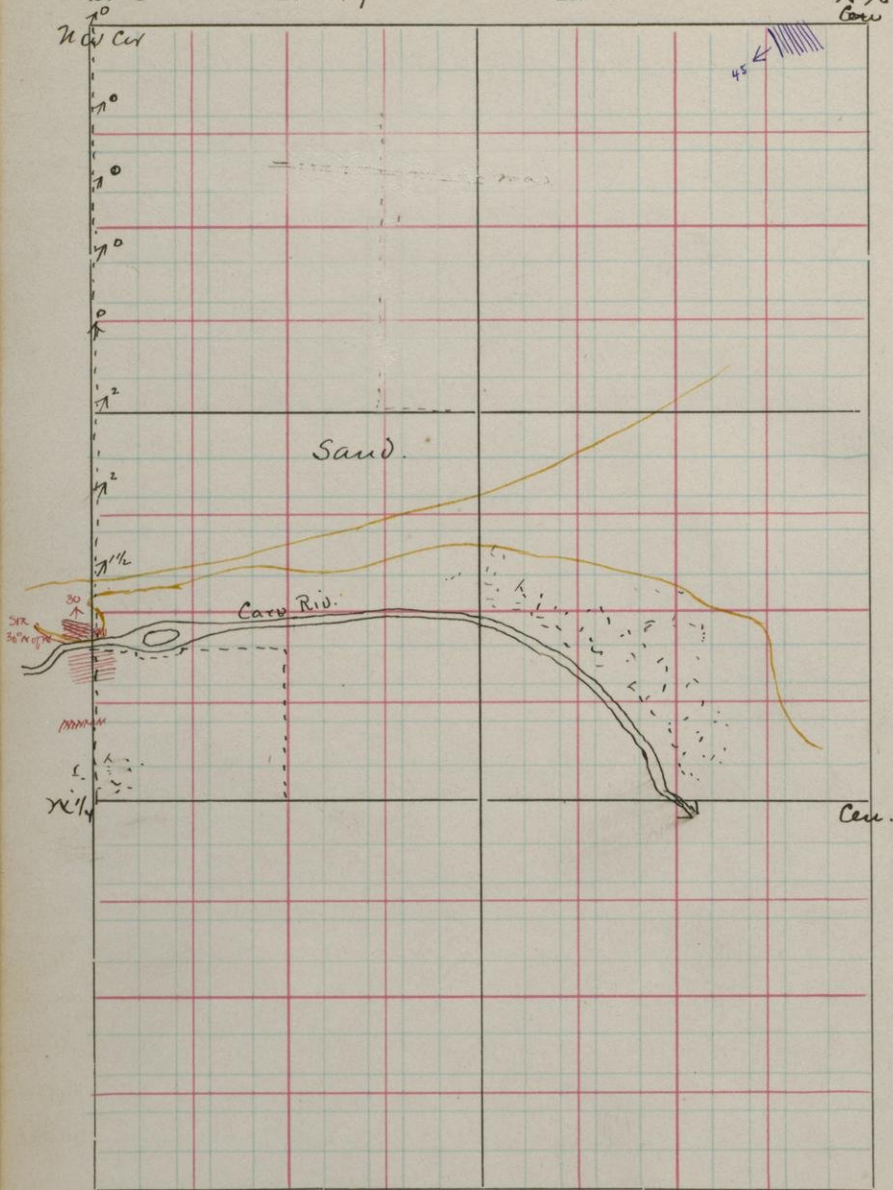
At 500 N of the S.W. cor Sec 6 is a large flat ledge of gray quartzite, and red and gray slates interbedded. This ledge is plotted wrong on the sheets but is right on map in note book opp. p. 32 Book 152. The dip however is given here as 35° N. (Smith's observation) I found it 40° N. However there is more or less curvature.

S. 6
New Cur

T. 47

R. 25-

N 1/2
Cott



The only exposure in the NW 1/4 Sec 6-47-25 on the following

near the river on the west line are some interbedded red quartzites and shales like those 500 ft of the SW cor 7 Sec. Their strike is 30 N of W. and dips 30° N.E.

