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Crystal Falls region, Michigan: neighborhood of the Michigamme River: [specimens] 32932-33000, 33208-33313. No. 295 1892

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1892

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

295

Crystal Falls Region
Michigan
H. A. Bayley

132936 33000; 33208-33313

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

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

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

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

295

1

Neighborhood of
the
Michigamme
River

1892

W. S. Bailey

NW 1/4

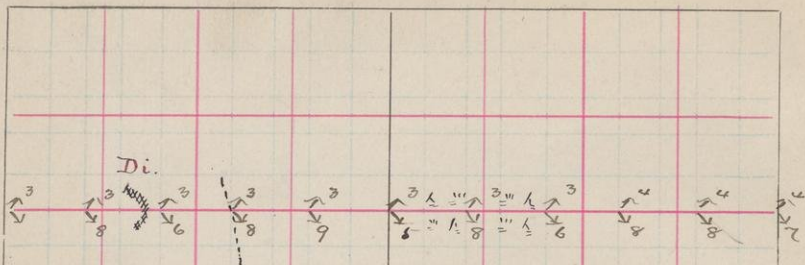
S.

8

T.

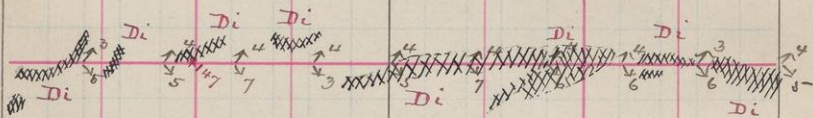
43

R. 31



NW 1/4 P

8



S.W 1/4 Sec 8

Two runs were made across Sec. 8-43-31. one at 750 N and the other at 1250 N of the S. line of the section.

The rocks found are principally medium to coarse grained Diabases. The ledge at 1250 N. 1820 W of S.E. Cor is a very dark phase of the rock, the others are generally the light gray variety.

32930

144

G.D.

1260 N. 450 W of S.E. Cor. Sec. 8 is the light colored Diabase, that is here partially schistose. It forms a small hill.

145

32931

G.D.

1750 N. 250 W of S.E. Cor. Sec. 8. Schistose greenstone, with concretions or aggregations of S. feldspar, in the coarser phases of the rock.

146

32932

G.D.

750 N. 950 W of S.E. Cor. Sec. 8. Gray Diabase from north side of high hill lying south of location here given.

147

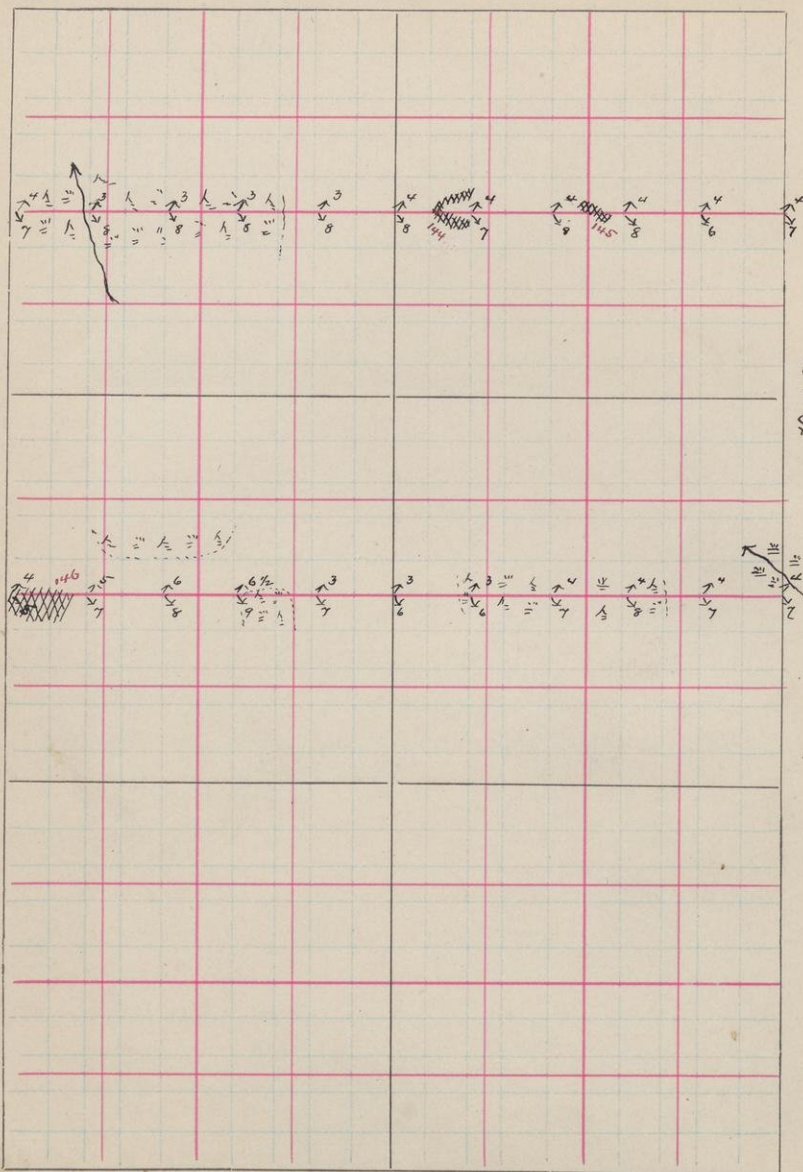
32933

G.D.

750 N. 1780 W.

S. 8 T. 43

R. 31



E 1/4
P
S. 8

Rock like 146. The entire west
half of the run 750.15 is over
heils that are so closely crowded as
to make a continuous ledge.

S.

17

T. 43

R.



From U. W. Cr Sec 17 - 43-31. Went
North about 50 paces to U. side of
river, then East along this bank
400 paces, then S. to Section line
and East in this.

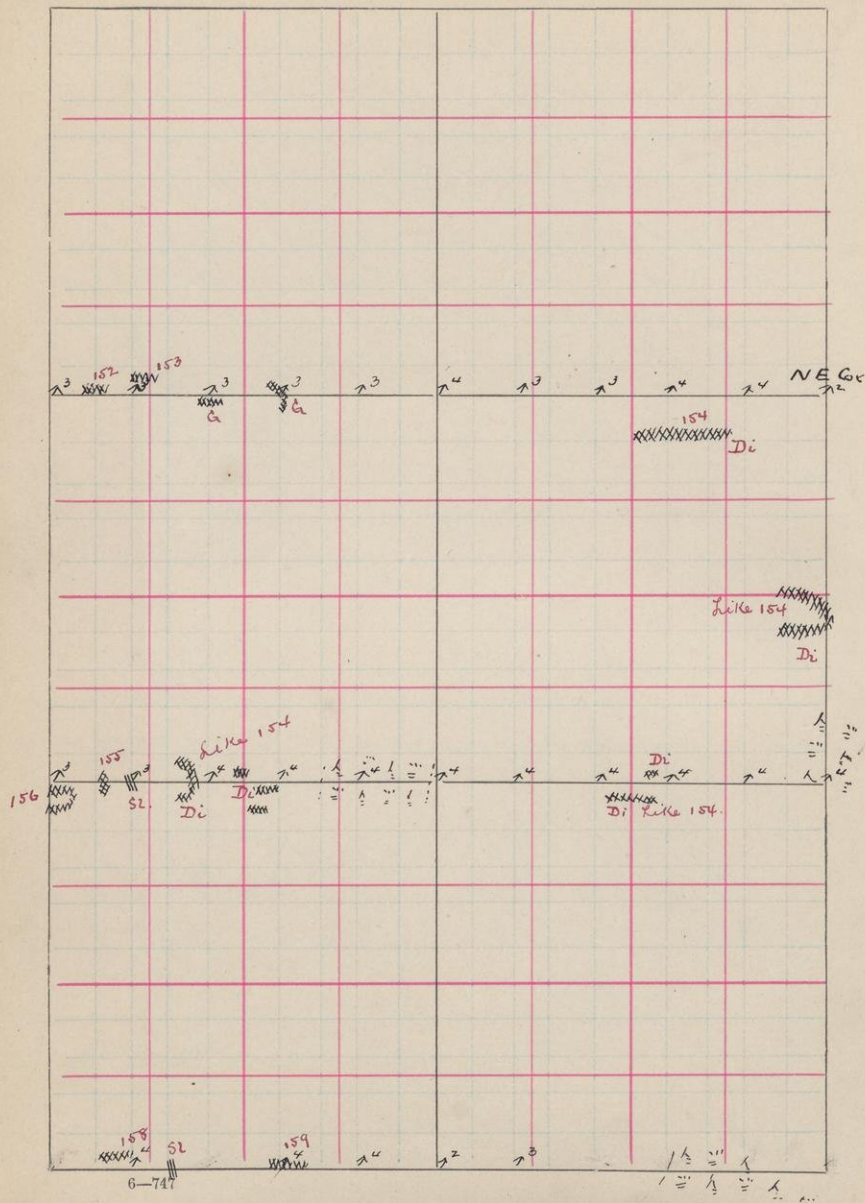
On the river bank ab. 60 paces E of
U. W. Cr Sec 17 and about 50 paces
N are the black slates (64), which
extend 30 paces further East. No
good dip nor strike could be de-
tected in them, nor could contact
be found between these and the
very coarse grained black diabase
a few feet to the north of them, which
is undoubtedly an intrusive.
The coarse Diabase is the same
rock as that occurring so abundant-
ly in Sec 7.

148
32934
A. D.

20 N. 1425 W of S. E. Cr Sec. 8
a small ledge of a different green-
stone occurs. This is the fine grained
greenstone belonging with the flow rocks.
Further up the same hill are other
small exposures of greenstones and
some of slates, with now and then a
contact showing the interbedding

S. $NE \frac{1}{4}$
17 T. 43

R. 31



of the eruptives with the fragments.

At 1950 N. 1350 W. is a knob of the greenstone. 15 paces north of this is a flat exposure of slate with greenstone on slo^d to W. and S. sides.

149
32935-

Admiral

2015 N. 1315 W. of S.E. Cr. Sec. 17 is another small exposure of slate, whose schistosity has the usual E.W. strike. Strike of bedding not determined.

At 2000 N. 1200 W. of S.E. Cr. Sec. 17 is west end of high hill composed principally of slate striking 15° N of N and dipping 70° to the W.

East of this in a higher rise are scattered small ledges of greenstone as indicated in the map, one of conglomerate and others of slate.

