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Lake Vermilion Region, Minnesota: [specimens 26943-27506]. No. 195 1897

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1897

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

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

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

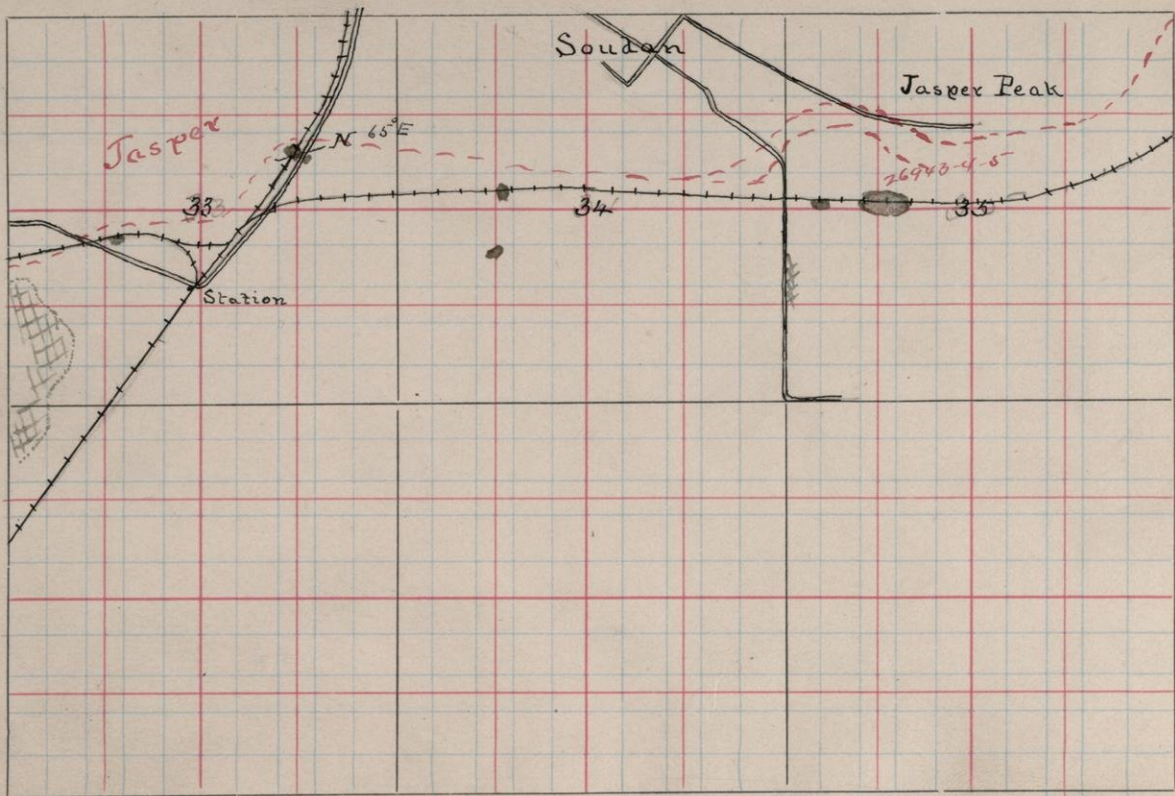
3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of $2 \times 2\frac{1}{2} \times \frac{3}{4}$ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of $3 \times 4 \times 1$ inches, must be selected, in accordance with 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.

195

6-747



S.

T. 62

R. 15

underlined nos. = determined microscopically!

July 14

Went East along rail road from Jones
three miles then South and covered
S 1/2 of Secs. 33, 34 and a portion of 35.

The little hill through which wagon
road runs to Sandan is composed largely
of schistose greenstone containing
small porphyritic crystals of feldspar
in places and possessing a schistosity
that is almost vertical and that strikes
 25° S of W.

Any other ledge was seen before
reaching wagon ^{road} crossing on East side
Sec. 34. This too is greenstone.

The cut in the rail road just East of
road crossing is through greenstone
Ochreous. To the west the schist is the
usual dark rock. At the East end
of the cut it is lighter in color.

The contact between the two is very
sharp. Relations cannot be definitely
ascertained, but believe light rock
to be the younger.

F.P.
26940

In places the light rock is more massive than elsewhere, the massive and chertine phases appearing as bands.

July 15

Moved to Pine Island.

July 16

Coasted along N. side of Sucker Point (See p. 51. Book No 195), paddling from E. to W.

Just East of Extreme end of point are gray wackes and slates at the water's edge. These are interbedded with an apparent E-W. strike.

On the hills in the northern portion of this point are bare ledges of gray wacke and slate so massive in appearance that strikes and dips are very difficult to obtain.

NW

26946

The major rock is a coarse grit. In the little bay, near west line of Sec 19, the strike is N. 70°W and dip 65°N.

NW

26947

The larger of the small islands N.W. of the end of Sucker pt. is a coarse gray-wacke that strikes about E-W and in

general ^{dip} strike vertical. It seems to be closely folded with tiny folds pitching East and major one pitching west, but J. H. could not be sure. On the more northerly end of the island the rock is slate rather than gneiss.

The little island near the W. line of Sec 18 again slate and graywacke, the slate predominating. The strike is N 75 E and dip about 75°-80° to N.E.

The little island near North corner Sec 408 is composed of a schistose rock that resembles closely a green-schist, but which I imagine to be a sheared graywacke cut by quartz veins. Its strike is N. 85° W. but this may be the strike of schistosity?

26948 Took four specimens beginning
26949 at N.E. cor of island and passing
26950 around S.E. side. [See p. 25. Book No. 198]
26951

July 17

Rain. Rested.

July 18.

Made a short trip Eastward through Pine Island Narrows and back. Went into Trout Lake to see the Trout Lake granite. This is a fine grained pink granite, which evidently cut greiss and Hornblende schist. The dykes noted on the North shore of Pine Is. and narrows are its apophyses.

Then went west on South side of Pine Island to Jack Pine Island and north through northern narrows.

JW

26952

Fish specimen was taken from East end of island in Little Portage Bay on South side of Pine Island. It is a fine grained light green rock and schistose. It resembles a fine grained greenstone or graywacke. It is broken up into many polyhedral blocks, so that it is safe to say its foliation is due to jointing and shearing. No bedding was observed, but the dip of the schistosity is N. as a very

high angle.

In the little bay around the west point of this large bay are several ledges of Schist² which are distinctly banded in places with a strike of N. 70° W. and dip 80° N. The rock looks very much like a squeezed cumpling or like a metamorphosed fragmental. The bands are coarse and fine alternately.

26953 Coarse variety.

Fine variety like 26952.

At the point at the west end of this bay are interbedded black slates and graywackes from a few inches to a few feet in width. The rocks strike 20° of E. and dip 71-72° N.

26954 Slate²

26955 Graywacke.

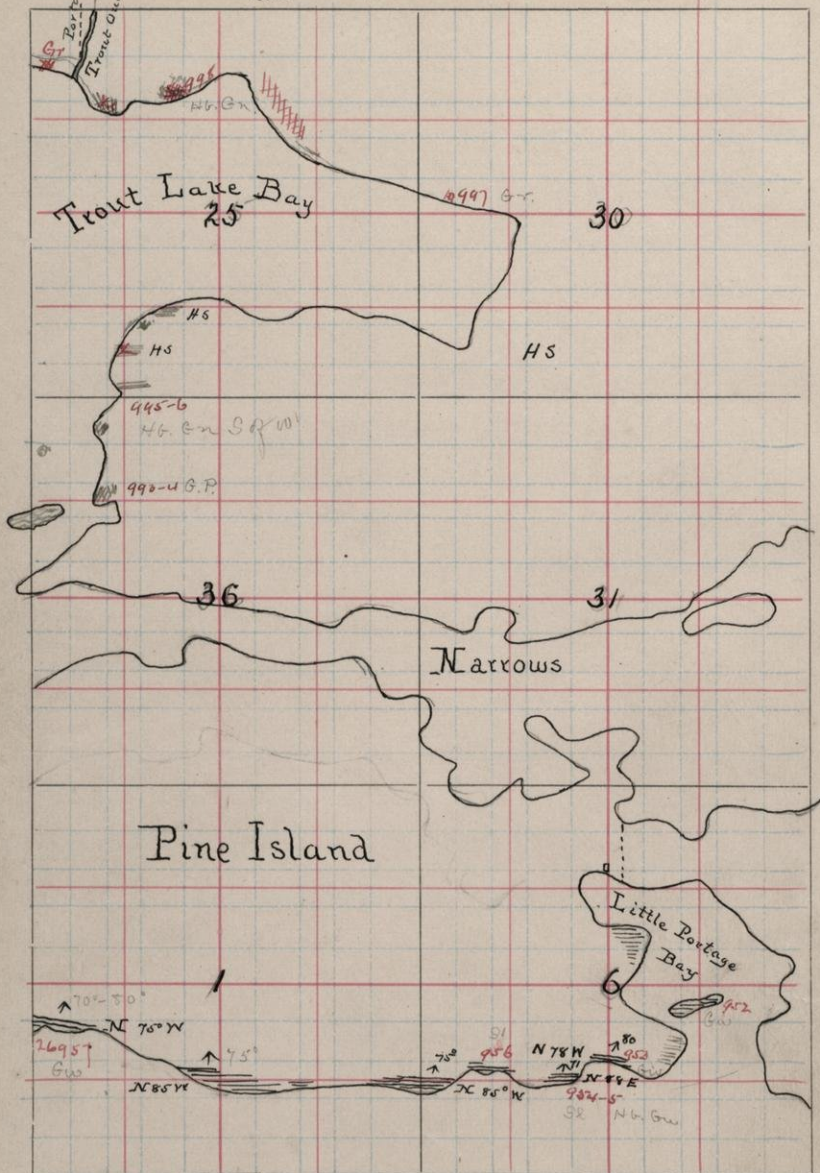
To the west the dip gets a little flatter

1/2 mile further west at the clearing the slates are less abundant and the graywacke more so. Dip and strike

S.

T. 63
62

R. 16-15



sl as before.

26906 Specimens from this place.

The same rocks extend for some distance west with a strike 50° S 9° E and dip 75° N.

About midway between the range line and the west to line ^{west} the rock is more massive than it is further east.

Graywackes here predominate, but further west slates are the more abundant. These same rocks occur in fine exposures to the S.E. line between Secs 1 and 2. Here they are very like those to the east. They strike 12° - 15° N 7° W and dip to the north at about 70° - 80° .

26957 Distinctive phase of graywacke.

In places in the little point over which the section line runs the graywacke is streaked with lenticular masses, lenticles of massive phase.

26958 The little island in the S. to of Sec 2. is the graywacke striking N. 78° W. It is quite massive and is jointed into polygonal blocks like the specimens.

SL
26959 Around the west side of Pine Island
the same rocks continue with the
same character, but in easternmost of
little island in the channel it ap-
pears more crystalline and is cut by
quartz veins. It is much more schistose
than the rocks to the S.E. but is appar-
ently practically the same. It is streaked
with lenticles of more massive phases
which produce its "schistosity".