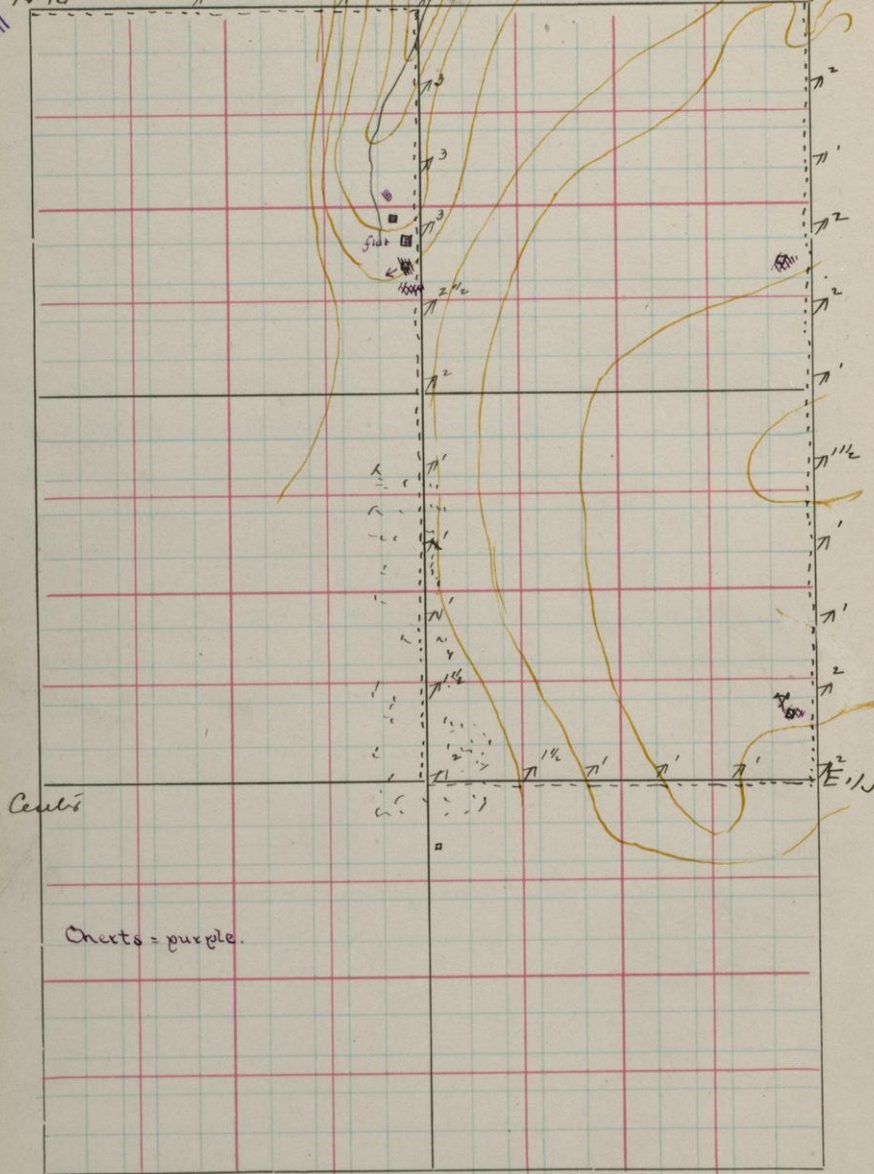
S. 3. 6

T. 47

R. 25

N. 25

45



Cherts = purple.

In the N.E. 1/4 of Sec 6 - 47 - 25 we meet with the iron formation, which is shown in the pits scattered through the section. These pits all show chert and ore.

It will be noticed that there is no effect produced in the magnetic variation over this area, by the presence of the iron formation. The variation is practically normal. Slight differences due to compass. On the magnetic sheet these have been corrected.