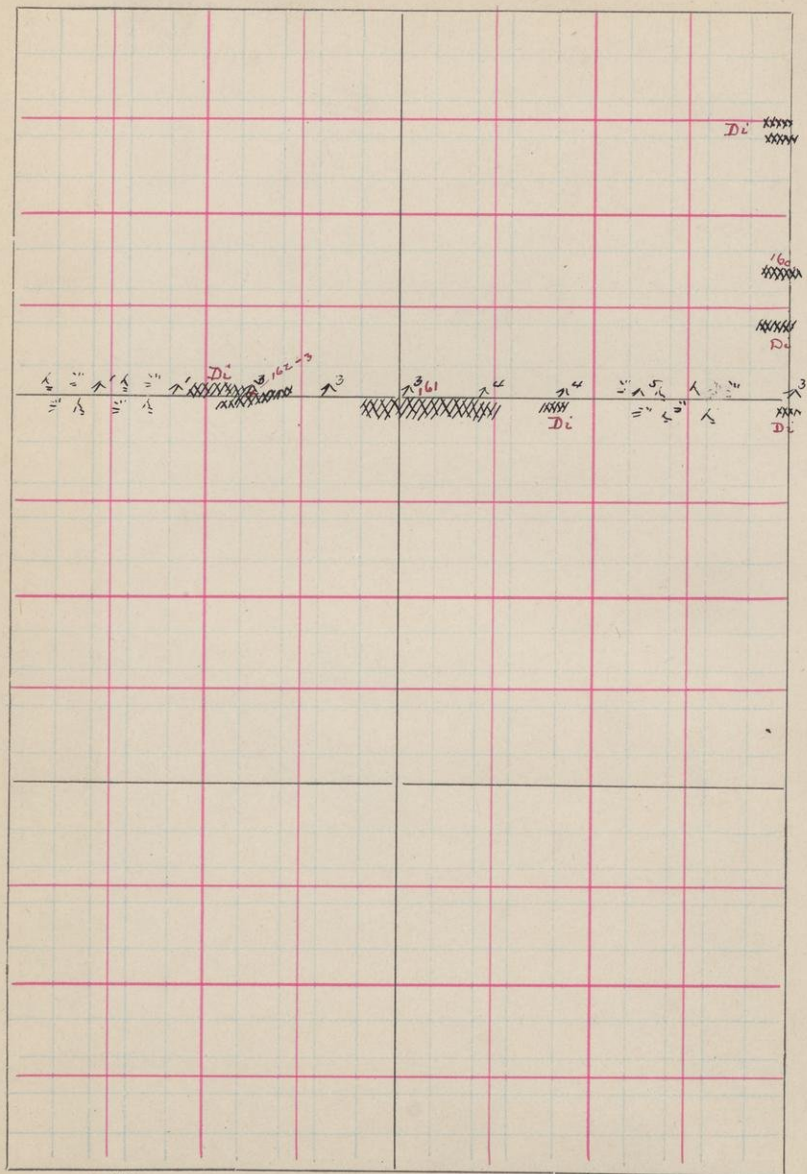
150
32936

The conglomerate dips W and strikes like the slates a few degrees W of N. 1150 W. 2020 N. of S.E. Sec. 17.

On the north side of the hill, where

S. E. $\frac{1}{4}$
S. 17 T. 43

R. 31



6
it is precipitous the contact of the
slates and greenstones is plainly
seen, with the latter amygdaloidal
on their edges.

A good exposure is at
2050 N 1100 W of S.E. Sec 17.

where the slates strike $30-35^{\circ}$ W of
N and dip $75-80^{\circ}$ W. and are in
contact with an amygdaloidal
greenstone.

151
32937
Q.A.
(2)

At 1100 W and 1950 N of S.E. Sec 17
(70 paces S. of above location)
another exposure shows again
Diabase and slate interbedded.

152
32938

2010 N. 950 W. of S.E. Sec 17.
Flat ledge of dark rock, probably
slate.

153
32939
Q.D.

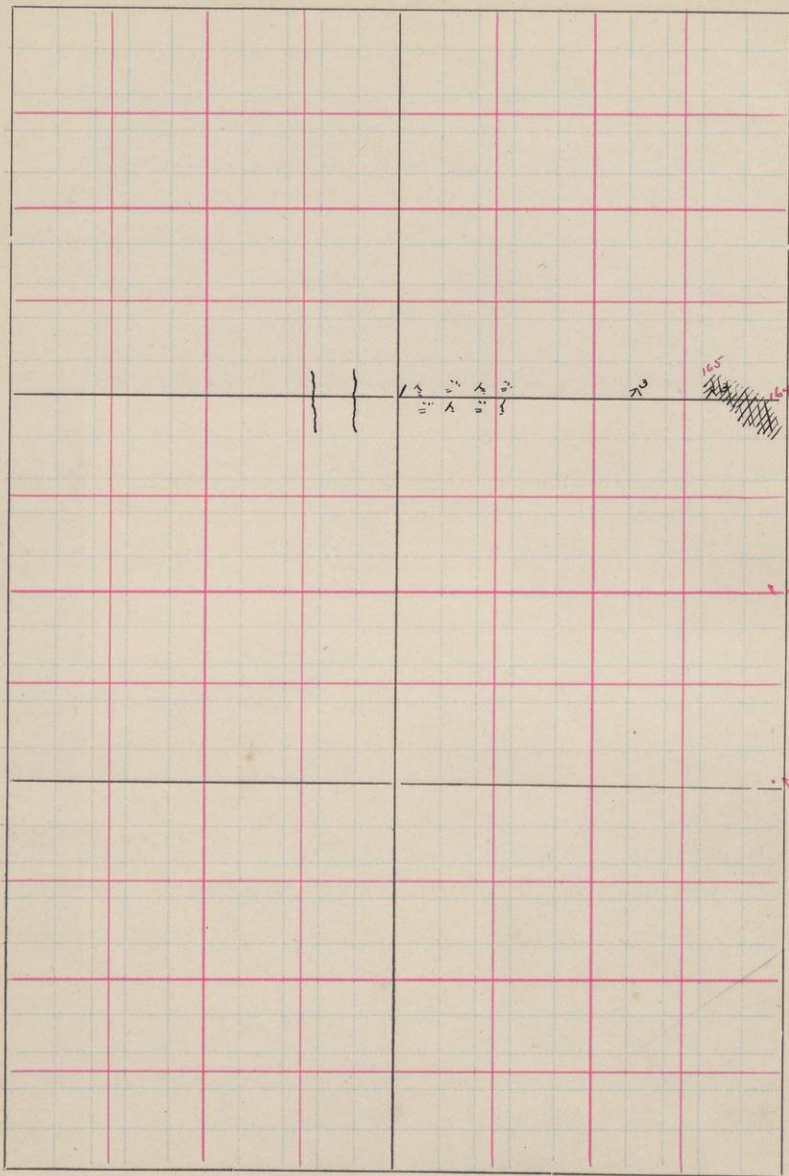
800 W. 2000 N S.E. Sec 17
Specimen of intrusive (?) Diabase
from one of a number of similar
ledges on a large hill.

154
32940
Q.D.

1950 N. 200 W of S.E. Cor. Sec 17.
Gray intrusive Diabase.

S. 17 T. 43

R. 31



155
32941
G.D.

Running W. along line 1500 N. of S. line of Sec 17, cross small ledges of the intrusive Diabase at from 200-300 W and at 700 W begin ascent of high hill whose lower portions on the west are the rock like 154. The hill is now covered so that relations between rock could not be made out. At 830 W is a large exposure of this Diabase, at 900 W one of slate, dipping and striking as at the north and at

155
32942
G.D.

1500 N. 950 W of S.E. Cor 17. The fine grained gray rock, that is probably a greenstone.

156
32942
G.D.

1500 N. 1000 W of S.E. Cor 17.

At 1250 W begins another hill in which are exposed greenstones and slates as at the north. The slates here strike 50 W of N and dip 80° W. At the west end of the ledge at west end of hill the slates become very sandy and resemble Rominger's flag slates, as specimen 157 shows. 1480 N. 1350 W. of S.E. Cor Sec 17.

157
32943

158
32944
G.D.

1000 N. 900 W of S.E. Sec 17

Coarse gray Diabase:

This is the west side of the slide^d here already crossed twice. At this place the relations of the rocks can be only guessed at since there are but few exposures.

At 1000 N. 850 W a ledge of fine grained dense material like quartzite^d was found and 50 paces further East a very coarse grained quartzite^d. 1000 N. 800 W of S.E. Sec 17.

159
32945
G.D.

722 N of S.E. Cor 17.

Banded crystalline rock striking 50° N of N and dipping high W the East. The rock is probably a schistose amygdaloid.

161
32947
G.D.

500 N. 500 W of S.E. Cor 17.

From large hill of very coarse red weathering Diabase like that at N.W. Cor.

162
32948
G.D.

500 N. 675 W.

Very fine grained splintery gneiss

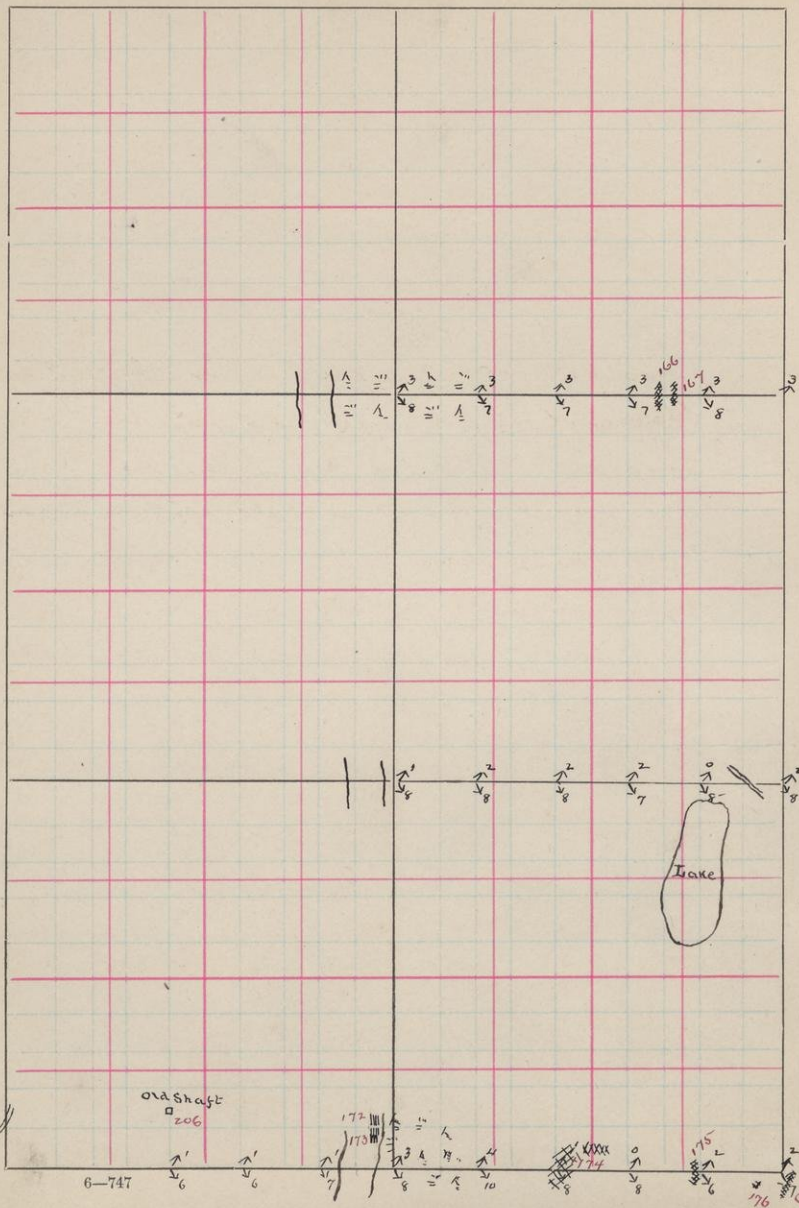
163
32949
G.D.

cut by small granite dyke 20 paces

S. NW $\frac{1}{4}$
20 T. 43

R. 31

NW
Cor



U. 7 162.

164
32950
A.D.

Fine grained greenstone from E.
end of hill - 500 N 1040 W. of S.E. Sec 17.

165
32951

510 N. 1100 W of S.E. Sec 17.

166
32952

2000 N 1150 W of S.E. Cor Sec. 20

Greenstone, amygdaloidal in places

167
32953
A.C.M.