SL
26960 Jack-Pine island varies little in its
geology from the main land. On the
north shore the rocks are slightly more
massive

SL
26961 But on S. and E. sides they are well
bedded.

On the cleavage (also bedding) sur-
faces there are often lenticular areas
resembling squeezed pebbles, as may
be seen on examination of 26961.

Strike N. 80° W. with ^{dip?} strike as indica-
ted on map.

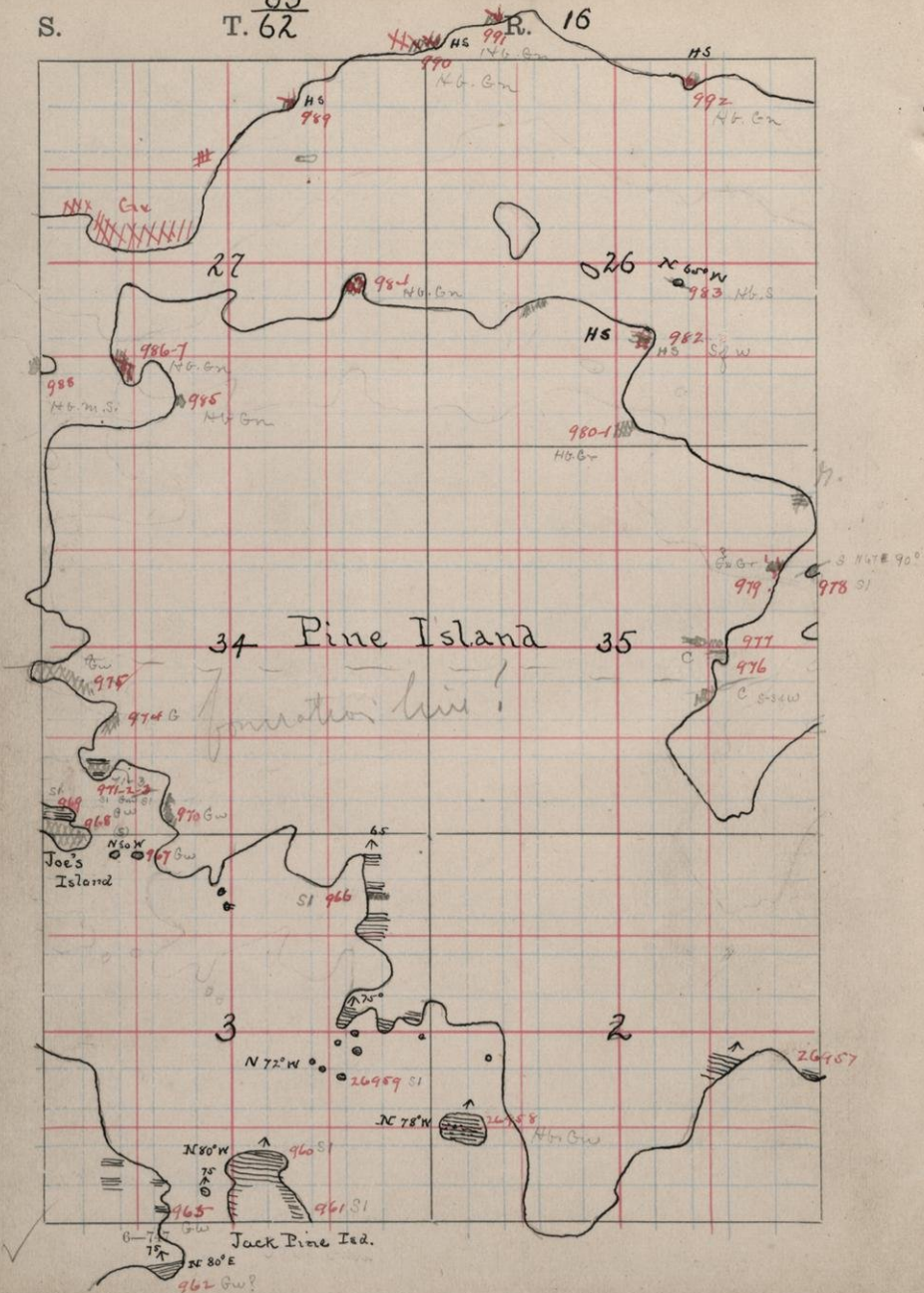
SL
26962 On the point fland west of Jack Pine
island the rock is a darker schist with
strike N. 80° E and dip 45° N. It is practi-

Vertical field
view?

S.

T. $\frac{63}{62}$

R. 16



Series of

9. 26963

all the same rock as the island.

The extreme S.E. point of main land is composed of a dark crystalline looking rock that appears like intruding in a strongly peritiferous one that assume the graywacke.

sw (contact)

26964

The line near where west end of Section 10 crosses is a slate striking N. 80° W. and dipping 80° N.

sw

26965

Graywacke schist from north side of little bay west of Jack Pine island.

That portion of Pine island the U.S. 1/4 Sec 3, is composed mainly of slates and graywackes, that are interbedded in places with a fine grained dense rock looking like a fine grained greenstone, but which may be a graywacke. Dips and strikes are given in map.

sl

26966

The little island between Pine Island and Jack Island is a massive green rock that resembles greenstone. It is gashed and ⁱⁿ weathered surface shows a distinct schistosity. Strike of schistosity - N 80° E

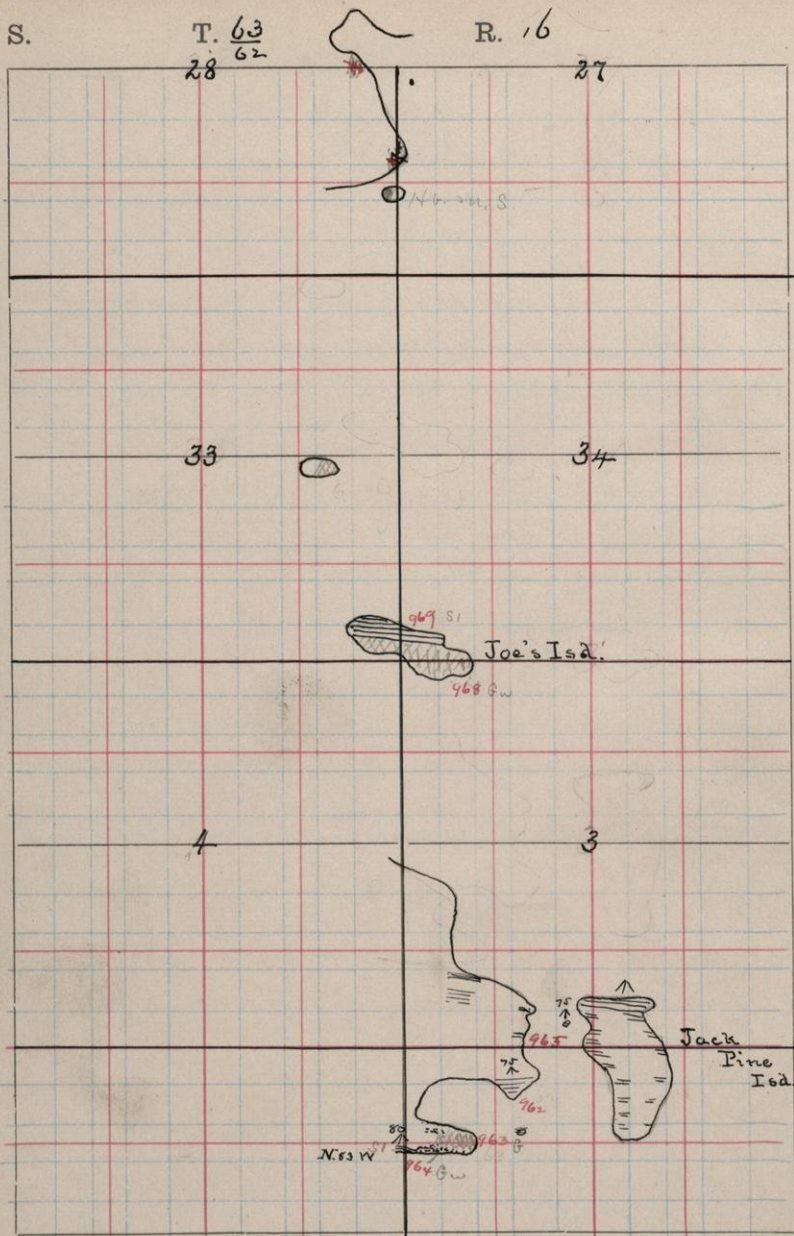
sw

26967

S.

T. 63
28 62

R. 16



NW
 26968 The rock in the East End of Joe's Island
 is greenstone and along its ²⁶⁹⁶⁷ North side
 is a rock like specimen, which ap-
 pears like a gneiss. If the two rocks
 are different 26968 is intruding in
 26967.

SE
 26969 Toward and along the North side of the
 island the rock appears like finer
 grained and to resemble more close-
 ly a slate than rock 968

NW
 26970 The little point on Pine Island just
 East of Joe's island is coarse grained
 greenstone with phenocrysts of feldspar
 dotting its fracture surfaces

SE
 26971 The South side of the West point is
 slate, while the main of this point is
 NW
 26972 a more massive schist, fine grained
 and schistose like some gneisses. This
 is cut by a greenstone dyke.

SE
 26973 Another phase of the schist that looks
 fragmentary.

Evidently these green schist are ig-
 neous rocks either intruding or inter-
 bedded flows.

The West End of the island and the

East end of the island of its extremely fine
compared for very fine grained green-
stone, banded and contorted, with dense
lenticular masses in a schistose
matrix. This rock looks like a lava
flow which may be intruding in Stale-
Specimens from bay at west end of
Pine Island between Jais Island and
the island north.

h.
26974

rw
26975

Schistose rock. Apparently phase 3
26974, from shore of bay at extreme
N.E. of Pine Island.

July 19

Went west along N. side Pine Island from
narrows at E. 1/2 post Dec 35 to end of Pine Island
then back along north shore

The little point near the East 1/2 post Dec
35 is a schistose greenstone, with galeatium
striking a little S.W. It weathers rough and
is filled with lenticular masses more dif-
fering from the schist merely in lack
of schistosity.

schist cgl.

26976

Schistose phase

26977

More massive phase from north side of point
further W.C.

The little island N.W. of this point is mainly schistose and massive greenstone like 76 and 77 - the warning phase making back-
 turn of island. On its N.E. side near the
 Sl water's edge the rock is so schistose that
 26978 it resembles closely a slate whose cleav-
 age strikes N 67° E and dips nearly ver-
 tical. The slaty cleavage is perfect, but
 the rock is more chloritic than are the
 slates to the south.

North of the island at the first little point
 26979 is a mass of pink, finely schistose rock
 which in a clean fracture, looks like a
 coarse greenstone saturated with red
 granitic material.

From the relations of the greenstone with
 slate it looks as though the granite
 were younger than both.

In the little bay north of this point is a
 great mass of greenstone that unlike
 the more massive phases of this rock ob-
 served elsewhere. There, however, it is
 cut by quartz veins that are punched
 out in many places. It is also possessed
 of a banding that strikes a little S of W,
 which is also the predominant direction

of the quartz veins.