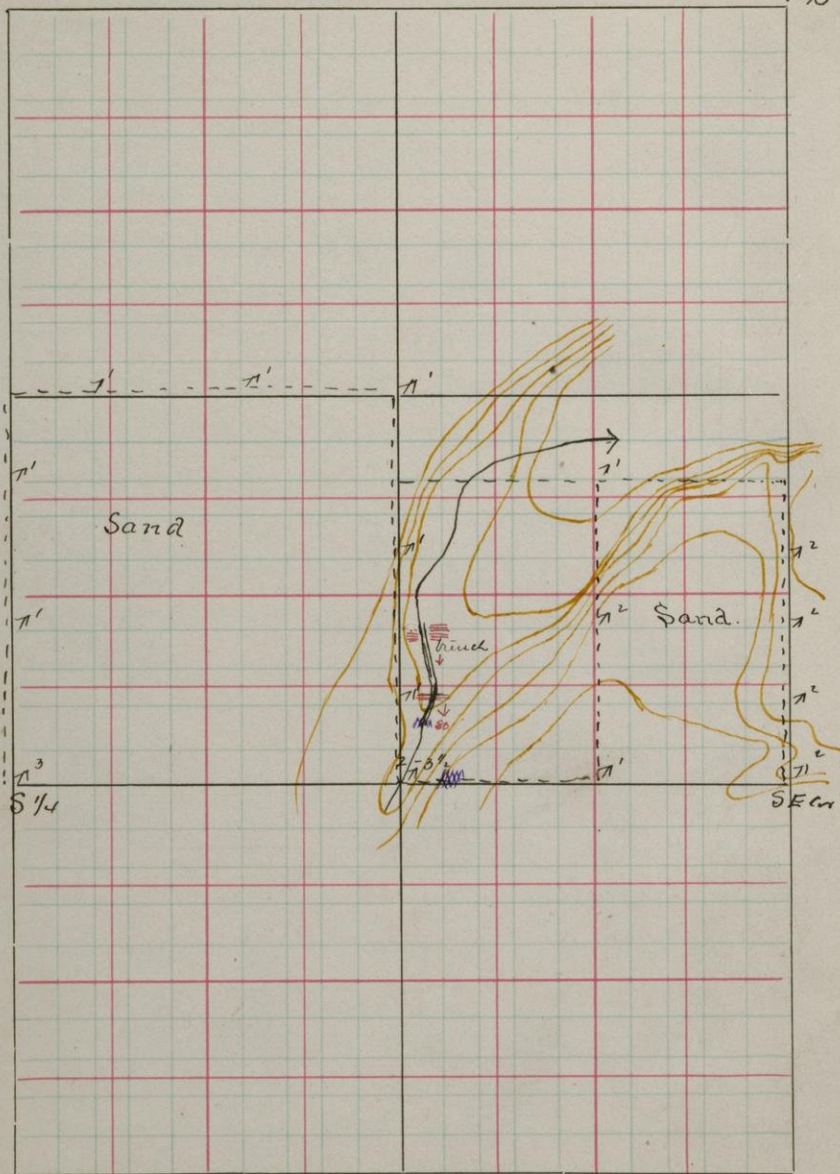
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T. 48

R. 25

E 1/2

Co 22



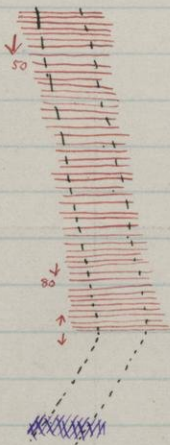
SE 1/4 Sec 31 - 48-25

West of this quarter Section is covered by Sand.

A little strip of country along the stream running north at 500 W of S.E. Cor shows Exposures.

Quartzite in heavy massing, which is at 450 W of S.E. Cor.

North of this is a pit, or trench in the red scales. The trench is located on opposite page - an enlarged map follows:



U. B. I think this is the place where Deanman observed an unconformity. I could see no evidence of one.

W. S. B.

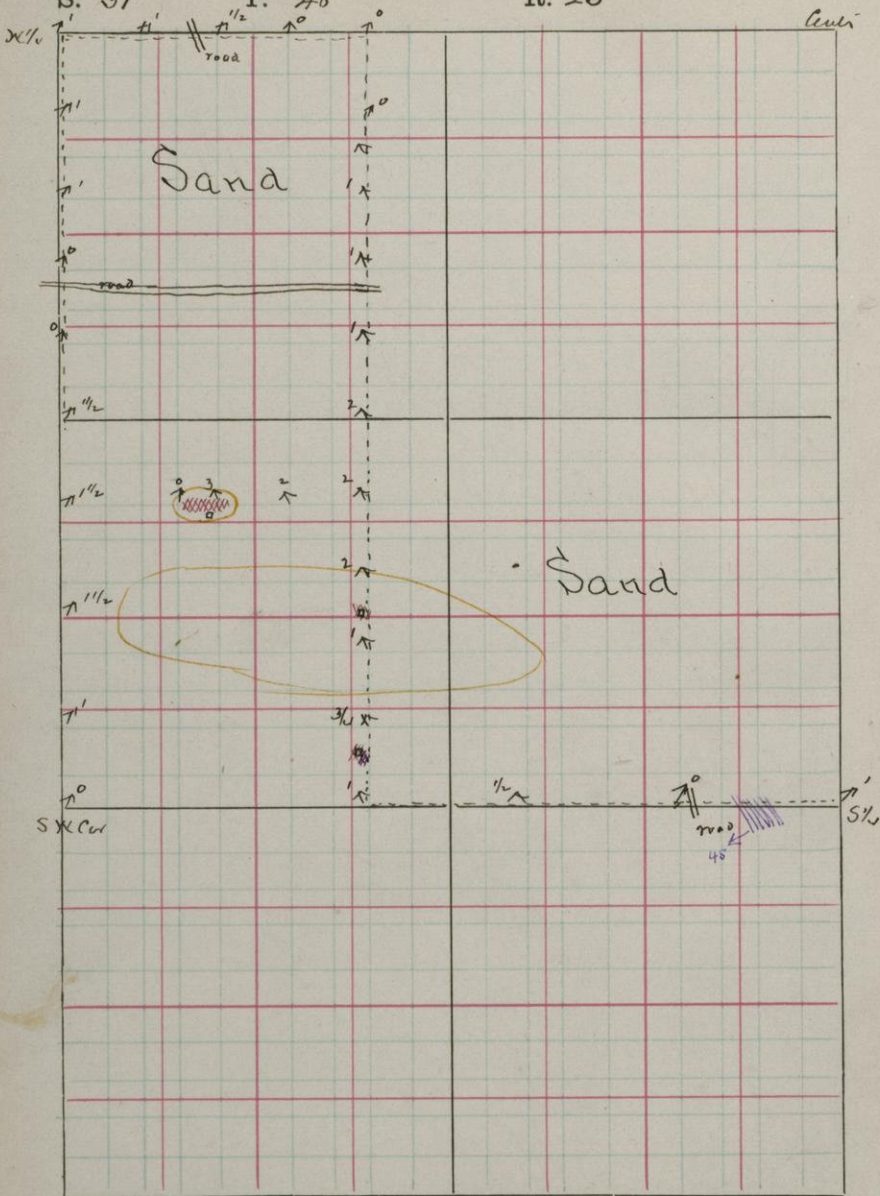
These Exposures are not shown on my copy of the plates (photographing copy), though I know Dr Clements nailed them.

S. 31

T. 48

R. 25

Cen.



SW $\frac{1}{4}$ Sec 31 - 48-25-

Most of this $\frac{1}{4}$ S. is covered with sand, but here and there the rocks outcrop. The little pits at 400 E of SW Cor are in red slates. The Southern one is quite a large hole. On the dump in addition to the red slates are many pieces of chert.

24956
Missing

The little hill at 200 E. 400 N of S.W. Cor Sec 31 is composed of slate, but it seems to be a different slate from that in the pits. It is not red, but is a black slate with a cherty look.

24957

On the North side of this same hill further East is a black magnetitic slate (not magnetitic variation) a little different from any black slate seen. It appears to contain layers of white weathering, gray cherty stuff, and pebbles or ore. Its strike and dip could not be obtained.

Some of it in the little pit are fossiliferous layers of black slate.