2000 N 1130 W of S.E. Cor. Sec 20

Very fine grained dense greenstone
like that usually associated with
greenstone conglomerate.

168
32954

2000 N 950 W of S.E. Cor. Sec 20.

Narrow band of slate only a few
feet wide is here exposed, inter-
bedded with fine grained green-
stone. The slate strikes 18° N of U
and dips 70° W.

Another and large exposure of the
same slate occurs a little east
and south of 168.

169
32955
A.D.

2000 N 325 W of S.E. Cor. Sec 20.

Medium grained gray diabase

This specimen represents the prevailing rock which appears in many small exposures in the NE 1/4 of the N.E. 1/4 of this section.

170
32956
A.D.

1535 N. 750 W of S.E. Cor. Sec. 20.
Another specimen of the fine grained gray Diabase.

The scales found in the north line of this section are again exposed in the line 1500 N of the S. section line. Here they occur with flows of greenstone as above. They strike however only 30° W of N and dip 45° W.

The line in which these occur extends from 800 to 900 W.

About 30 paces north of the 1500 line is the base of a large hill the slates are bounded on the west by a fine grained rock (171)

171
32957
A.D.

1530 N. 900 W of S.E. Cor. Sec. 20.
and west of this by a coarser grained Diabase.

172
32958

In the river at
1540 W 1050 N of S.E. Cor. Sec. 20

173
32959

near the east bank are exposures
of a slate rock striking 30° E of N
and dipping $65-75^{\circ}$ N. On fractured
surface they seem more like amy-
gdaloid squeezed so as to be perfectly
schistose. Interstratified with these
are harder layers like quartzite.
It is not improbable that the
rock is a slate conglomerate, and
that the hard portions are squeezed
pebbles.

Upon returning East on the 1/2 line
at 1400 W. 1000 N. begin the ascent
of a very high hill, which, however,
is so completely over covered that
it is difficult to discover rela-
tions of rocks in it.

On its west side the rock is coarse
red weathering diabase, more or
less schistose in places. A specimen
was taken from the north end of the
top of the hill, about

174
32960
A.D.

1275 W. 1000 N of S.E. Cor Sec 20.

East of this the old flow rock ap-
pear in isolated ledges - as at

175
32961

1100 W 1000 N of S.E. Cor. Sec 20
A.C.M.

is a very fine grained Diabase
and at

176 1020 W. 980 N. of O.E. Cr. Sec 20
32962

a Schistose greenstone

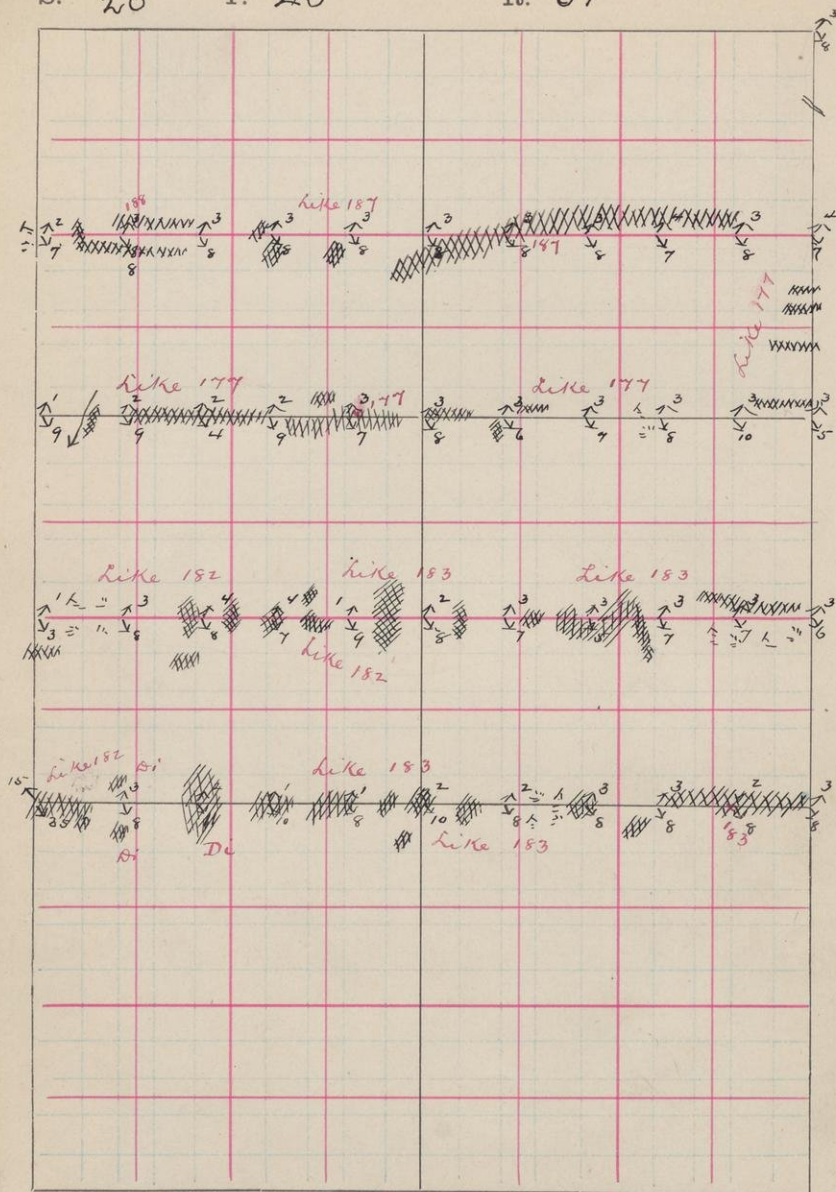
at 1000 W. 1000 N. of O.E. Cr. Sec 20
is a small ledge of slate and
East of this all exposures ^{are} of the me-
dium grained gray Diabase, repre-
sented by specimen

177 600 W. 500 N. of S.E. Cr. Sec 20.
32963
A.D.

S. SE 1/4
20

T. 43

R. 31



Sec 20 in its South half is nearly solid ledge of diabase. By no means were all of the Exposures specimens. A few samples of the prevailing rock were taken and samples of heavy Exposure that differed in the least from the coarse Diabase.

178
32965
G.D.

30 S. 1630 W of S.E. Cr Sec 20-43-31

178 is a schistose rock much shattered and broken. It looks like a fragmental, but may be a greenstone, especially since a little further East in the same hill is a schistose greenstone.

179
32965
G.D.

1520 W of S.E. Cr Sec 20-43-31.

32966
G.D.

More massive phase of 179.

From 1500 W to 1400 W the rock is like 181, but a little darker.

181
32967
G.D.

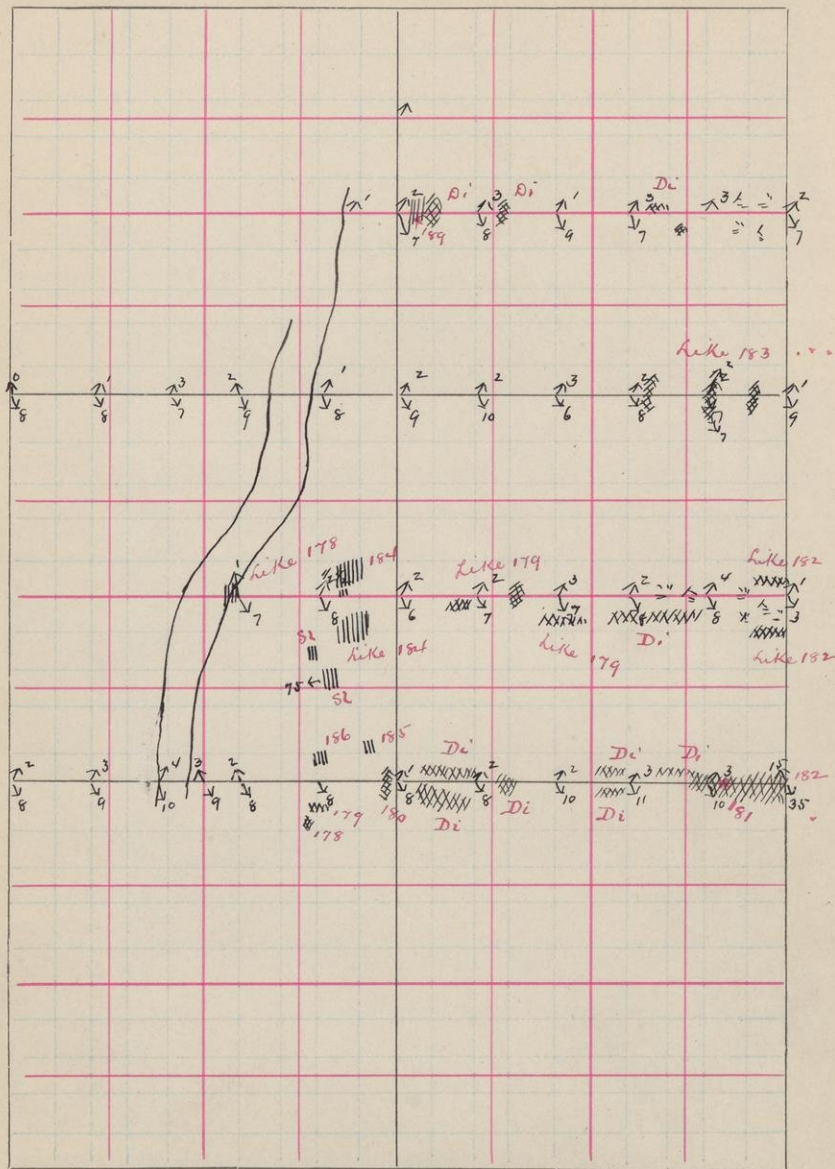
1070 W of S.E. Cr Sec 20-43-31

Lightest phase of the coarse Diabase or gabbro that forms the greater part of the surface of the section.

The rock occurs in rounded hills that

S. W. 1/4
20 T. 43

R. 31



have a well marked trend to the S.E. They are evidently composed of material that is younger than the greenstone flus. It is fresher and is apparently intrusive through the former.

182
32968
G.D.

1000 N of SE Cor Sec 20-43-31.
At this point there is a large mass of a very dark, beautifully crystalline rock, full of large crystals of an amphiboloid and brilliant grains of pyrite. It contains but little feldspar and is highly magnetic, thus accounting for disturbance of needle at the 1/4 post.

183
32969
G.D.

100 N of SE Cor Sec 20-43-31.
Medium grained gray Diabase - the prevailing rock from the S.E. corner to 800 N of this corner.

The coarse gabbro or Diabase seems to be on the west side of the gray medium grained Diabase throughout. If the two were flus the coarse grained rock should be to the East of the finer grained material as

the dip of the bedded rocks is to the west. There are, however, a few obscure lines running a little W of N that may be discovered on the sides of cliffs. They look as though indicating flowage.

In places the rock gets coarse, and long columnar amphibole crystals, sometimes 2 or 3 inches in length, are developed in it. These are arranged suddenly radially, with the cores a very coarse feldspar. The appearance of these aggregates indicates foreign inclusions that have been partially dissolved, with the production of hornblende.

184

32970

300 N. 1550 W of S.E. Cor Sec 20-43-31
at the West end of the line 500 ft of
the section line the massive rock
give way to a slate in which the strike
is about 20-25 W of N, and the dip high
to the west.

These slates are better exposed at
1580 W and 275 N and are seen again
at intervals all the way south to
the south line of the section.