Hb. Br.
26980

The greenstone appears to contain fairly large, lenticles or inclusions of a white rock, whose long axes are parallel to the schistosity?

Hb. Br.
26981

In the little exposure just west of 980 the banding and schistosity of the greenstone are both curtailed, and the rock is cut by a light rock marked with parallel amphibole needles. It is schistose and resembles a gneiss.

The main point and the island lying off it and are composed of a schistose greenstone, with the aspect of a lamblende schist. It is cut by quartz veins and by red and white granitic veins and dykes. It may be that the rock is a schistose greenstone metamorphosed by the granitic. The strike in the point is nearly parallel to that of the schistosity - elsewhere, i.e. a little S.W. on the island it is N. 65° W. Dip vertical.

Hb. Sc
26982

Lamblende schist near granitic dyke.

Hb. Sc
26983

Thin greenstone phase from island.

The dykes have a tendency to run along the banding and the schistosity, although they frequently cross both.

Hb. Gm. In the next point the rock cut by
26984 granite is more like a greenstone than like a hornblende schist. The dykes are quite massive but nevertheless they follow the schistosity very closely.

In a few places small stringers of the granite are cut into like the foliation of the schist, seemingly indicating that this rock is older than the

Hb. Gm. schistosity of the greenstone
26985 In the bay near the end of the island the greenstone is free from dykes. North of this point the rock does not differ materially from 985 but it is cut by granite dykes.
Hb. Gm. 26986 Greenstone

Hb. Gm. 26987 " and granite

Hb. Gm. 26988 The island in the Channel is greenstone.

The north shore of the narrow greenstone

and granite at the west, until the large bluff is reached, near center Sec 27. This is practically all granite, though near the water edge to the west some hornblending schist occurs.

The point N.W. of Little island in N.E. 1/4 Sec. 27 is greenstone cut by granite as usual. All the shore between this point and bluff west is granite. Greenstone cut by granite.

Hb. 50
26989

This greenstone is not the hornblende schist phase in spite of the fact that it is cut so thoroughly by granite. In the shore N.E. of the island the granite cuts a greenstone which seems to be intermediate between the greenstone proper and hornblende schist.

Hb. 50
26990

On the west point, nearly opposite the island the schist in which the granite is intruding is more like hornblende schist than like greenstone. The granite cuts out veins, dykes, and lenticles.

Hb. 50
26991

H. M.

26992 Same as 26948, intruded by anastomosing granitic veins.

The little pink part of 26948 is composed of a green-schist, partly massive, partly schistose, as though a gradation exists between the phases. At the west side, near the water's edge, the rock is agglomeratic, containing fragments or boulders 2-8 in. in diameter in a schistose matrix, sometimes black, often serpentine-looking.

Pinkish

26993 From nodule, fragment or inclusion

26994 Complete nodule

This rock apparently grades into a more normal greenstone.

It is probable that rock is a flow in greenstone.

The next point consists of banded black, light and pink rocks cut by granitic and diabase dykes in the main running parallel to the banding. These dykes vary in width from a few inches to several feet. The greenstone dykes are schistose. The banding in the banded

Rock is very even, striking in the whole
a little of W. Quartz veins are abundant.
Greenstone representing the dominant
rock.

26996 Banded schist showing weathered sur-
face.

26997 Red granite? North Side Front Bay, This
rock extends in separated ledges as far
as the 2" little point East of the mouth
of Front outlet. Here it gives place
in part to a rock resembling ^a dark
greenstone saturated with granitic
material. In a few places the greenstone
is very much like a hornblende-schist
being banded. It is apparently intruded
by the intermixed rock
26998 Predominant rock.

Note. It looks as though greenstones
and slates are interbanded, perhaps
by intrusive along bedding planes,
perhaps by contemporaneous flow-
and that the series of interbanded
rock has been altered by granite?
forming Murchison Series in sense
of Birchall. The question now is as to

Whether the slates and the granite are above or below the Stump Conglomerate? If below, then there are two slate formations. If above there are two greenstone and gneiss formations. The presence of hornblende-schist near granite and its absence from these ledges in which are numerous granite veins seems to show Cretaceous action, but it throws no light on the age of the rocks.

July 20.

Paddled east to Canoe island and main shore.

The little island west of Canoe island is composed mainly of a fine grained greenstone with a slaty cleavage making it resemble a true slate. The rock is fractured in a complicated manner and is filled with stringers and apparent fragments of a white weathering cherty substance. At first sight the rock looks like a conglomerate. Believe it the greenstone.

26999

Specimen flag-variety from west end of island.

58.

Panau Island in its N.W. end is a normal green-schist, which on Bay East of the N.W. promontory is distinctly banded with a strike a little S. of W. These bands are alternately white-chert-looking layers and dark schists; the cherty-looking ones predominating at this place.

Some 700 yds. beyond the Swamp a great mass of quartz-porphyr. begins and runs lengthwise of the island. It is schistose and much decomposed at this place thus yielding poor specimens.

Q.P.
27400

is one of the freshest.

A little to the East the porphyry appears to grade into a green-schist through an intermediate rock - at least no contact between the two types was observed.

The green-schist is again on the West side of the East end of the island and the Porphyry on the South side.

W.P.

27401

Intermediate rock

27402

Green-schist only a few paces dist.

and from 27401.

Just East of the narrow isthmus, where the schists are again well banded there is an excellent outcrop of a dense gray rock that looks like felsite^d (dense porphyry), with a typical fine grained green-schist. I think the contact is eruptive with the porphyry intruding in the green-schist. Near the contact the schists are banded with narrow seams of what look like chert or felsite^d.

91

27403

Dense porphyry

27404

Schist from a few inches from the contact.

On the South side of the long eastern part of the island the green-schist and the porphyry seem to be inter-laminated with the porphyry predominating.

On the S.W. side of the island, which is porphyry and green-schist up to this point, is an exposure of black slate. Beyond this to the north are other banded rocks that are light gray and still others that are blue-black. These ap-

pear like slate, striking E-W and dipping about vertical. Through them are also large bands of white rock that are regarded as porphyry. They are white schists that are gashed and broken, but they contain no quartz phenocrysts.

- sl 27405 Slate from Waters' Edge
 sl 27406 Dense gray slate, about 20 yds from shore.
 SW 27407 Porphyry band through 27406 and 27408
 sl 27408 Slate from further inland.

Island S.E. of Canoe island is green. Thin schist on north and on south sides with porphyry in center in band running E-W.

[For map see p. 23 Book]
 [cf also descriptions of 26895-904 Book]

July 21

Paddled into Rice bay then S. along shore to Island in Mud Creek Bay.

Ran along hills north of Rice bay finding greenstone, which in the weathered surface looks like Lamprophyre schist. It is cut by great dykes and veins of gran. etc. Saw near East end of bay, saw biosparcs north, finding same rocks throughout.

pb. Am.
27409

Green schist. Predominant rock in side of road near little stream.

The little knolls at the head of Rice bay are of greenstone-schist, which in weathered surfaces are spotted with lenticular spots of chlorite that resemble fragments.

juw

27410

Fresh specimen.

juw 27411

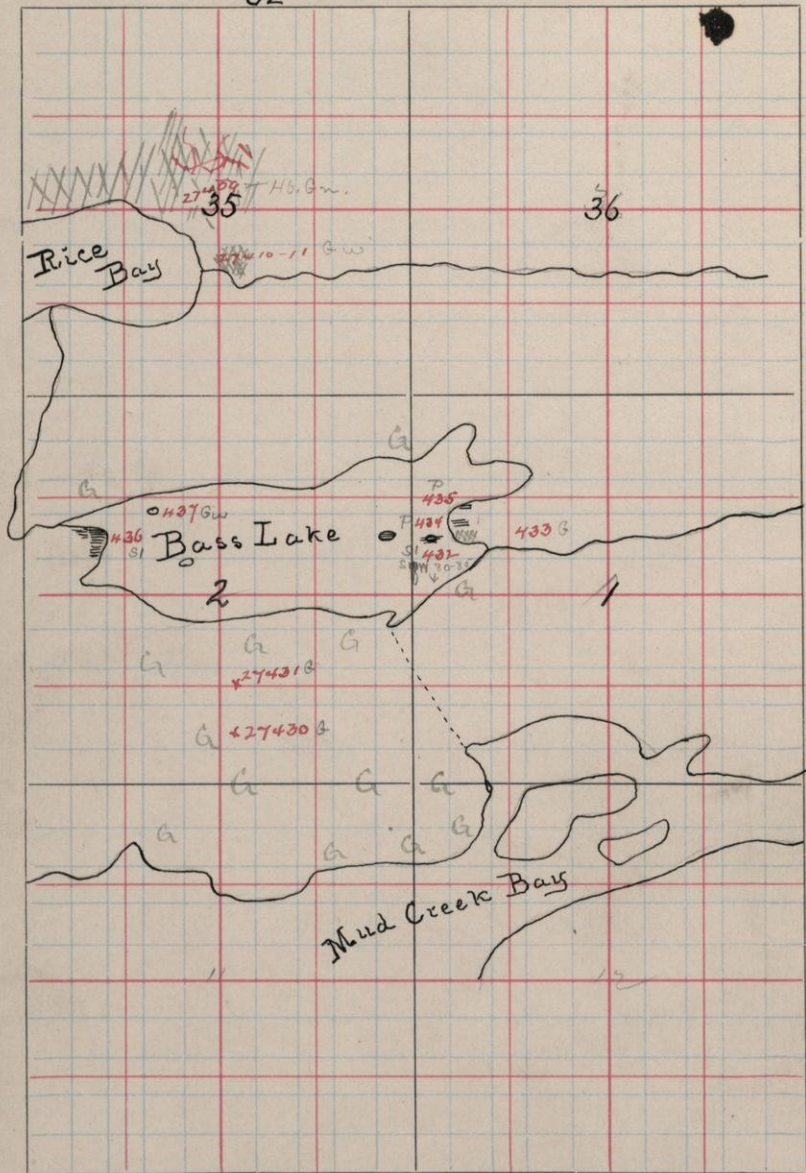
Clearage thamb. showing apparent fragments in weathered surface.

The rock at the mouth of Rice bay outlet, south side is slate?, striking about E-W.

S.

T. $\frac{63}{62}$

R. 15



The rock in the lower bay around the
end of the Main land in D.E. 1/4 Sec
H. T. 62 R. 15. (p. 30 Book) is a

g.A.

27412

g. 27286 with

greenstone full of little eyes of quartz.
It is probably an altered quartz-diorite
or porphyry. It is unsorted, schistose
and contains the gashes so common
in other green schists?

J

27413

Black Jasper

H.S.

27414

Green schist border of Jasper

M. 27415

Porphyry to north.

[See page 34]

July 22

Examined carefully the shore of Lake
from Mud Creek bay South to Ann-
strong bay.

The little point at which Dr Clements
stopped a few days ago in his inves-
tigation of this shore is a diorite whose
feldspathic and quartzose components
are red. This rock lines the coast for
a short distance and is then replaced
by a slate in which the diorite is unques-
tionably intrusive. The contact of the
intrusive and the slate is not parallel
to the bedding of the latter. The strike
of bedding is from N to 80° N of W and its
dip S. at 80° - 85° .