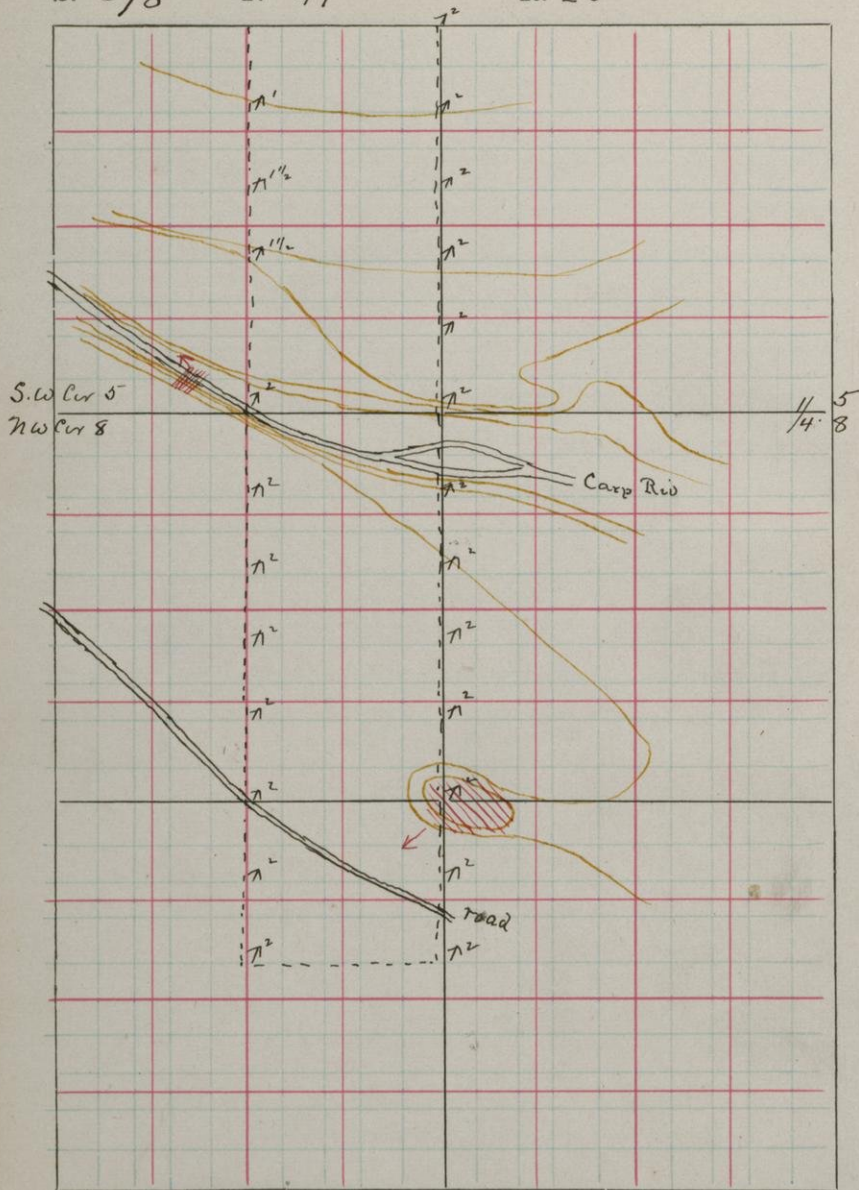
Can this conglomerate be the same as that at the fault?

N.B. Note cherts in the red slates! This

S. 5/8

T. 47

R. 25



N 1/4

6-747

occurrence has been observed a number of times at different places. Nearly all the pits in this tongue of the river bed seem to be in red slates and some of the one producing pits at Champion are likewise in red slates.

Can these red slates be the equivalents of the jaspers elsewhere? Or is there an iron formation in the slate beds?