185
32971
G.D. (3)
186
32972
G.D. (2)

70 N. 1540 W of S.E. Cr Sec. 20-43-31
and

40 N 1620 W. of S.E. Cr. Sec. 20-43-31.
All specimens of these states.
185 is a coarse grained variety
and 186 a quartzose phase, looking
very much like the rock 178

In the river at.

250 N 1700 W of S.E. Cr Sec 20 are
other schistose rocks like 178-179.

The rocks along the lines 750 and
1000 W of the S. section line of Sec 20
are similar in every respect like
those further south. but few speci-
mens were taken. Many of the hills
are much larger than would be
supposed from a study of the plotted
exposures. They are more covered
and so show no extensive ledges
other than those indicated.

187
32973
G.D.

750 N 400 W of S.E. Cr Sec 20-43-31
Specimen of prevailing Diabase.

188
32974 G.D.

750 N. 900 W of S.E. Cr ~~Sec~~ 20-43-31

Fines grained phase of 189.

189

32985

G.D.

750 N 1485 W of D.E. Cir Dec 20-43-31

The high hill near the river is composed mainly of a schistose Diabase, that is much roved and filled with iron scales.

At the location above indicated, on the west side of the hill, the rock is very schistose and much jointed. It is much like a fragmental in appearance, but contains a large amount of pyrite, like some of the amplites.

Now west on Section line between
Secs 20 and 29 T 43-31 as far as SW
cor Sec 19, then north $\frac{1}{4}$ line and
East to river.

On the South side of Sec 20 the coun-
try is mainly sand plain and
swamp.

At 100 W of the S.E. cor of the Sec. 19
and a little to the north of it there
looms up a great hill, with a very
steep side to the south. It here ends
abruptly and seems to be the ter-
mination of the ridge that has
been crossed so frequently between
the dam of the Michigan River
and this point.

Since the rocks are so well Exposed
on this cliff side a section
was made across it and specimens
taken from E to W.

50 N. 150 W of S.E. cor Sec 19-43-31

On the East side of the cliff the
rock is a massive fragmental,
which in places contains small
white fragments like the conglomerate
h.w. of Mansfield.

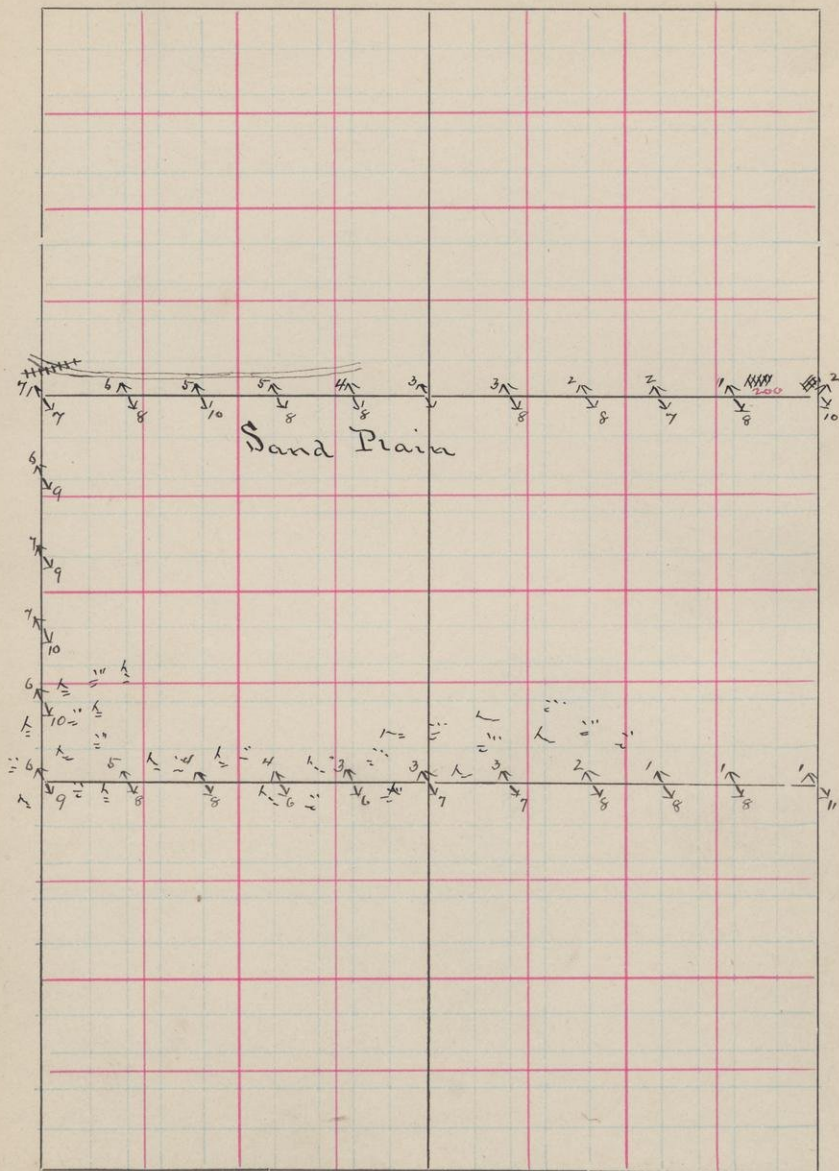
190

32976

G.C.M.

S. S.W. 1/4
19 T. 43

R. 31



191 Beyond 190 is a 20 ft. thick
 32977 bed of a more quartzitic rock of
 G.C.M. which two specimens were taken
 191 30 N. 165 W. of S.E. Cor Sec 19-43-31
 32977 25 N. 160 " " " "

192 35 N. 200 W " "
 32978 At this point is a schistose
 G.C.M. bed that in its weathered surface
 193 looks not unlike a greenstone
 32979 conglomerate.
 G.C.

194 50 N. 250 W of S.E. Cor Sec 19-43
 32980 -31, is the middle of a mas-
 G.C.M. sive layer of greenstone, which at
 195 260-300 N is amygdaloidal, with
 32981 small grayish black amygdules
 G.A. in a diabasic groundmass.

196 At 300 W. begins one of the spheroid-
 32982 ally panted beds in which both
 197 fragments and matrix are amygd-
 32983 aloidal. If these beds dip to the
 G.A. west as they seem to do, and as
 they certainly do further north,
 then the spheroidally panted material
 is above the amygdaloid 195.
 Since 195 and 196-7 grade into

Each other the spheroidally pitted rock would appear like the surface portion of an amygdaloid. In spite of the fact that the fragments are so often rounded, I cannot but believe that this peculiar conglomerate is the broken surface of a lava flow, in which matrix and fragments are the same in material.

198
32984
Q.C.M.

60 N. 380 W of S.E. Cr. Sec 19-43-31.
is one of the fine grained dense
greenstones, forming a small iso-
lated hilltop SW of large hill.

199
32985
Q.C.M.

135 N. 475 W of S.E. Cr. Sec 19-43-31.
Same rock from S. side of large
hill.

200
32986

510 N. 1045 W of S.E. Cr. Sec 19-43-31.
a schistose dense rock, resembling
a quartzite in general appearance.
No dip, nor strike of beds was noted,
but the ^{strike} of the schistosity was E-W

201
32987

500 N 975 W of S.E. Cr. Sec 19-43-31

A very small ledge on the side of a swamp. It is a dark grayish blue rock, schistose, and cut by long needles of mineral that decomposes easily into a white sandy substance. The rock is unlike anything else seen in the region, and is very much like a chertlike slate.

202

546 N 680 W of S.E. cor. Sec 19-43-31.

32988

At this point we have the west side of a nest of ledges, some small, others large, in which the rock is greenstone. Most of the rock is like 202, a dense diabase with tiny porphyritic crystals of white plagioclase showing on its weathered surface.

At 600 W is the west side of the same hill as was crossed on the south side of the section. The west-
ernmost exposures are all of the conglomerate or spheroidally parted rock (like 196-7). Here the fragments, instead of being rounded like boulders as they are further south, are fragmental in every

24

sense of the term. They are angular, irregular in shape and rounded occasionally only in their corners. The pieces are separated from each other by a very narrow space of interstitial substance, in some cases, in others by much of it. This interstitial material is also often filled with small fragments.

30 paces E. of 600 N the amygdaloid appears, as it does to the south also. Further East it loses its amygdaloides, becomes dense and at 500 N of the E line of the section, it is a fine grained porphyritic diabase.

203
32989

A.C.M.

450 N 500 N of S.E. Cr Sec 19-43-31.
Specimens of this rock, from its southernmost exposure.

204
32990
A.A.

520 N. 280 N of S.E. Cr. Sec. 19-43-31.
Greenstone amygdaloid.

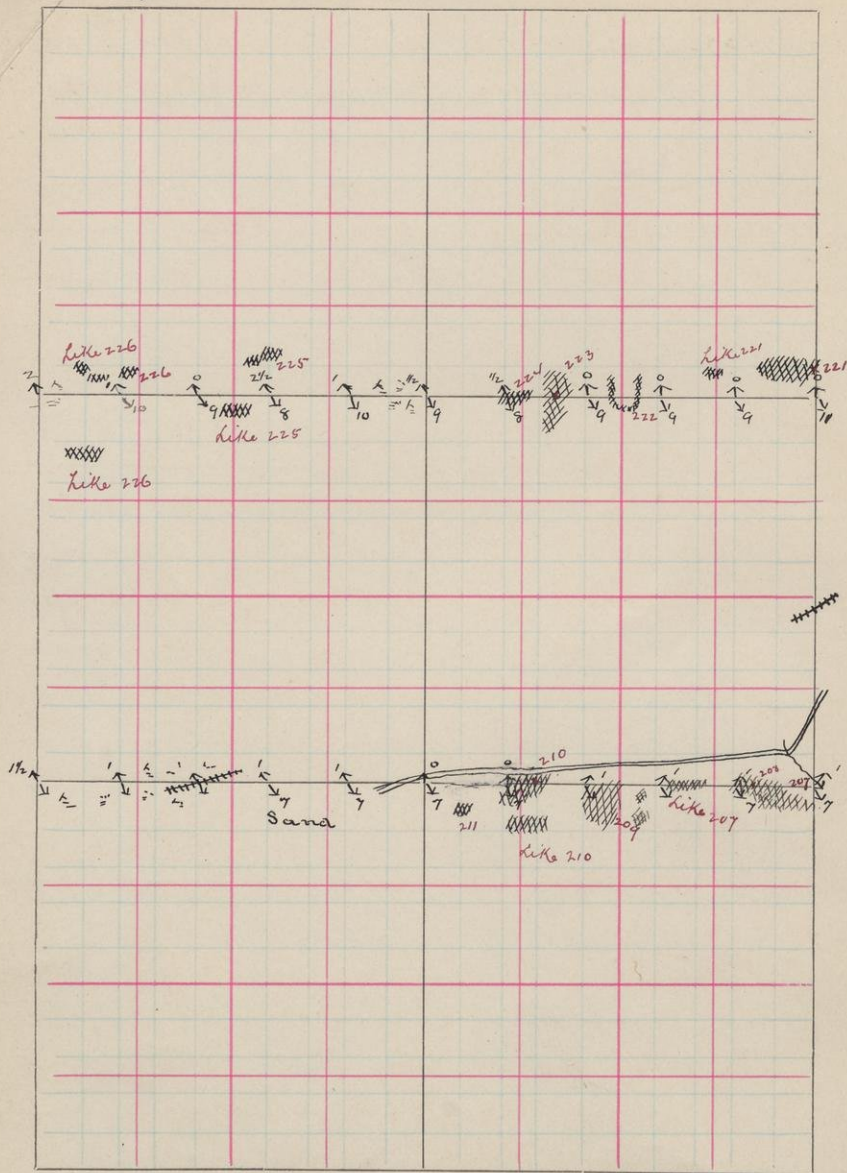
205
32991

A.C.M.