July 22 (2)
27th 1896

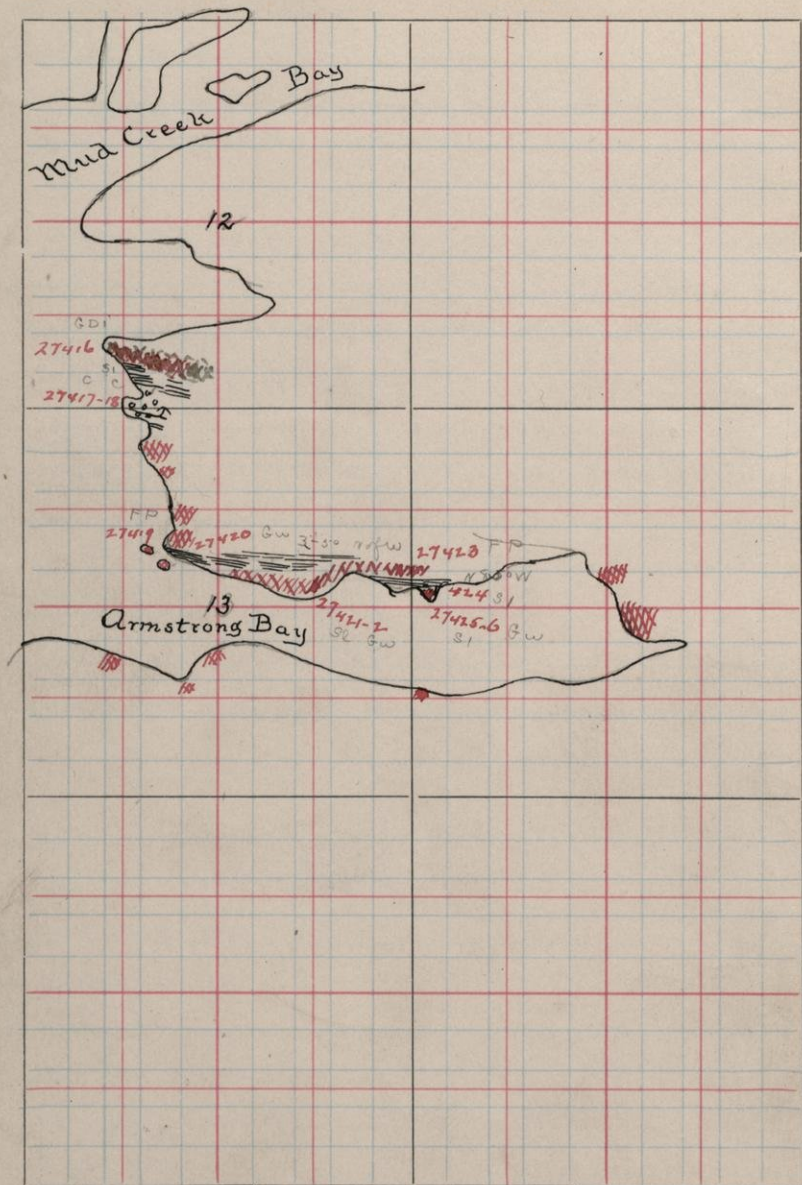
Diorite from end of point.

The next point is a very dense conglomerate that seems almost like a fine
grained gneiss. The rock is so massive
that strikes and dips are not obtain-
able. The fragments included in it ap-
pear to be of the same substance as the
matrix. A few black ones may be jasper.
A few bands that may be bedding bands
strike S.E. and dip high to the north

S.

T. 62

R. 15



- C 27417 Specimen of the Conglomerate
 C 27418 Fragment of Conglomerate showing in-
 cluded fragments?

W. The next point consists of much broken
 porphyry schist of the usual character.
 In one place it contains a large len-
 ticular mass of graywacke, which
 leads to the supposition that it may
 be an inclusion in intruding porphyry.
 This porphyry is less schistose in the
 point further south, and here it
 has much of the character of the per-
 porphyry containing quartz phenocrysts.

F.P. 27419 At the point on North side of Armstrong
 bay at the mouth is like a fine grain-
 ed granite?

Around the point the porphyry is in
 contact with a slate banded with fine
 grained, dense, gray rock that has
 been considered as graywack, but
 which I take to be a felsitic porphyry.
 The band follows the strike of the schist,
 which is 30° - 50° N. and dips vertically.

W. 27420 Specimen from band.

The west points to the East are coarse or medium grained porphyries and a dense schistose rock that may be a graywacke or a fine grained porphyry.

sl

27421

Fine grained, or dense rock

fw

27422

Schistose porphyry

Just west of where the range line crosses the coast are slates and graywackes dipping vertically and striking about N. 55° W. Back from shore is a porphyry like 27422 but more schistose.

F.P.

27423

It differs from the normal porphyry in containing no quartz-phenocrysts, but in their place possessing large feldspars.

sl

27424

at the south edge of this mass the rock is dense, where it is in contact with the slates.

The slates themselves are also dense with an incipient cleavage and a well defined banding striking N. 55° W. and dipping nearly vertically.

sl

27425

Normal variety of slate.

SW

27426

Near the water's edge a large band of dense rock was observed. This is cut by quartz veins in profusion. The rock may be like 27425, but are more inclined to think it is a quartzite?

July 23 and 24

Sunday rested. Other day went to Tupper to get a new compassman.

27427

[27427-29 p. 35]

July 25

In afternoon wandered about hills between Barr Lake and Wind Creek bay and examined shores of Barr Lake. Between Barr & Vermilion Lakes found my greenstone in large hills bare and knoll-like. These rocks are mainly greenstone schists cut by ^{mostly} massive greenstone dykes and rarely by porphyry dykes. Both the schists and the dykes are more or less schistose with foliation striking a true E. of W. and in addition the schists are frequently fissile.

27430

Greenstone from hill about midway between dykes.

H.

27431 Highly schistose phase from a lens-like mass between fissile schists?

Barry.

sl

27432

The little island off point at Eastern end of the lake is a graywacke and slate striking a little S of W and dipping 50° - 55° S. It is cut by joint planes so that it breaks into polygonal blocks, but it is not schistose.

H.

27433

The main portion of the point opposite the island is greenstone like 27433 cut by decomposed porphyry dykes 5-15 ft. wide running with the schistosity.

P

27434

Several of the little hillocks here seem blue composed of graywacke, and an occurrence of the same rock appears at the water's edge.

P

27435

The rock at the west end of the lake looks remarkably like a graywacke. At the water's edge the ledges could be studied at a few places only.

sl

27436

Sphinite

From point at west end of lake. Prob. graywacke, though it weathers like a greenstone.

hw

27437

From little island New portion of lake.
Looks more like greenstone than
like graywacke.

July 26

Went up Mud Creek to Mud Lake, exam-
ined shores of lake and made a trip
into country north.

QP

27438

Big
P.P. 2-99.

The first little point on South side of
Mud Lake is a very schistose porphyry
with large phenocrysts of quartz. It does
not resemble very closely the porphyry
to the west as it is very much decom-
posed. In several places it has been
mined, presumably for gold.

SL

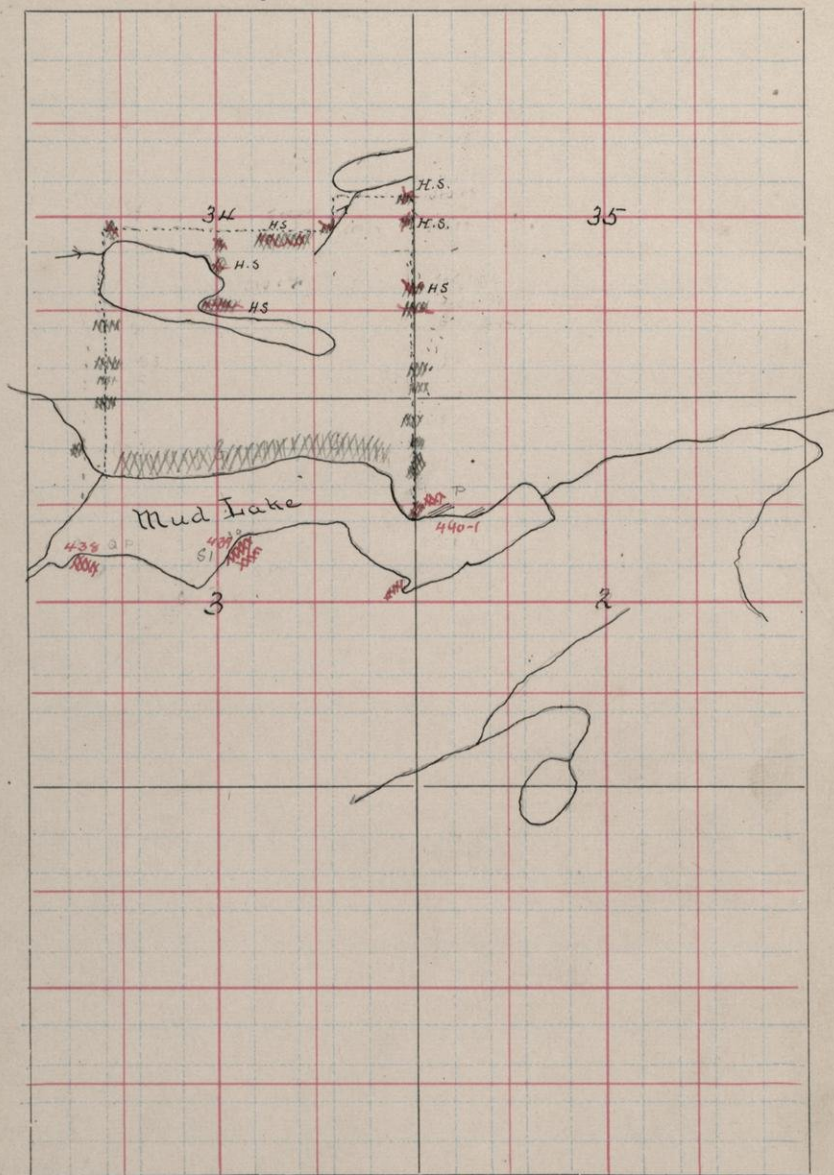
27439

The next point at the water's edge con-
sists of a fine grained gray rock that
may be porphyry or felsite. On the top
of the hill is the usual coarse porphyry
with phenocrysts of quartz. This occasion-
ally contains as inclusions large frag-
ments of a banded rock looking like
graywacke. The fine grained rock
weathers into sharp edged projections

S.

T. $\frac{63}{62}$

R. 14



It is filled with joint planes so that polygonal blocks are easily detached from the ledge. It is impossible, on the other hand, to obtain good specimens.

The little point on north side of the lake near the East end is a well bed-

58.
27440 bed slate and a fine grained rock sup-
posed blue graywacke. It strikes SW and
dips nearly vertical. Back of the slate on
the hill is porphyry.

59.
27441 Graywacke.

Schistosity strikes and dips with bed-
ding.