S.W. of Sec 5 - 47-25

N.W. of Sec 8 - 47-25

The only Exposures in these $\frac{1}{4}$ sections are -

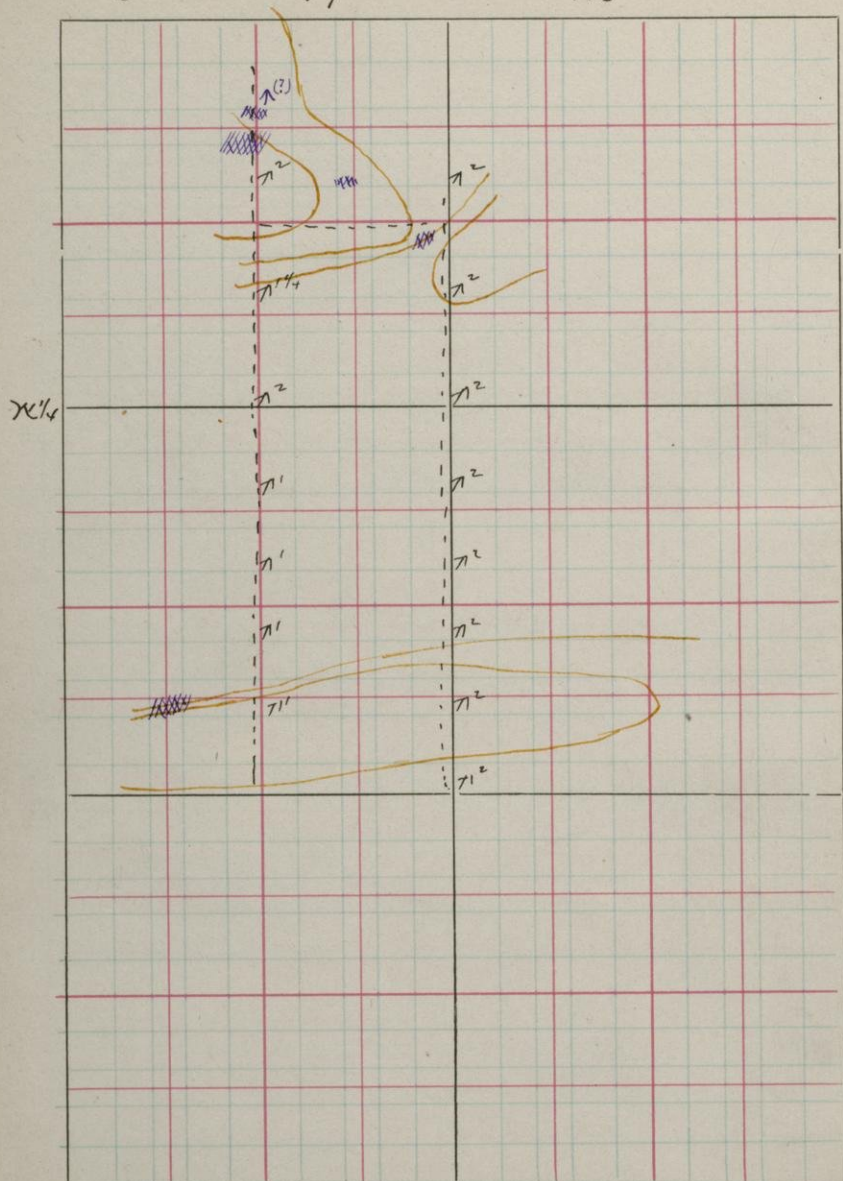
in river, at about 150 E of S.W. Cor Sec 5 where there is a small ledge of black slates like those under the quartzite at the fault -

and

in the hill 500 S. 500 E of N.W. Cor Sec 8.

S. 5⁻

T. 47

R. 25⁻

The only Exposures in the $W\frac{1}{2}$ Sec 5. 47-25, so far as mapped are opposite page are several of white quartzite so massive and heavy bedded that its dip could not be determined. In the northernmost ledge it was supposed a northerly dip could be detected.

Marquette Conglomerate

The Conglomerate South of Marquette is best Exposed at from 200 East of W. line Sec. 34-48-25, westward to the line.

At 200 E of the line is a very large Exposure of the Conglomerate, so large that there can no longer be any thought that it is a local feature of the quartzite. Here the Conglomerate is full of iron pebbles. It seems to end around the East side of the western lobe of the Mesnard Quartzite, but could not be followed. It appears to end in the valley.

Quartzite and slate are in the north of it as is the case further west.

S.

T.

R.

Map of Conglomerate

Page 32.

and the banded quartzite of the Mes-
sian series to the South.

The quartzite under the conglomerate
is ripple marked, with the ripple
face the uppermost, just as is
the case with the quartzite near
the Prison.

24948 one pebbles from the Conglomer-
ate

24949 } Quartzite north of the Conglomer-
24950 } ate in north side of the hill.
24951 }

Goodrich Mines

24952 Specimen of one conglomerate
with white schist pebbles, from
dump heap of Goodrich Mines.

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