500 N. 200 N of S.E. Cr. Sec 19-43-31.
Dense gray greenstone.

S. NE $\frac{1}{4}$ T. 43
19

R. 31



206
32992

1075 N. 1800 W of S.E. Cr. Sec 20. 43-31.
Gray quartzite^d from deep top of old
shaft. The rock is massive like the
quartzite^d of the Marquette region, but
it differs from this in containing
large fragments of black slate^d, which
are in places so numerous as to con-
stitute a quartzitic conglomerate^d.

207
32993
G.C.M.

1000 N. 40 W of S.E. Cr. Sec 19 - 43 - 31.
Just west of the E 1/4 post of Sec 19 is
a high rough hill of the fine grained,
dense gray greenstone. At the base
of the hill the rock is decomposed, as
shown in specimen 207, but further
west it is fresher and shows plainly
the spheroidal parting.

208
32994

1000 N. 80 W of S.E. Cr. Sec 19. 43-31.
Sample from one of the spheroids.

209
32995
G.C.M.

960 N. 250 W of S.E. Cr. Sec 19 - 43 - 31.
Fine grained, dense, gray greenstone.
At this point the rock is massive,
but a little further west at 300
W of the E line of the section the spher-
oidal parting is again developed.

The rock here contains little white
mass of saccharoidal quartz, closely
resembling pebbles in appearance.

Still further west the greenstone
becomes porphyritic, and shows tiny
white crystals of plagioclase in its
weathered surface. Specimen taken from
1020 N. 360 W of S.E. Cr. Sec 19. 43-31.

210
32976
G.C.M.

This rock like all other phases of
the dense greenstone is cut by many
joint planes and by tiny veins of
quartz.

211
32997
G.A.

960 N. 450 W of S.E. Cr. Sec 19-43-31.
Greenstone amygdaloid.

212
32998
G.A.

1000 N. 770 W of S.E. Cr. Sec. 24-43-31.
Small hill of greenstone amygda-
loid, with occasional chert amygdulae.

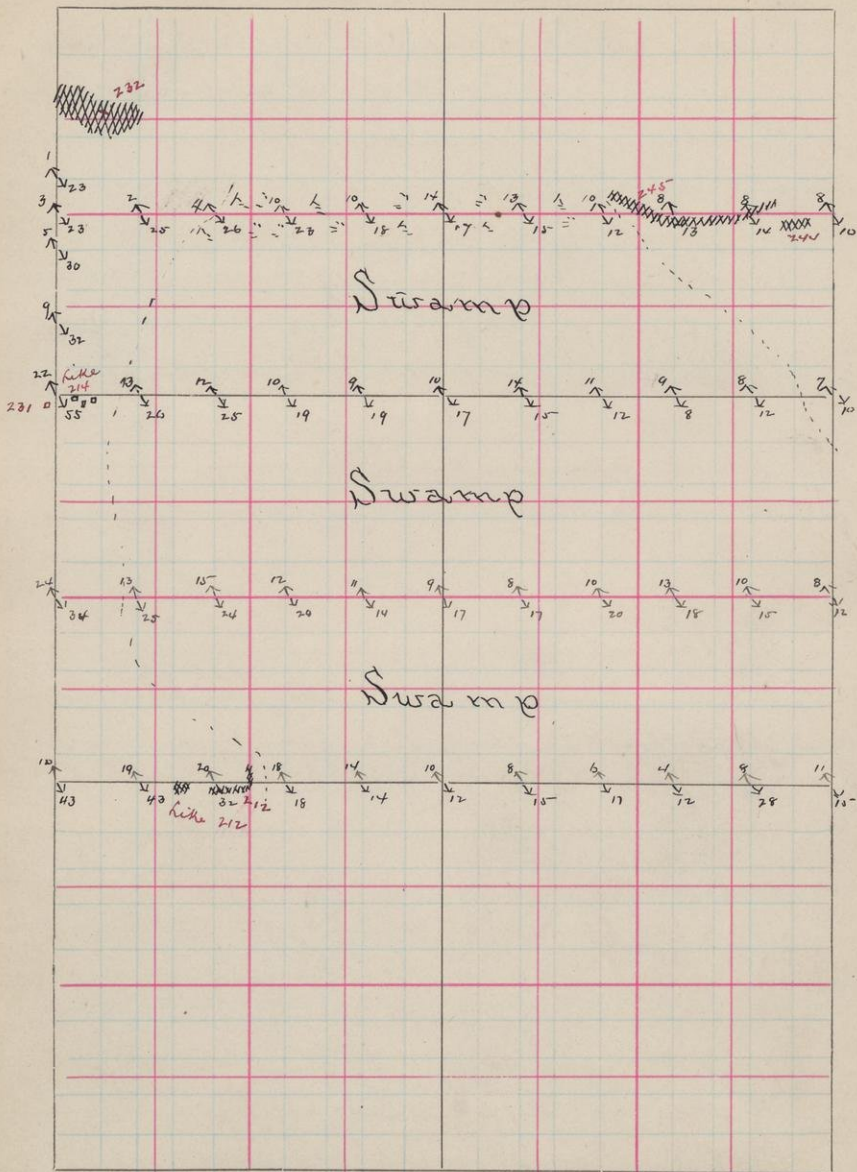
Access test pit at 980 N. 1080 W of
S.E. of 24 is in drift.

213
32999
G.A.E.R.

1000 N 1300 W of S.E. Cr. Sec. 24-43-32
A small cliff 70 paces long is com-
posed of an amygdaloid with red
amygdulae that are probably quartz.

NE 1/4
S. 24 T. 43

R. 32



The rock is schistose, with strike of schistosity > Crw.

Just East of the W 1/4 Post Sec 24 (which could not find) are a number of old test pits from which gravel was taken. No rock was seen in place in any, but from the quantity of rock 214 on deep heap of pit nearest 1/4 Post, it is surmised that the underlying rock is red shale.

214
33208
R. 52

Note gap

215
33208
G.A.E.

1530 N. 1570 W of S.E. Cr. Sec 24-43-32

Massive greenstone from west side of a large hill, and a few paces further East an amygdaloid containing a large quantity of Epidote?

216
33209
G.A.E.

217
33210
G.C.M.

1520 N. 1350 W. of S.E. Cr. Sec. 24-43-32

Fine grained, dense, gray greenstone, that is in contact on its west side with a narrow band of fine grained greenstone conglomerate.

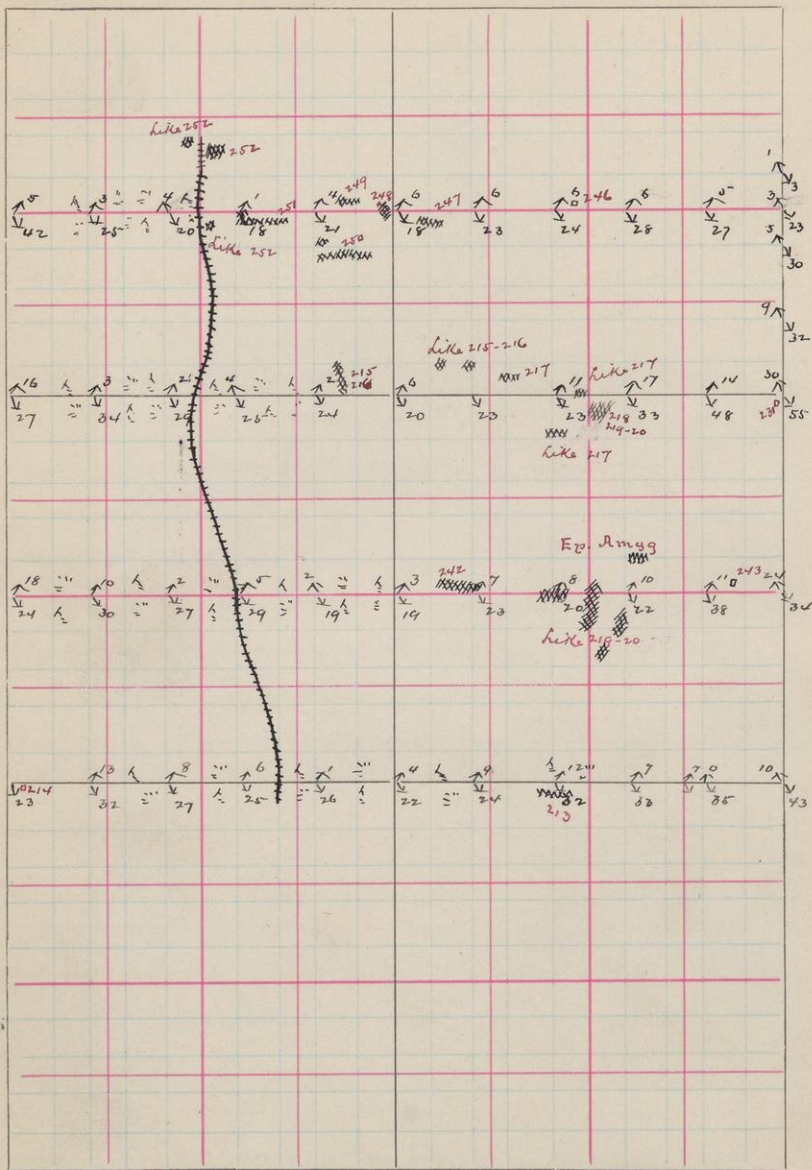
From 1200-1300 W and from 1050 to 1550 N is a high rough hill of amygdaloid and conglomerate.

SS.

24

T. 43

R. 32



The amygdaloid is the epidiotic kind and the conglomerate one that seems to be midway in character between the greenstone conglomerate of the north and the spheroidally parted rock of the south. The cementing material (218) is a well marked amygdaloid with prominent flowage structure. The fragments are of all shapes and sizes - some are angular, others subangular, while others are round. Amygdaloids (219) and the dense gray greenstone (220) form the fragments. They are probably different portions of the same rock mass. The amygdaloides are larger than the others and are more completely rounded. Toward the middle of the hill the fragments decrease in number but become larger, until at 1440 N the typically spheroidally parted rock occurs.

218

33211

219

33212

220

33213

G.A.

1490 N. 1240 W of S.E. Cr Sec 24. 43. 32

1470 N. 1230 W " " "

1470 N. 1230 W " " "

Clustered around the point 1500 N.

1100 N of S.E. Cr Sec 24 - 43-32
are again found a number of test
pits. They are all shallow, none
having reached rock, with the ex-
ception perhaps of a single large
pit from which a quantity of
slate like 214 was taken.

221
33214
A.C.M.

1550 N of S.E. Cr Sec 19 - 43-31
At this point specimens of the
fine grained, dense, gray green-
stone was taken from the top of a
very large bare E.W. trending
hill. Many ledges of the same rock
occur to the south and east of this
one. They are not located on the map
given in this book, but are prob-
ably the found in Mr. Merriam's
note book.

222
33215
A.C.M.

1500 N. 225-254 N of S.E. Cr. 19-43-31
Another ledge of the fine grained,
gray, dense greenstone is found
at this place. It differs from
221 in containing less pyrite,
and in containing tiny pherocrypts
of feldspar. It is more or less badly

joined.