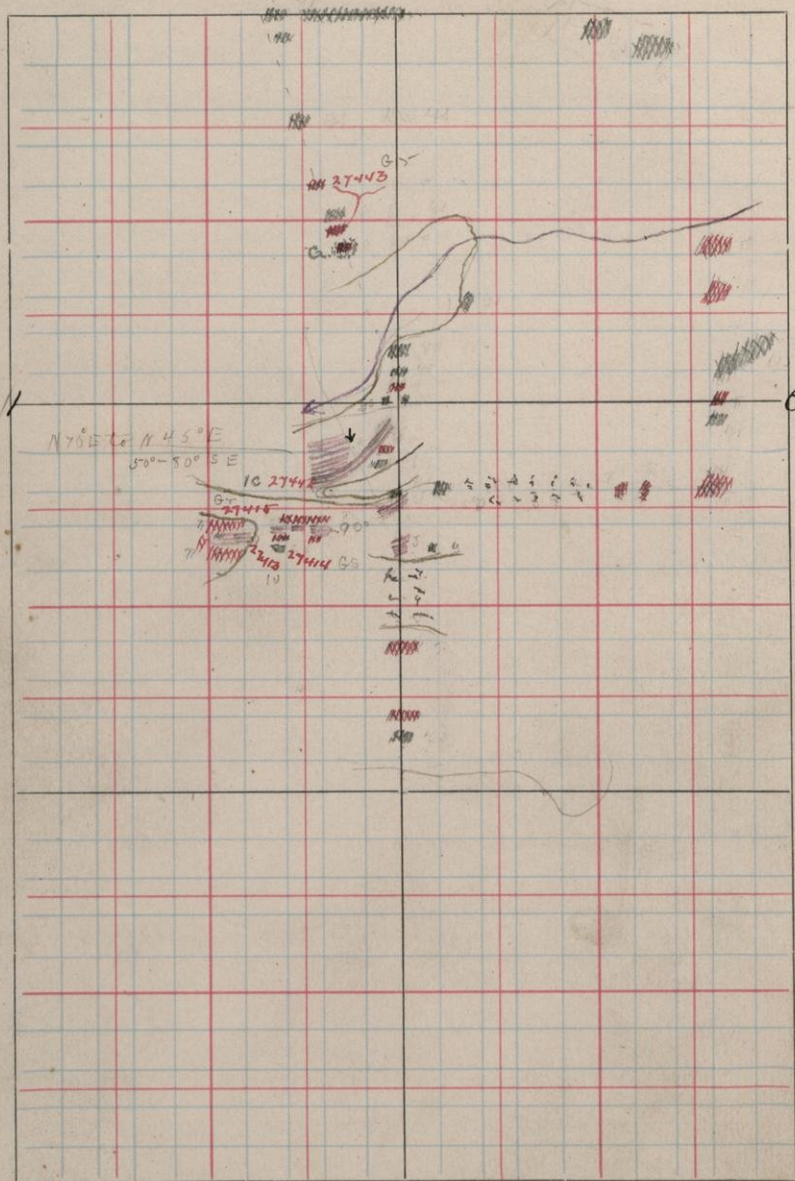
The rest of the north shore is green-
stone.

Ran north from the lake along sec-
tion line between Secs 2 and 3 cross-
ing greenstone and greenstone. Schist
to 500 paces N of town line, when struck
greenstone schists cut by granite dikes
and veins. At 800 N. Town line the
schists occur with same relations to
ward granite?

S.

T. 62

R. 15-14



July 27

Study Sec 6. in T. 62 R. 14 and Sec. 1 in
T. 62 R. 15.

The result of the work is represented on
the map opposite.

A small strip of ^{black & white chert, no red!} jasper that varies in
width between 10 and 25 paces strikes ap-
proximately E and W and dip nearly vertical
runs from a point at nr 300 S. and 200 W.
of E. to pass Sec. 1 to a point 250 paces
west. At its western end it is marked by
several folds that dip to the E.

This belt is bordered to the north and the
south by schistose porphyry, contain-
ing in places fragments of the jasper.
In one or two places the green schist of
the district underlies the jasper especially
to the south - and this likewise contains
jasper fragments. There is no doubt but
that the green schists are younger than
the jasper.

While the major dip of the larger folds
at the west end of the exposure seems to
be eastward, the minor folds dip in
all directions, predominantly south.

To the north of this, across a little gully is another ledge of jasper 150 paces wide. The strike varies from 20° S of W to SW and dip from 50° to 80° SE. The jasper here looks as though it were fragmental, and it is interbanded with a fragmental rock. In other places the jasper is cherty and in many places it looks very much like slates.

1. e

27442

Fragmental rock interbedded with jasper.

1.5

27413

Black jasper

1.5 27414

Green schist south

1.5 27415

Porphyry to north

Porphyry dykes appear in some places where intruding in both the jasper and the green-schists?

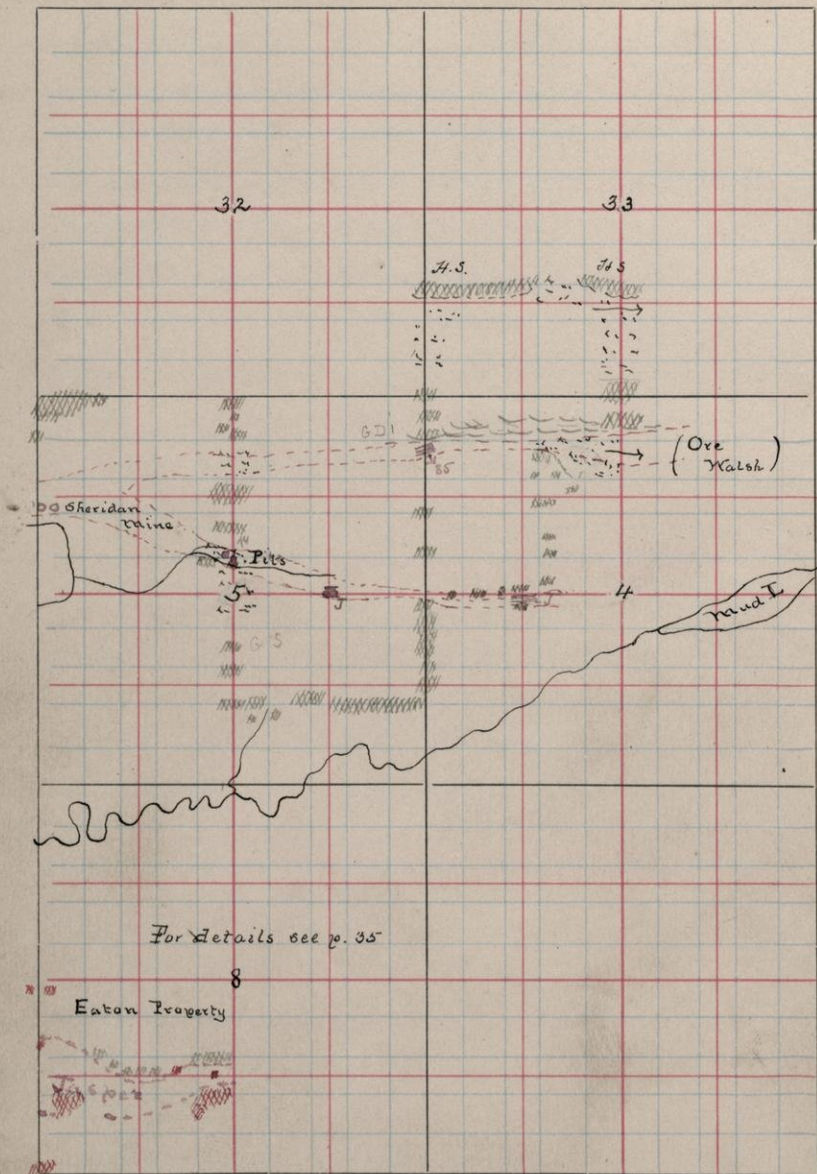
From SW $\frac{1}{8}$ post Sec 6 to NW cor of Sec are frequent ledges of schistose porphyry, cutting greenstones. At 200-400 ft of $\frac{1}{4}$ post is some jasper striking about SW (no sure).

The porphyry is free of inclusions of green schist, so free in places that

S.

T. $\frac{63}{62}$

R. 14



The solution of the fragments has affected the composition of the intruding rock until it is now gray instead of the usual white color. Moreover it contains less quartz.

271

27443

Porphyry intruding greenstone. 500
S of NW cor Sec 6, on side of hill.

July 28

From NW cor Sec 5. T. 62 R. 14 ran East 1000, S. 1600, E 1000, N. 1600 to N.E. corner of same section crossing many greenstone schist ledges. Most of these schists are highly foliated rocks, others are fairly massive, but are jointed to a remarkable extent and others are filled with gaping gashes.

At 200-250 S of N.E. cor of the section is a small hill of Jasper. The hill is covered with boulders and fragments, but at several places got strike of ledges as N.W. N.W. and points between these. The sun was shining so strikes estimated. The dips were high to South (53° - 55°) on the north of the Jasper hill is a massive greenstone of the usual type. It forms

N.S.

27000

a great E-W hill like a dyke.

N.S.

27000

Usual greenstone-schist of region
700 N. 1000 W of Sec 5. Sec 5. T62-14.Greenstone, with massive type from
dyke-like hill. From point immediately
in strike of Jasper.

N. 600,

From NE cor Sec 5, went E. 1000, S. 800,
W. 300, S. 800, W. 1700, N. 800, crossing
my greenstone-schist. Except near center
of Sec. 5, where found a few ledges of jas-
per, the Eastward Extension of the Sheri-
dan property, and a single ledge near
center Sec. 4.

July 29.

Made a rapid survey of the Eaton property in O.E. 1/4 Sec 7 and S.W. 1/4 Sec 8, T. 62 R. 14. Dr Clements examined surrounding country.

The Jasper forms high bare bluffs showing folds in profusion. From the tops of these the shafts at Soudan can be seen. They are in the Fredrickmant strike of the now bearing beds. One or two holes have been opened in the hills and from these one has been taken.

The strike of the Jasper, including both black and red varieties, is about S.W. and the dip from 35° - 55° S.E. The con-
 tortions are so numerous that no general rule of structure could be made out. There seems to be pitching high to the East, as a rule.

I.O.

27427

One

In places the Jasper is cut by quartz-porphry containing quartz phenocrysts. On the north of the Jasper the rocks where exposed are green schists, represented by 27428 from 500 N. 100 W of S.W. Sec 8. The large pit at 500 N. 100 W of the

H.S.

27428

S.

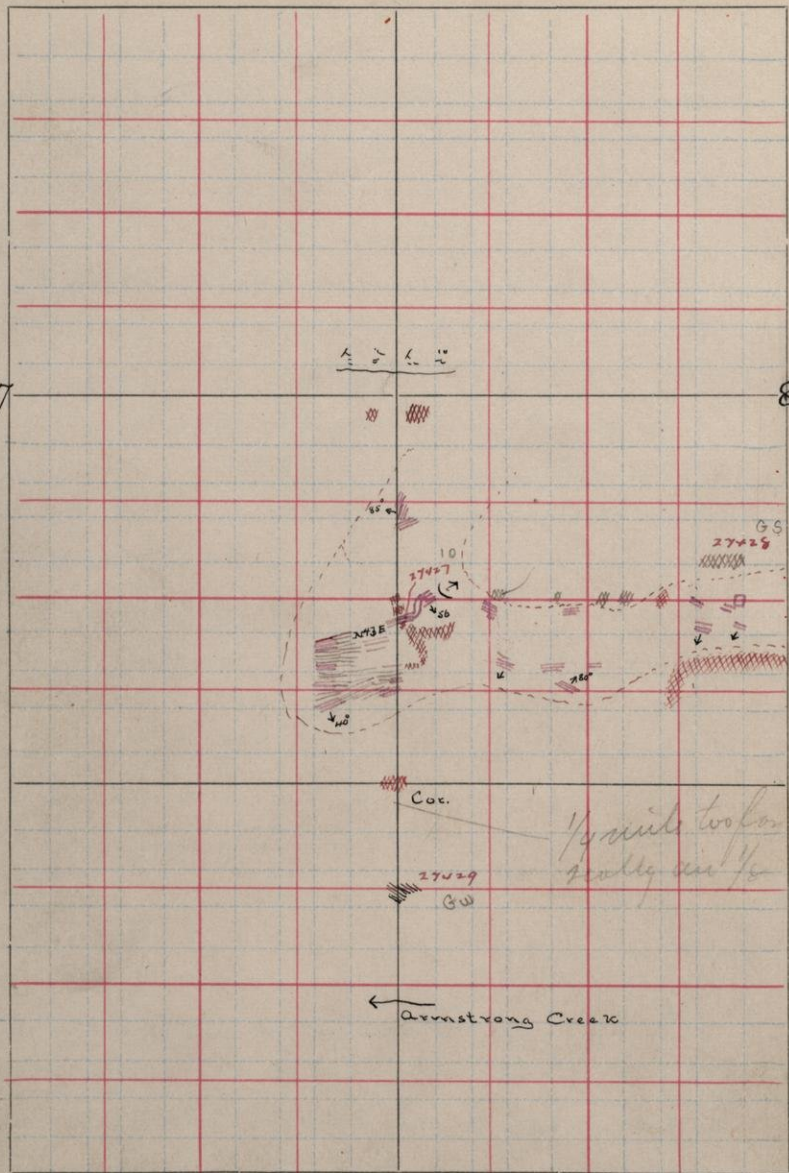
T. 62

R. 14

do

7

8



Same 1/2 path is between this and a
great hill of porphyry to the south.

Sw.
27429

At 225-300 S of W E cor Sec 18 is
a south facing cliff of a bedded rock
striking Nw and dipping vertically. It
presents the appearance of a quartzite
though it may be a porphyry.

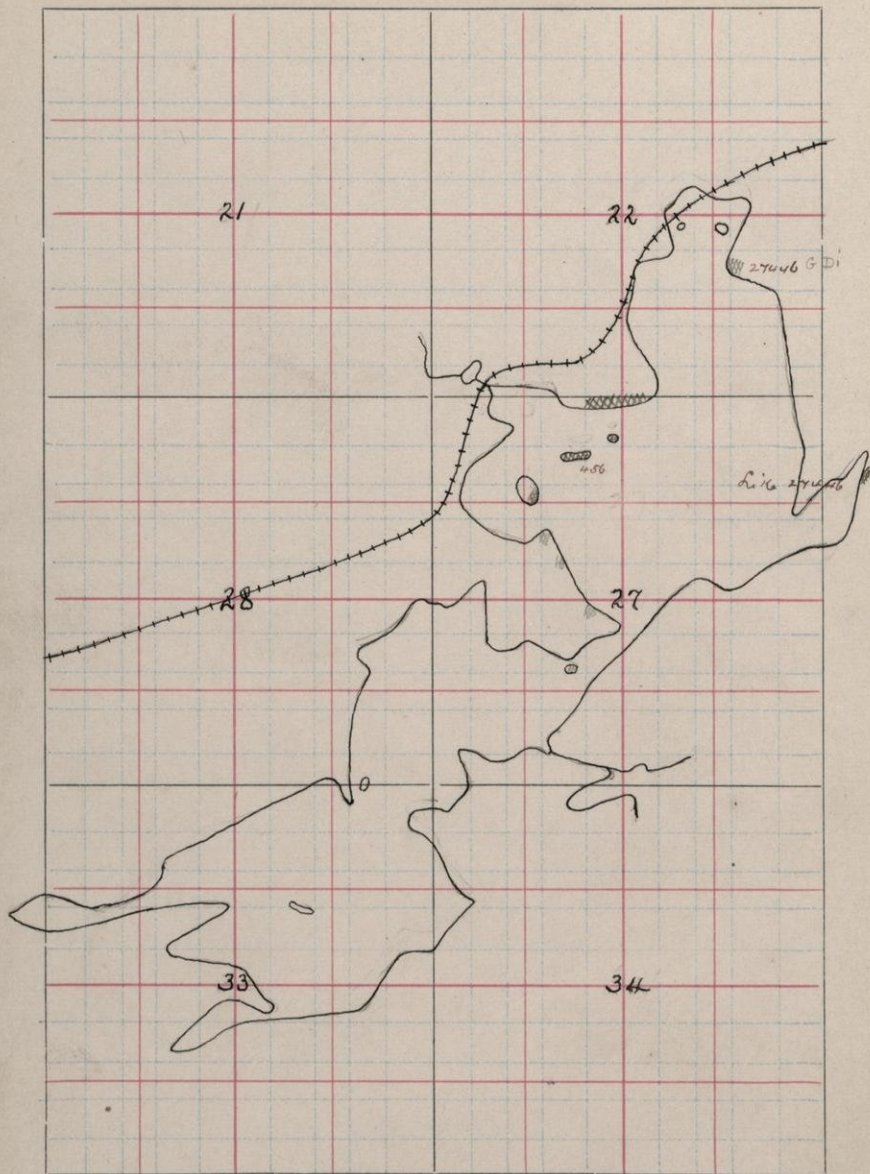
July 30 1881

Went to Eagle's Nest after a day spent
in Town fixing up accounts.

S.

T. 62

R. 14



Aug 1-2.

Made a preliminary trip around the more northerly of the Eagle's Nest Lakes. Then cruised perhaps into next lake S.E.

On North Eagle's Nest all the rocks are massive greenstone except at one place. These greenstone differ from the greenstone schists of Vermilion in the fact that they are for the most part completely massive and are so marked as to indicate that they are surface flows. The presence of a greenstone conglomerate among them lends further credence to this supposition.

H. 27446

On N.E. Coast Eagle's Nest

H. 27447

Shore, near center Dec 26. 62-14

H. 27448

Shore, near S.W. cor Dec 25 ..

H. 27449

Island, " " " " "

The greenstone conglomerate beds referred to above is on the shore near line between Dec 25 and 26. The schistosity strikes about E-W and dips high to the north. The rock, though it may be a

conglomerate, may nevertheless be a pressure breccia in which fragments are broken bands of fine grained greenstone. In other words it is possible that the conglomerate may be a pressure fractured type or flow.

27450 Showing conglomeratic surface

27451 } Pebbles or pseudo pebbles.

27452 }

H. 27453 Line between 35 and 36.

27454 From island in U.E. Sec. 35

27455 Point in U.E. Sec. 36

27456 From island in Eagle's Nest Lake.

Other ledges are indicated on map opposite?

Aug 3-4

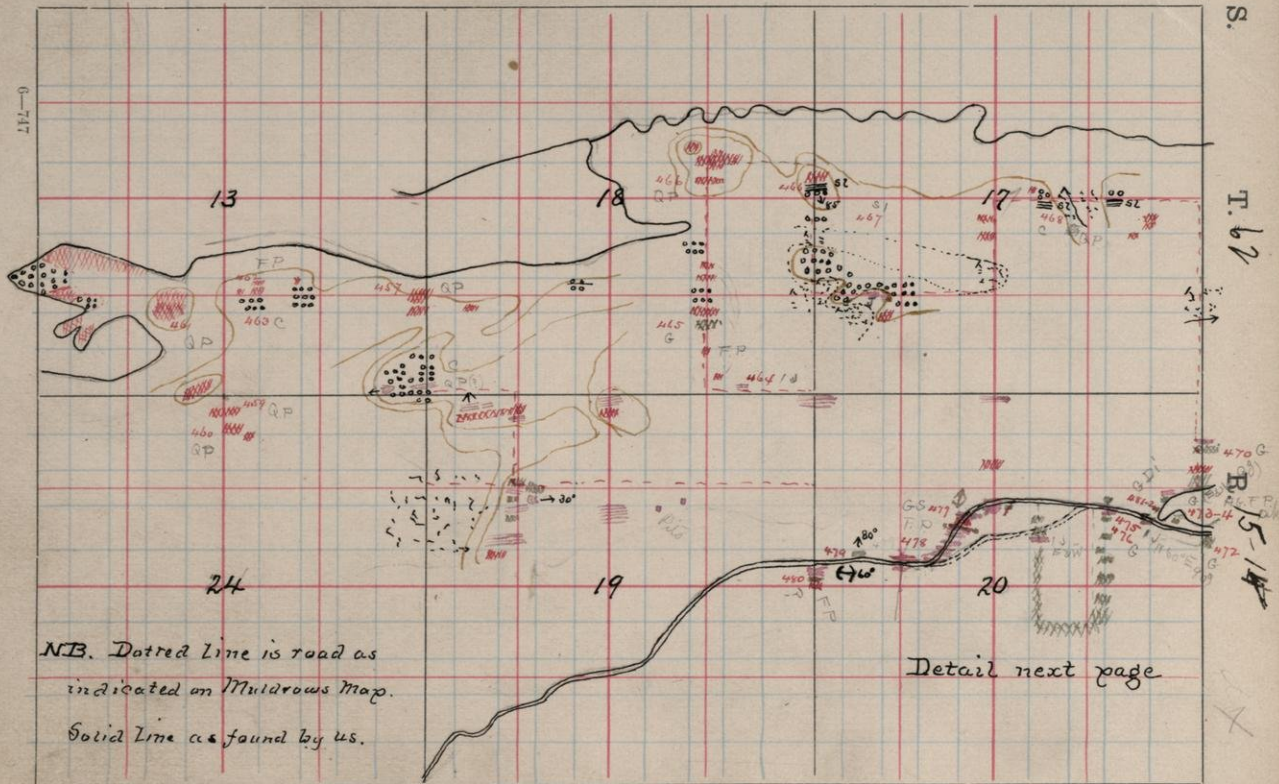
Examined country in Decs 18, 17, 19 & 20
T. 62 R. 15. Cloudy Day. Got lost but
located few exposures. On following
Day reviewed work and located ac-
curately.

From 500 S of N.E. Cor Dec 19 ran west
one mile. The first half mile of this run
was supposed to be over jasper though
the rock was covered with drift. At 400
W. is either a ledge of jasper or a boulder
of this rock. Could not determine which.
At 475-500 W. on side of swamp, are sev-
eral pits from which large quantities
of red jasper have been taken out. This
was evidently in place beneath the sur-
face though could not see it.