25

223
33216
G.D.

1500 N. 330 W of S.E. Cr. Sec 19-43-31.
Fine grained Diabase forming large
hill.

224
33217
G.C. 111

1500 N. 400 W of S.E. Cr. Sec 19-43-31.
Fine grained, dense gray greenstone
with small porphyritic crystals of
feldspar.

225
33218
G.A.

1570 N. 710 W of S.E. Cr. Sec. 19-43-31.
Much decomposed, schistose amyg-
daloid, with chlorite and quartz
amygdules.

226
33219
G.A. Sp

1520 N. 580 W of S.E. Cr. Sec 19-43-31.
Purpleish-brown fine grained amyg-
daloid, with amygdaloidal portions
of various degrees of perfection. The
rock shows the spheroidal parting.

227
33220
G.C.

1510 N. 1110 W of S.E. Cr. Sec 19-43-31.
Purpleish, much decomposed green-
stone(?) showing in its weathered
surface little irregular areas of
pink weathering particles resemble.

ling fragments. The rock is badly shattered, so that it is impossible to get a good hand specimen.

228
32221
Q.C.

Specimen of same rock free from fragments. For

The next 1/2 mile west the rock is all greenstone conglomerate?

229
32222
Q.C.

1460 N. 1200 W of S.E. Cor. Sec 19-43-31.
From Eastern Exposure.

230
32223
Q.C.

1570 N 1875 W of S.E. Cor. Sec 19-43-31.
From East End of western exposure
of same greenstone conglomerate?

231
32224
R. 87.

1500 N. 950-1000 W of S.E. Cor. Sec 24-43-32 are several test pits, most of which are in drift. The specimen was taken from a pit at 1490 N. 1010 W.

232
32225
Q.A.E.

1875 N. 950 W of S.E. Cor. Sec 24-43-32.
From top of large exposure of Epidioritic
greenstone amygdaloid forming
hill 100 paces ESW and 50 paces NW.

233

33226

450 N. 700 W of S. E. Cor. Sec 24-43-32
From west side of small elevation,
where a little cliff overlooks the
Swamp. The rock is so much de-
composed that cannot preserve
definitely upon its nature. It is
probably a schistose greenstone.

234

33227

Q.A.E. (2)

From top of same elevation. Supposed
to be from the ledge forming the
elevation. The piece from which
specimen taken, however, may
be loose. It is a schistose amyg-
daloid.

235

33228

Q.A.E.

540 N. 1090 W of S. E. Cor. Sec 24-43-32
Small ledge of schistose amygdaloid
from side of hill.

236

33229

Q.A.E.

550 N. 1100 W of S. E. Cor. Sec 24-43-32
A small ledge of very fine grain-
ed epidotic amygdaloid, with
very small amygdules.

237

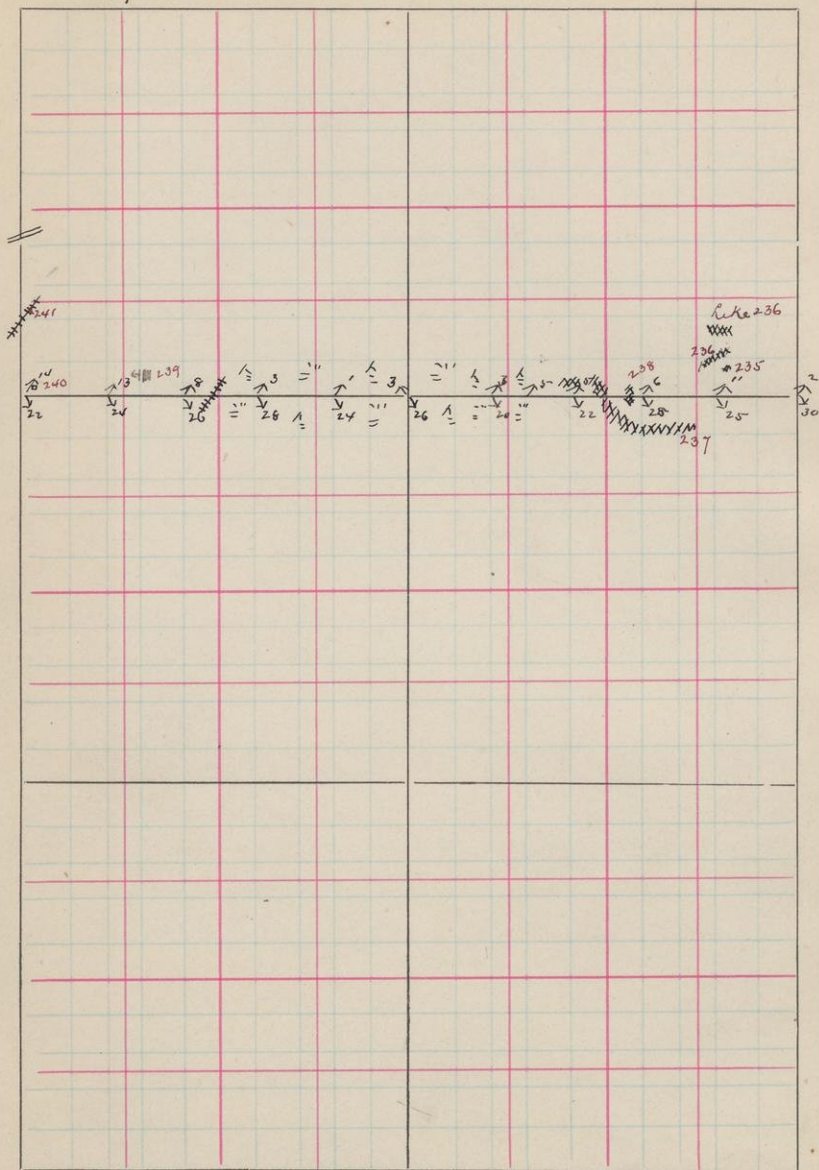
33230

Q.A.E.

460 N. 1140 W of S. E. Cor. Sec. 24-43-32.
Fine grained, dense, bluish gray
amygdaloid, that may be fresh phase

S. $SW \frac{1}{4}$ T. 43
24

R. 32



of the Epidolite amygdaloid.

238
33231
G.A.E.

500 N. 1228 W. of S.E. Cr. Sec. 24-43-32
Another specimen of the Epidolite
amygdaloid, in which large amount
of Epidolite.

239
33232

At 520 N. 1830 W. of S.E. Cr. Sec. 24-43-32
on a flat ridge west of the Swamp
is an exposure of a banded schistose
rock whose strike as nearly as could
be determined is N.W. and dip very
high to the west.

240
33233
Orr.

515 N. 1990 W. of S.E. Cr. Sec. 24-43-32
is a working pit from which Lema-
tile and iron-bearing slates are
being taken.

[The pit has been studied by Mer-
riam, whose notes see for further
information].

241
33234
BZ, S2.

At about 110 N of W 1/4 post Sec. 24
43-32 is a small ledge of crum-
pled black slates carrying ore, on
north side of railroad.

The hill from which 218-219-220 were taken was again visited, this time at its southern end, where found nearly the same rocks as were found north.

242
33235
G.A.E.

1260 N. 1440 W. of S.E. Cr. Sec 24-43-32
A ledge of purplish fine grained amygdaloid is the western most exposure on the hill. This hill is about 300 steps across at this point, and all the ledges E. of 1300 W are the spheroidally pitted amygdaloid, which is here strongly epidotic.

In the valley East of the hill is a test pit from which lean ore was taken

243
33236
Orr

1265 N. 1070 W. of S.E. Cr. Sec 24-43-32

244
33237
A.C.

1740 N. 50 W. of S.E. Cr. Sec 24-43-32
The rock in the particular ledge is so completely uncovered and is so wet when uncovered that it is difficult to tell whether it is the greenstone conglomerate or not. The ledge to the west, however, is conglomerate.

245
33238

G.C.S.

1760 N. 250 W of S.E. Cr. Sec 24-43-32.
From the large ledge west of 244.
Probably schistose greenstone con-
glomerate.

246.
33239

R.SZ.

1760 N 1280 W of S.E. Cr. Sec 24-43-32.
Slate from dump heap of old pit.
Mixed with much sand and gravel
on heap, but probably in place in
the hole.

247.
33240

G.A.E.

1740 N. 1460 W of S.E. Cr Sec 24-43-32.
Much decomposed schistose amyg-
daloid

248
33241

G.A.E.

1750 N. 1500 W of S.E. Cr. Sec. 24-43-32.
Fine grained, gray, dense green-
stone.

249
33242

250

33243

G.A.E.

1760 N. 1560 W of S.E. Cr. Sec 24-43-32
1700 N 1560 W of S.E. " " " "
Both rocks seem like schistose
amygdaloid.

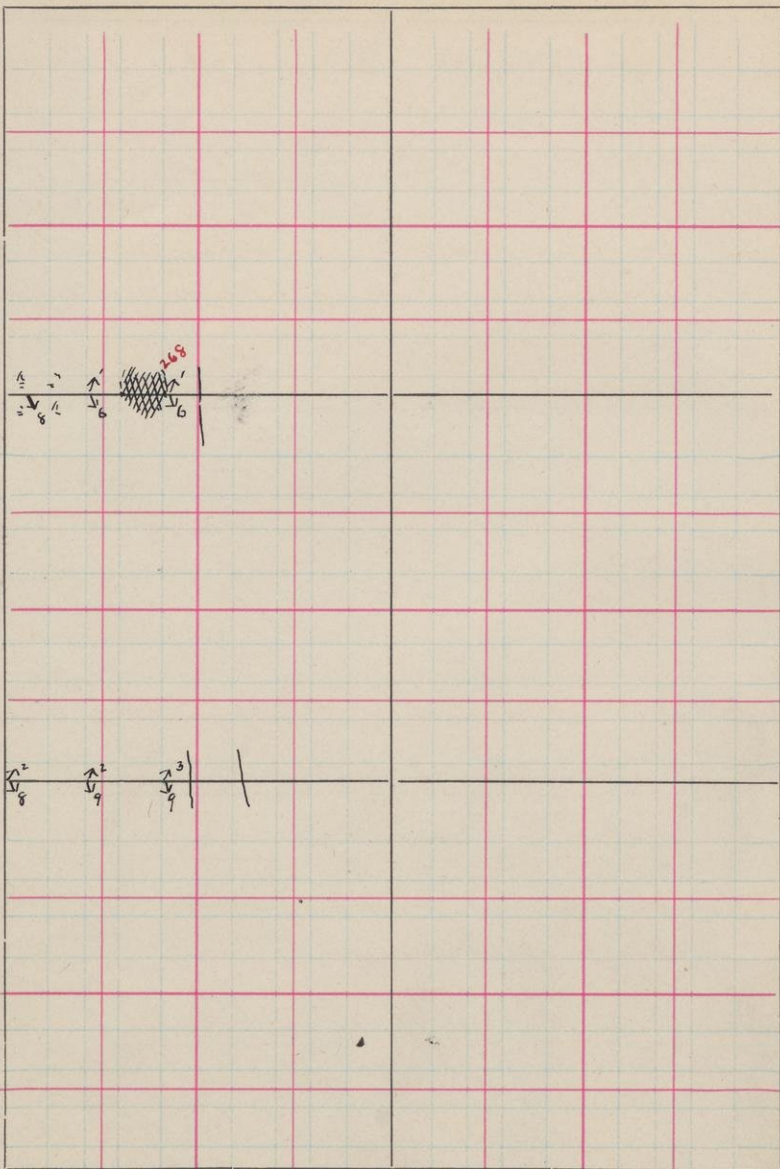
251
33244

G.A.E.