At this point got lost, finding ourselves
in Armstrong Bay before we thought our-
selves in the neighborhood. Got our loca-
tion fixed, ran south to corner between
Decs. 13, 18, 19 & 20, then west to S. 1/2
Dec 13, went 500 and East 1000 to 475
1/2 line Dec 18, where stopped work.

At 400 N of S.E. Cor Dec 13 found ledges
of what is supposed to be Christine porphyry

Q.P. Aug 1904
27457



on slope hill overlooking Armstrong Bay.

From this point to the corner crossed over Conglomerate. The conglomerate is very coarse. It resembles the same conglomerate found elsewhere and is filled with pebbles of gabbro. Interbedded with this, just north of the corner is a bed of a white rock looking very much like porphyry, but which, no doubt, is a fine grit or conglomerate.

Q.P. (byged)
27458

Just south of the S. $\frac{1}{4}$ post Sec 13 are two ledges of rock supposed to be porphyry. They are in the trend of the porphyry and green-schist found by Leitch.

Q.P. (byged)
27459

50 paces S. of N. $\frac{1}{4}$ post Sec 24. T 62 R. 15

Q.P. (byged)
27460

173 " " " " " "

Q.P. (byged)
27461

At 500 ft. 50-200 W of S. $\frac{1}{4}$ Sec 13 is a knot of porphyry of the usual character. It contains phenocrysts of quartz in abundance.

Q.P. (byged)
27462

East of this at 500 ft. 900 W of Sec 13 is another ledge of porphyry and just

Q.P. (byged)
27463

south of this are of conglomerate.

Both of these rocks extend east about 400 paces.

S.

T.

R.

Клетка № 44,

From DEC in Dec 18 ran 500 W. then
 1700 N, 500 E, 700 S, 1000 E, 500 N, 1500

1.5

27465

O. to N. side of lake in Dec 20-21. J. 62 R. 14.

The Jasper north of the South line of Dec 18 is very cherty and in some places is sandy, thus differing from the greater portion of the old Jasper.

Specimen from 400 W. 50 N of DEC in Dec. 18.

On our north crossed successively F.P. porphyry and greenstone ridges. The porphyry is the quartzless variety with a greenish matrix.

27465 Greenstone from 345 N. 500 W of DEC in Dec 18.

At 500 N. and again at 750 N are conglomerate ledges. These contain much Jasper in fragments on their southern sides and are finer grained on northern sides. They are separated by ledges of porphyry.

Q.P. (Hydro)

27466

At 1100 N is the South side of large hill of a rock that looks like porphyry. It however, contains so many and such large quartz grains that are suspicious that it is a fragmental rock.

Indeed it is possible that all of the porphy with quartz phenocrysts is sedimentary. At any rate they should be examined in thin section.

At the hill just north of E. 1/4 Sec 18 are again found porphyry and conglomerate. The porphyry is on the north side of the hill. It is separated from the conglomerate to the south by a bed of fine grained slate dipping 85° N. It is evenly banded, strikes about E-W and is of the usual character of the rock.

27468 At 400 E of Center Sec. 17 are mass covered ledges of conglomerate on the side of a hill.

Q.P. (figured)

27469

From ledge about 150 S.E. of 468. [Holes faulted here. Don't know what rock is.]

From the N.E. cor Sec 20 south blake is covered with sand dunes and drift, so could not make a thorough study. Know however, that a Jasper ledge forms south side of top of hill overlooking lake, and that gray porphyry is to the south.

27470

At foot of N.E. cor Sec 20. Yreus stone

27471

Yreus stone found at end of lake.

Aug 5.

Went along County road bliz between
Secs 19 & 20 T. 62 R. 14 Then ran south
from road 700 paces at west end of
lake, west 300 and north to road. Then
went around north side of lake in
Sec 21.

g. 27472 The large hill near the W 1/4 post Sec 21
is a massive fine grained greenstone
where it crosses road

The same rock constitutes the little
hill on the north side of the road and
east side of lake's outlet. On its north

g. 27473 side the rock appears bedded with a
nearly E-W strike and a vertical dip

H. F. P.
27474 The rock is cut by a 3 ft. wide dyke of
porphyry which is much like a fine
grained granite.

About 200 paces west of the west end
of the lake, immediately south of the
road are narrow bands of black and
red jasper striking N. 60° E and dipping
vertically. This is interlaminated with
bands of greenstone. Cannot tell from the
logs whether the jasper is interbedded
or included in the greenstone.

5
27475

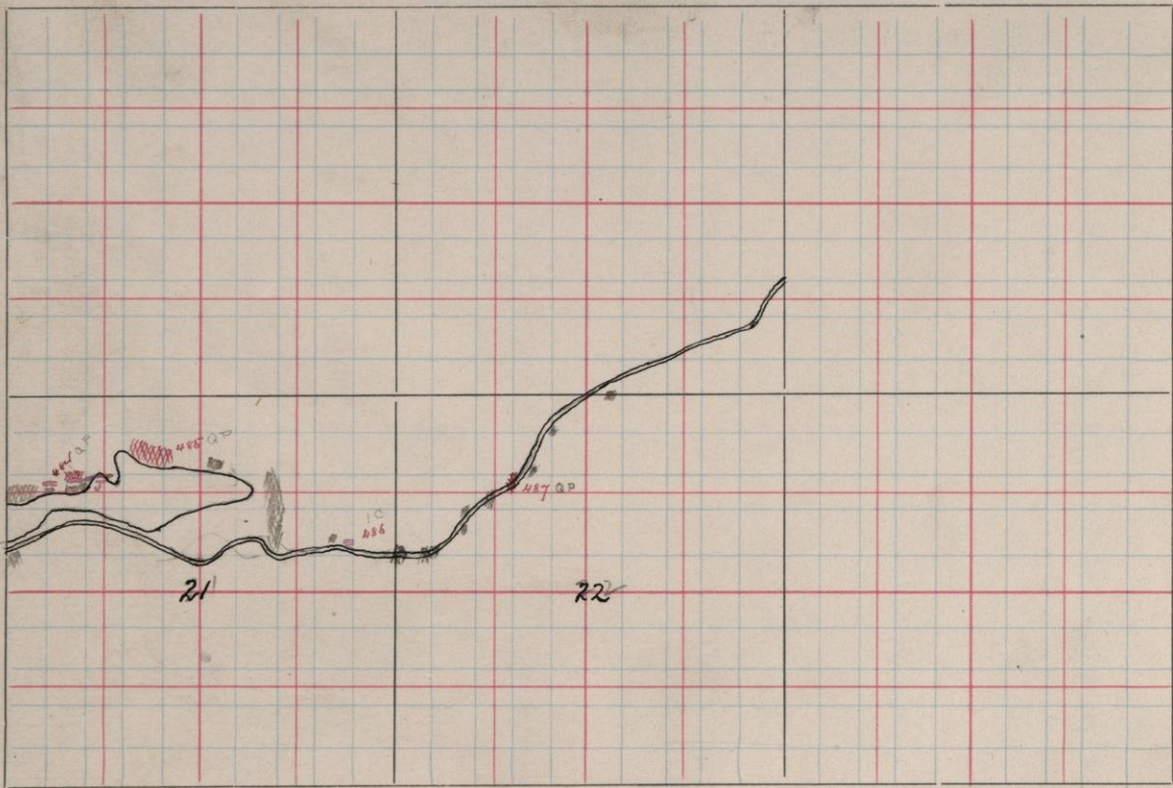
H.
27476

S.

T. 62

R. 14

110



A few paces further South the rocks dip high to the South. At about 45 paces South of road the banded greenstone or graywacke like 27473 again appears in narrow bands, and extends toward at 175 paces S. It is cut by rock like 27474.

At 750 S about 450 W of U.E. cor Sec 20 is another strip of Jasper on the South side of a greenstone bluff. A little bit of one occurs in the trough of a little fold west to the greenstone. The Jasper strikes about E-W and the greenstone appears to cut it.

On the road greenstone ledges occur as indicated. At 168 SW of $\frac{1}{4}$ line Sec 20. is a small ledge of schistose rock that 27477 seems very much like shale, but which in all probability is a greenstone schist near the center of Sec 20 the Jasper again appears. It strikes nearly E-W, with several gentle anticlines that pitch steep to the North.

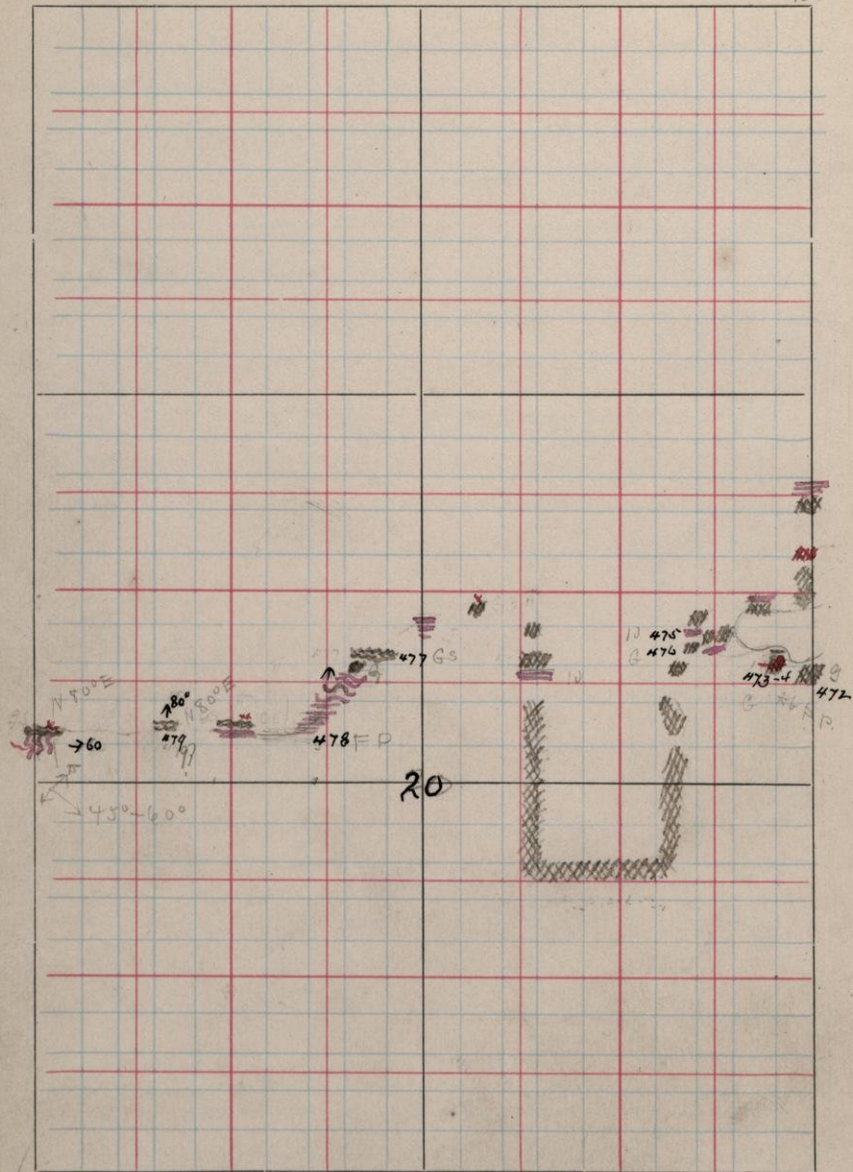
F.P. with 1/2 mile from road
At 440 further in Jasper and green schist are cut by a white, very decomposed specimen of which could be obtained. This I believe to be the granular form of the

S. 20

T. 62

R. 14

10



porphyry. It includes large fragments of jasper and small ones of green-schist. In places the fragments are so numerous that the rock resembles a conglomerate. At 187 further along is a ledge of banded rock that is either an altered greenstone or a graywacke. Bands strike 10° Sgw. and dip 80° N. The schistosity crosses the bedding, striking about 30° - 35° Sgw. The banding of this rock seems to be due to an alternation of softer and harder bands. Several little chess and wine bottle bands run through the rock parallel to the bedding, but think these are infiltration bands.

about 200 further west the various rocks are confusedly intermingled. A banded rock like 179 is in contact with a jasper, both being cut folded, with fold pitching 45° - 60° S.E. The strike in general is 10° Sgw and dip almost vertical, inclined slightly to the north. The actual contact between the two rocks could not be seen, though they approach within a few inches of one another. The slate rock is certainly folded with the jasper but whether the

? 27479

1,50?

two rocks are conglomerate or not could not be determined.