1740 N. 1650 W of S.E. Cr. Sec. 24-43-32
Schistose amygdaloid, capping a
denser phase of greenstone.

S. $NW \frac{1}{4}$ T. 43
29

R. 31



252

33245

Q.A.E.

1830 N. 1750 W. of S.E. Cor. Sec. 24-43-32.

At the rail road cut. There are exposures of the schistose epidiotic amygdaloid, best exposed on the west side of the road. The joint cracks are filled with epidote, and this mineral and quartz are segregated in little areas all through the rock mass. At the southern edge of the northern ledge on the east side of the road the usual spheroidal parting is well seen, and here the rock is more epidiotic than elsewhere.

253

33246

Q.A.

1050 N. 600 W. of S.E. Cor. Sec. 30-43-31.

Schistose amygdaloid from small ledge in sand plain.

254

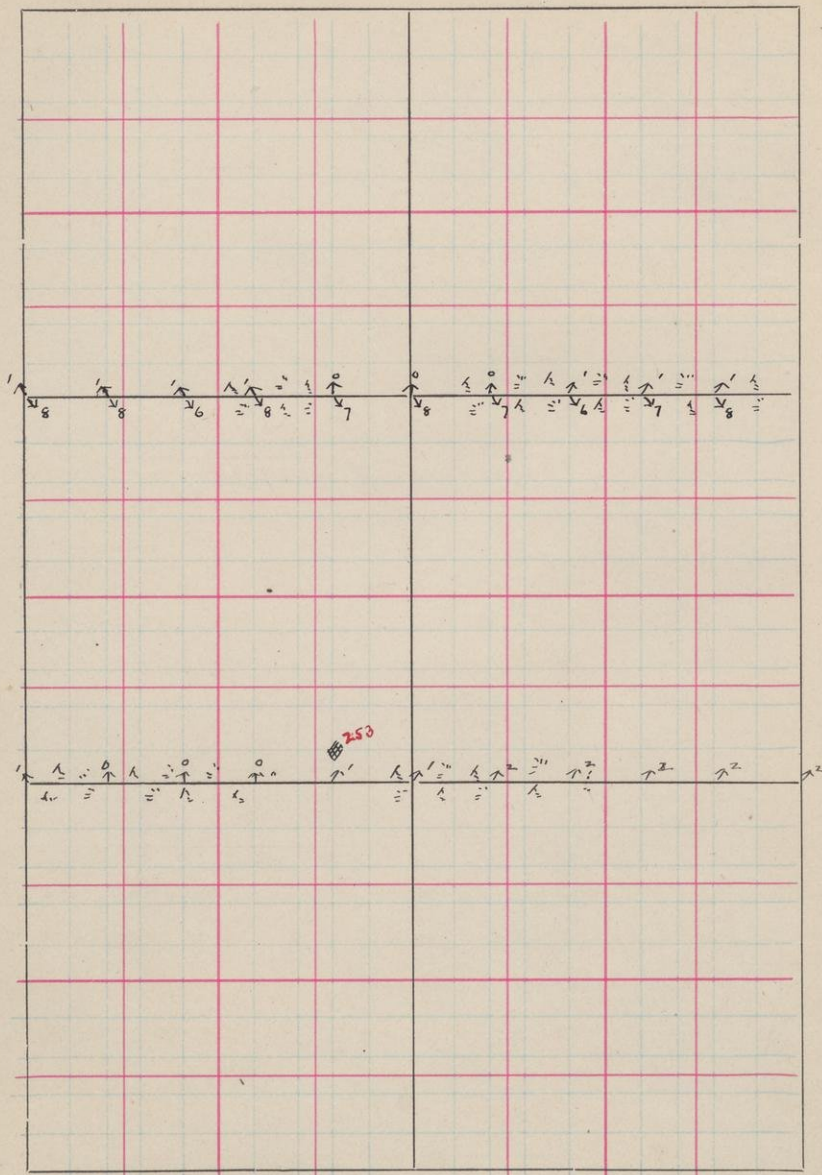
33247

1050 N. 1950 W. of S.E. Cor. Sec. 30-43-31.

From south side of large bare knoll of fine grained black greenstone, schistose in places but generally massive.

S. $NE \frac{1}{4}$
30 T. 43

R. 31



255
33248
Q.C.

975 N. 700 W of S.E. Cor. Sec 25-43-32.
Greenstone conglomerate from small ledge. On the south side of the ledge and in contact with the conglomerate is a black schistose rock like schistose phases of 254.

256.
33249

1010 N. 820 W. of S.E. Cor. Sec 25-43-32.
Small ledge of schistose, fine grained black greenstone.

257
33250

1020 N. 1450 W of S.E. Cor. Sec 25-43-32.

Fine grained black, slightly schistose greenstone forming a thin covered hill.

27.

258
33257
G.H.F.

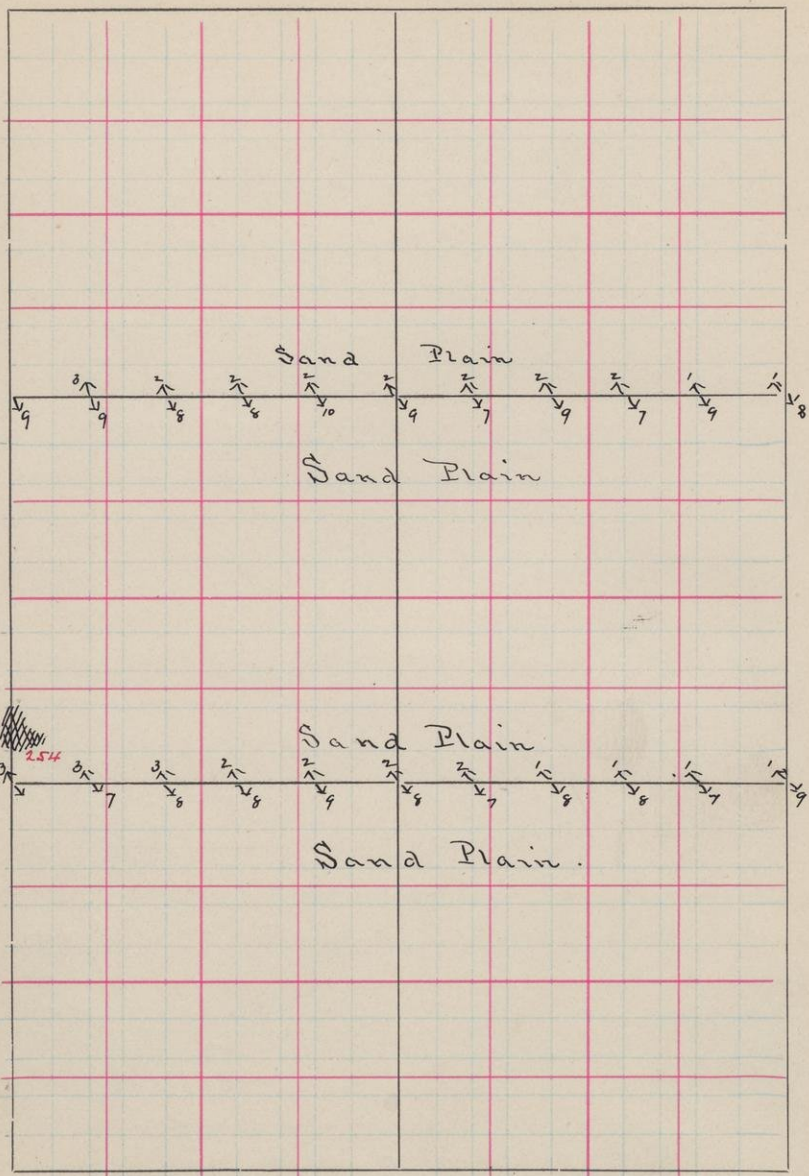
1000 N 1585 W of S.E. Cor. Sec 25-43-32.
Small ledge of greenstone, containing little crystals of iron carbonate. Another ledge of the same rock is at 1620 W.

259
33252
G.A.E.

Beyond this to the west is a high, large, thin covered hill, in which however are not numerous exposures. The rock where seen is

S. $NW \frac{1}{4}$
30 T. 43

R. 31



a dense, gray greenstone with
concretions of red feldspar.

260
33253

G.A.E.

1510 N. 1860 W of S.E. Cr Sec 25-
43-32.

Schistose, gray amygdaloidal
greenstone forming steep west
slope of high hill trending N & S.
Rest of hill was covered.

261.
33254
G.A.E.

Returning west along the line
1500 N of S. Sec line of Sec 25-43-
32, a high hill was crossed be-
tween 1750 and 1050 W of E line.
Hundreds of ledges were seen, of
the most prominent of which
were located.

The specimens taken show the
character of the rocks met with.

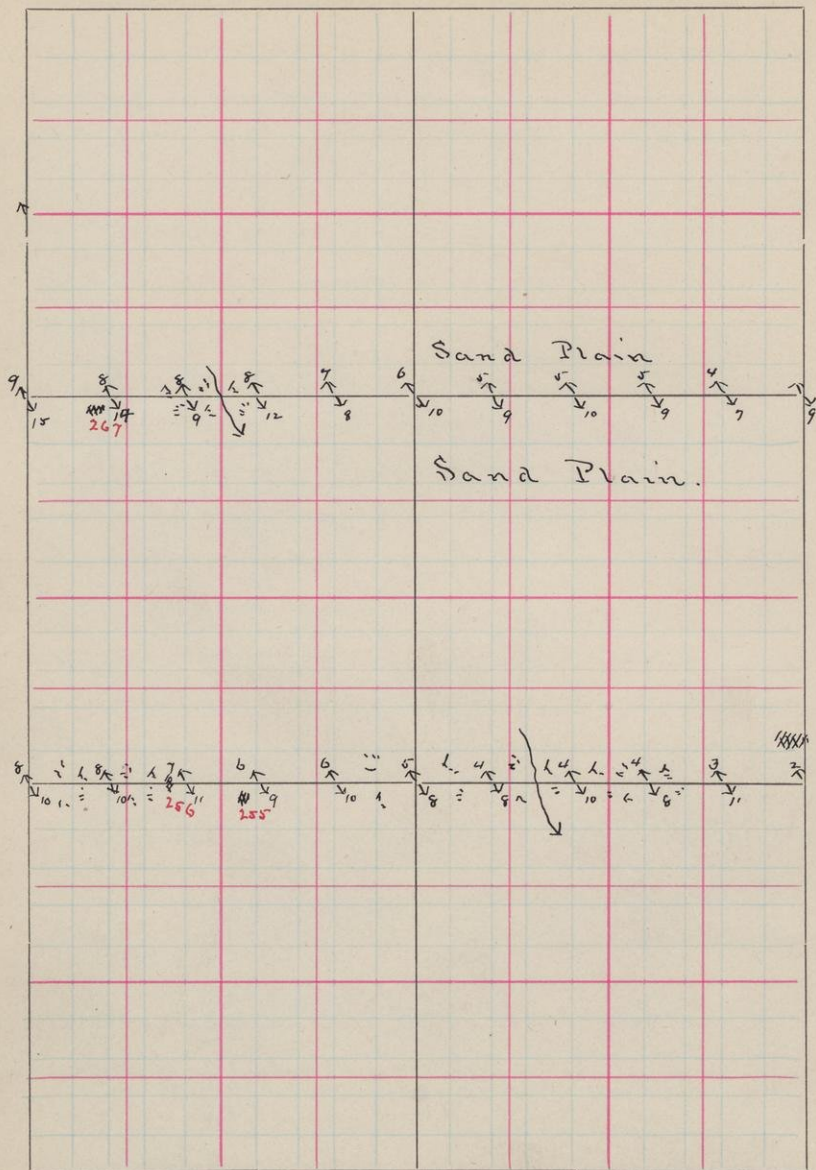
261
33254

1490 N. 1680 W of S.E. Cr Sec 25-43-
32.

A cryptocrystine greenstone con-
taining red crystals of feldspar -
a rock not unlike 259, of which
there is a ledge at 1750 W.