FP South of this point white^d porphyry again intrudes the jasper.

The banded rock runs about 75 paces west, at its^d west end the contact

which is covered to the east, is clearly exposed. Here fragments of the jasper are enclosed in the green rock, and these are always surrounded by an ore mantle.

? 27480 Specimen of the banded rock, which I believe is igneous, either a lava or a tuff.

on the north side of the lake greenstone is abundant and porphyry is occasionally met with.

9. or

27481

Greenstone from west end of lake

27482

" " " " " "

27483

one little ledge in the midst of the greenstone consists of a white^d rock that looks like chert. May be a dense porphyry. It is to be remembered that jasper is present in this first north flake.

Q.P. (figured)

27481

Porphyry from Dyke in Jasper.
Jasper runs East for some distance
fringed by greenstone, some of which
is banded as to the west. On the contact
of the greenstone and the Jasper is
given a band of white cherty looking
rock like 27483.

Q.P. (figured)

27485

Porphyry associated with Jasper.

Followed road East to Armstrong Lake.
Greenstone occurs at intervals all
the way

i.e. (Rocky)

27486

At 300, W of E Sec line Sec 21 is a
chert bed in greenstone.

Q.P.

27487

Porphyry in greenstone on road in
Sec 22. 1 ft of S. + 1 ft of Q.P. fresh + country like

27474

Aug. 6.

Examined S.W. bay of lake in Sec 34 then ran S. on line Sec 34 and back on line 1/2 mile East, following course indicated.

The point on west side of mouth of the bay is a fine grained greenstone, exhibiting beautifully the spheroidal parting in smooth glaciated surface. The spheroids are separated from each other by thin seams and veins of chlorite greenstone.

27488 } Specimens from this greenstone
Q27489 } ledge. Locations indicated on map.

The first half mile ^{and hills} running south is over sand plain. Beyond this are numerous small ledges of greenstone, the first one occurring on the north face of a drift hill.

27490 } Greenstone bed of 1/4 post Sec 3. T61-14.

27491 } The rock at 550 ... is coarse grained, as are also the hills on the East side of the little swamp near center of section. Some of the latter, however, are marked

by small spheroidal partings. This rock is cut by dykes of the coarse greenstone like 27491.

H.S. G.

27492

Thin ledge of spheroidal greenstone at 1550 S. 100 E of N 1/4 sec 3.

H.S.

27493

Coarse greenstone, one of many knobs overlooking Swamp. This Swamp extends to the lake in Sec. 11. Overlooking it is an escarpment composed partly of Hornblende schist and partly of granite. The granite is intruding in the schist, and these so far as can be traced grade into the greenstone. Search was made for indications of difference in age between the greenstone and the Hornblende schist; but in vain. It looks as though hornblende schists are greenstones metamorphosed by the granite which must be younger than both.

H.M.S.

27494

Hornblende mica schist striking N.W. 400 S. 300 E of N 1/4 Sec 10.

This rock appears much more crumpled than the greenstone. It contains strings of green Epidiote rock, dykes of green.

Hb. Gm.

stone and veins and dykes of granite.
It is not much different from 26940.

27495

At 350 S. 400 E of same 1st pit got
fresher specimen from rock from
another bluff.

This schist extends NE to the Sec line
at the 1/8 post, Coarse greenstone being
north of it.

Hb. Gm.

27496

At 200 N of the O.E. Cir Sec 3. is a
large ledge of coarse greenstone dotted
with speckles of chlorite so that the
weathered surface looks like a squer-
ed amygdaloid. The ridge extends west
some distance.

Near the East 1/8 post. Sec. 34. a few
ledges peep up from the drift. In the
main the rock is a fine grained, dense,
light green rock, with beautiful spher-
oidal pitting. The spheroidal appears
like amygdaloides especially on the
weathered surface.

Hb. Gm.

27497

weathered surface

27498

fresh specimen from 900 N of Sec
Sec 34.

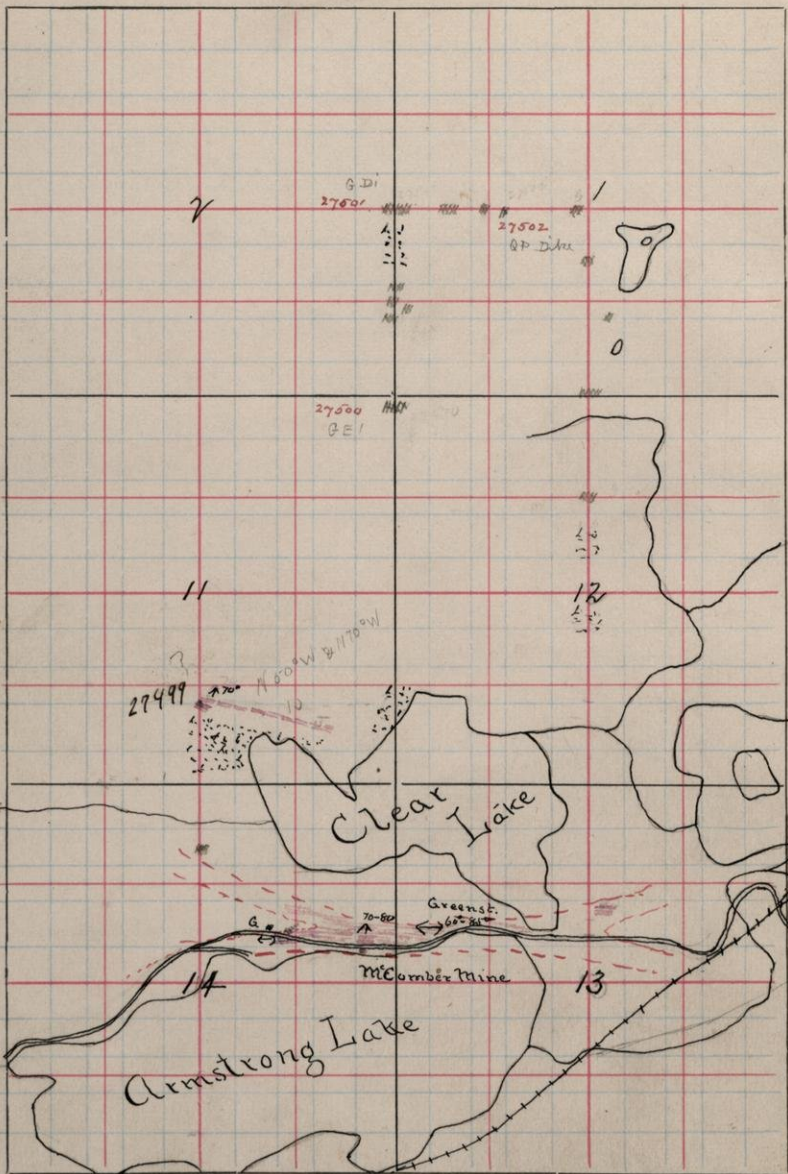
The rock is cut by dykes and veins of
white or pink weathering, fine grain.

S. 7

T. 62

R. 14

do



ed rock looking like fine grained green
slate on fresh surface.

On little island in lake, west of
this E $\frac{1}{4}$ post Sec 34 is a greenstone
conglomerate like 27450-1-2.

[See Book. p. 37]

Aug 7.

Ran north from center of Sec. 4 to 400 N
of Sec. line, then East 1000 paces, north
on Sec line to $\frac{1}{4}$ post between Sec 102
East 1000 paces and South to R.R.

Very few rocks were seen in Southern
portion of run. A small ledge of greenstone
was found in the midst of windfalls
about 300 S of N $\frac{1}{4}$ Sec. 4. and a ledge
of Jasper was traversed at 400 N of
this $\frac{1}{4}$.

This Jasper is well exposed for 600 paces
East. It dips generally about 70° N and
strikes N. to W. and N. to W. as indicated
on map. The rock is the black and red
variety - It is intricately stratified with a frag-
mental rock represented by 27499

9.
27499

9.1
27500

Near N.E. Cor Sec 18 found ledges of
Spheroidal, fine grained greenstone,

- 7.01 and further north, near 1/4 post between
 27501 Secs 1 and 2 a little coarser variety
 00. At 600 E of this 1/4 post a porphyry
 27502 dyke cuts the greenstone.

Aug 8

Ran north and west from R. R. until
 reached

- At is a large ridge of spheroidal
 green schist cut by white^d porphyry dykes
 on South side of Knoll, and in other places
 by a red rock supposed blue granite^d
 7.01
 27503

Further west, at west end of Knoll over-
 looking Swamp the porphyry becomes
 granitic or the granite^d bleaches white^d
 (cannot decide which is the case)

- 7.01
 27504 Specimen of the white rock.

Having by this time wandered from
 our course in account of lack of fuel
 went west along ridge on north side of
 Armstrong Lake & study the jasper in
 the Mcomber property.

At the East End the Jasper is bounded to the north by a dense greenstone, and is cut by small intrusives parallel to the bedding. This intruding rock is brown and rusty looking, and in other respects is like 27479-480.

The jasper has a uniform strike along the trend of the ledges, but is sharply creminated by closely appressed folds that pitch more or less steeply to the E or NE. The pitch is frequently at a high angle, but is sometimes as low as 60° . It is probable that the uniformity in strike and the uniform character of the series is due to close folding. The 100 ft. or more of thickness of the jasper as exposed is certainly much greater than the true thickness of the beds.

At the NE Corner Line, about 100 W. of E line Sec 14 the jasper begins to bound the Southern edge keeping within 100 paces of the lake shore and the northern edge continuing westward. At about 750-700 W. of the E line Sec 14 the rock is continued into large

Faldo pitching mesquite

It is numerous thin bedded with
a fragmental looking rock that weath-
ers white.

st? 27505 This white weathering rock

1.0 27506 are from mining.

1256-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

1000-6 3.3/4