S. NE 1/4 T. 43
25

R. 32



262
33203

263

33206

G.A.F.

1450 N. 1450 W of S.E. Cor. Sec 25-

43-32.

In a ledge of schistose greenstone there are bands of rock looking like slate (262). In other places these bands are brecciated (263)

Irregularly interbedded with these there is an evenly banded schistose amygdaloid, with its amygdules of quartz elongated, and often to such an extent that they have become very thin bands, and the rock has assumed the appearance of a gray evenly banded gneiss.

264.
33207

G.A.F.

1500 N. 1400 W of S.E. Cor. Sec 25.

43-32.

Schistose amygdaloid, resembling 263, but less schistose.

265
33208

G.C.P.

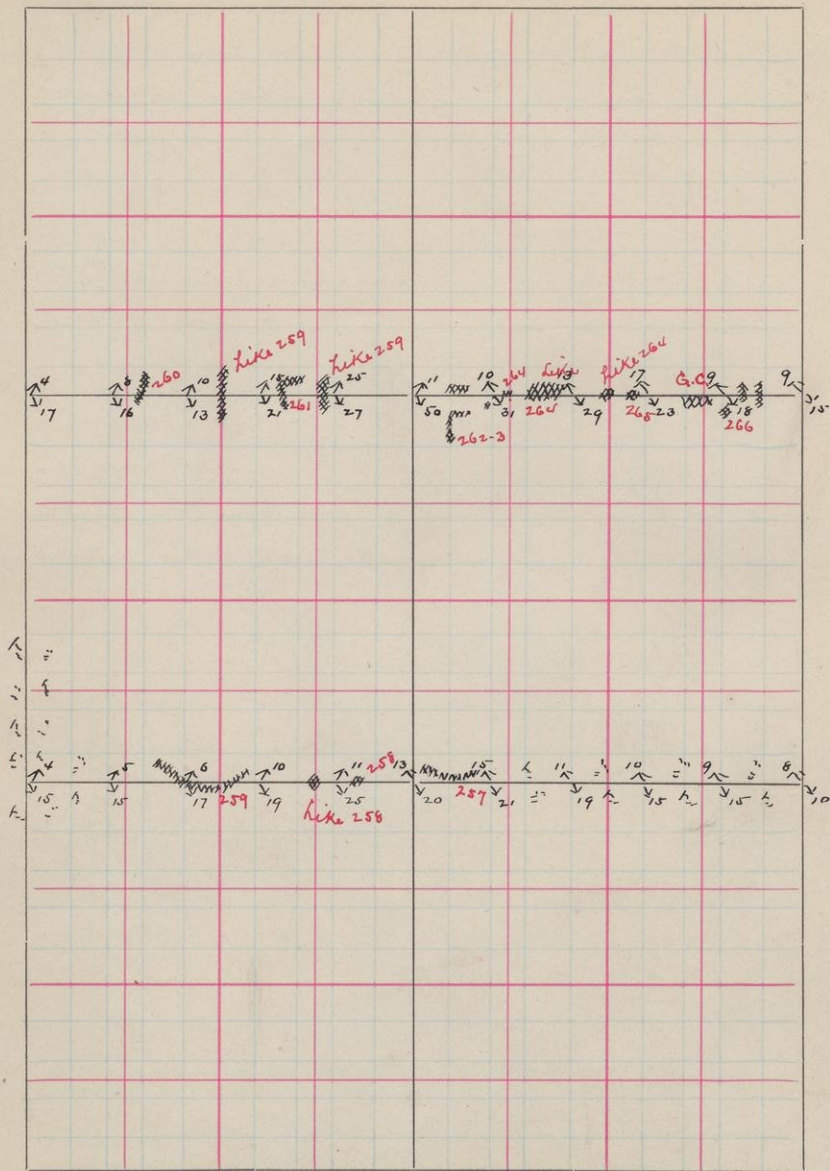
1500 N. 1230 W of S.E. Cor. Sec 25.

43-32.

Porphyritic fine grained, gray greenstone.

S. $NW\frac{1}{4}$
25 T. 43

R. 31



Between 1170 and 1050 N of
 E line of Sec 25-43-32 and 1500
 N. are exposures of a greenstone
 conglomerate in which the ma-
 trix as well as the fragments,
 consist of the greenstone with
 crystals of iron carbonate? (like 258).
 On the weathered surface the
 rock exhibits the peculiarities of
 the greenstone conglomerate, but
 on the fresh fracture it is seen
 to be quite different, since the
 material is not the fine grain-
 ed, dense, gray greenstone of the
 conglomerate, but is that of the
 carbonated rock, which Usselman
 has discovered to be an amyg-
 daloid.

This may indicate that the green-
 stone conglomerate is like in
 character to the spheroidally banded
 rock.

[Cf. 218 - 219]

267

33266

G.A.F.

1500 N. 920 W y S.E. Cr. Rec 25-
43- 32.

A schistose amygdaloid that
closely resembles a slate. From
small ledge

268

33261

G.C.M.

1500 N. 1850 W y S.E. Cr. Rec
29-43- 31.

Fine grained, dense gray green-
stone forming little knob in
sand plains near west bank
of the river.

Made a trip across Section 29-43-31 along the line 1045' S of the well Section line, starting at the river and running East. Most of the rock seen was a very coarse grained, gray lustrous mottled gabbro, but along the river bank are *Psilonomma* that are of some unusual interest.

On the East bank of the river at 425 N 1800 W of S.E. Cr Sec 29-43-31 is a large exposure of conglomerate associated with banded slates and greenstones.

The conglomerate is full of pebbles of all sizes and shapes, of greenstones, slate and chert. The greenstones are the most pebble like. They are rounded fragments of the fine grained dense variety.

The slate is the siliceous banded one, like the slates in Sec 4. Fragments of this are irregular and usually quite large.

The cherts are not rounded as

a rule but are fragments. Most of them are angular, and much larger than broad and in several cases two neighboring pieces are evidently fragments of the same original piece. Lenticular areas of the same white material occur as lenticular masses in the matrix of the conglomerate, and these in their edges are pinched into long stringer like masses, which in turn have often been broken (partly) away by the forces that produced the schistosity in the conglomerate, and thus have given rise to many of the long narrow fragments of this substance.

Two suppositions with regard to the chert fragments are thus possible.

1. The chert masses are secondary masses in the conglomerate, that originated before the rock became squeezed, and the fragments are brecciated pieces of them.
2. The large pieces and some of the lenticular ones are true fragments

44

some of which were broken by
the schistosity-producing forces.

A third possibility is that the
chert in all cases replaces some
other substance and is subsequent
in point of origin to the conglomerate.

Of the three suppositions the 2nd
appears the most reasonable, if
the fragments are true chert.

As to the nature of the material
the miners here must decide. Some
of it is brown white and structure-
less, other pieces are banded with
red like Jasper or with black like
flint, but whether this coloring
matter is only superficial cannot
say. A full suite of specimens
was taken to determine the ques-
tion.

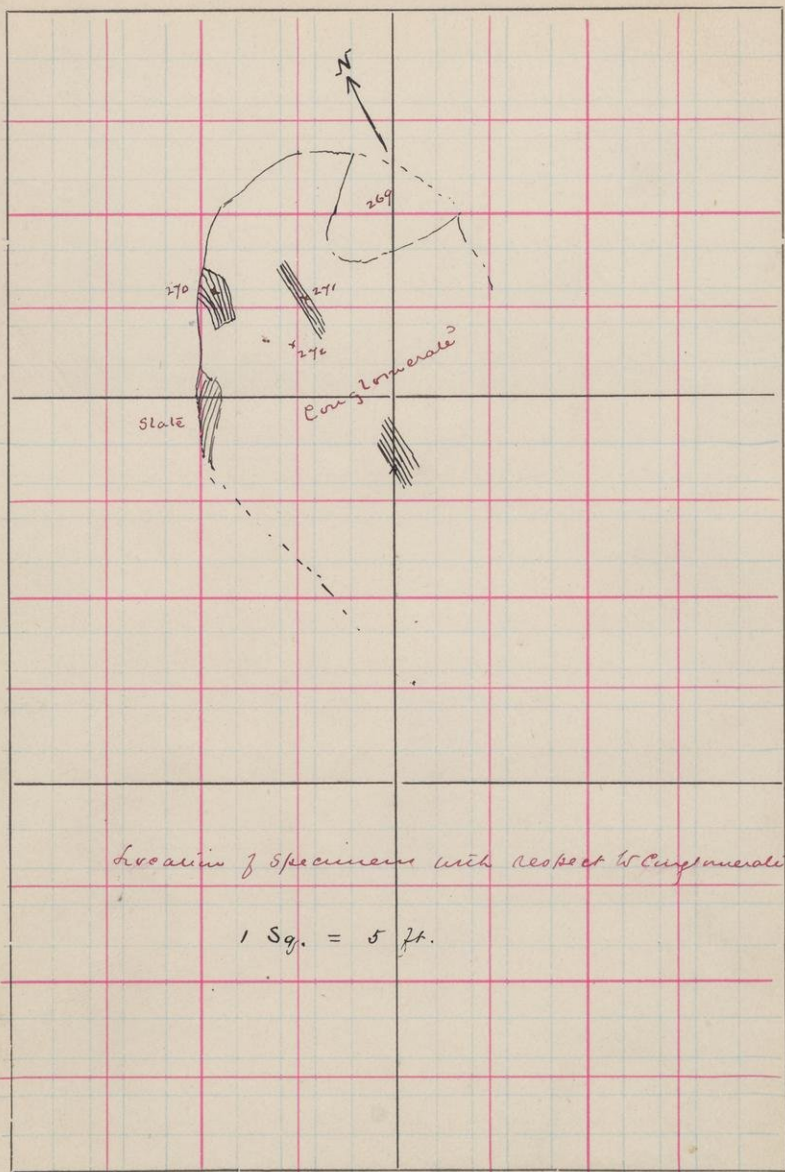
The conglomerate is schistose, as
has already been remarked, with
its schistosity striking 10-15° N of W.

Intervened with it is a layer of
sandstone or siliceous slate whose
strike is 17° N of N and dip 75-80 S.W.

S.

T.

R.



This strike is undoubtedly the true strike of the conglomerate.

Several large areas in the conglomerate (see sketch) are free from pebbles. They are often surrounded by the conglomerate and appear like greenstone.

269

33262

270

33263

Banded slate from west side of conglomerate exposure. The relations of this slate to the conglomerate are not quite clear. If the slate here is a large fragment its relations are easily understood. If a true bed, it is unconformable under the conglomerate, although on the west side of it. Moreover large fragments of it do undoubtedly occur in the conglomerate.

271

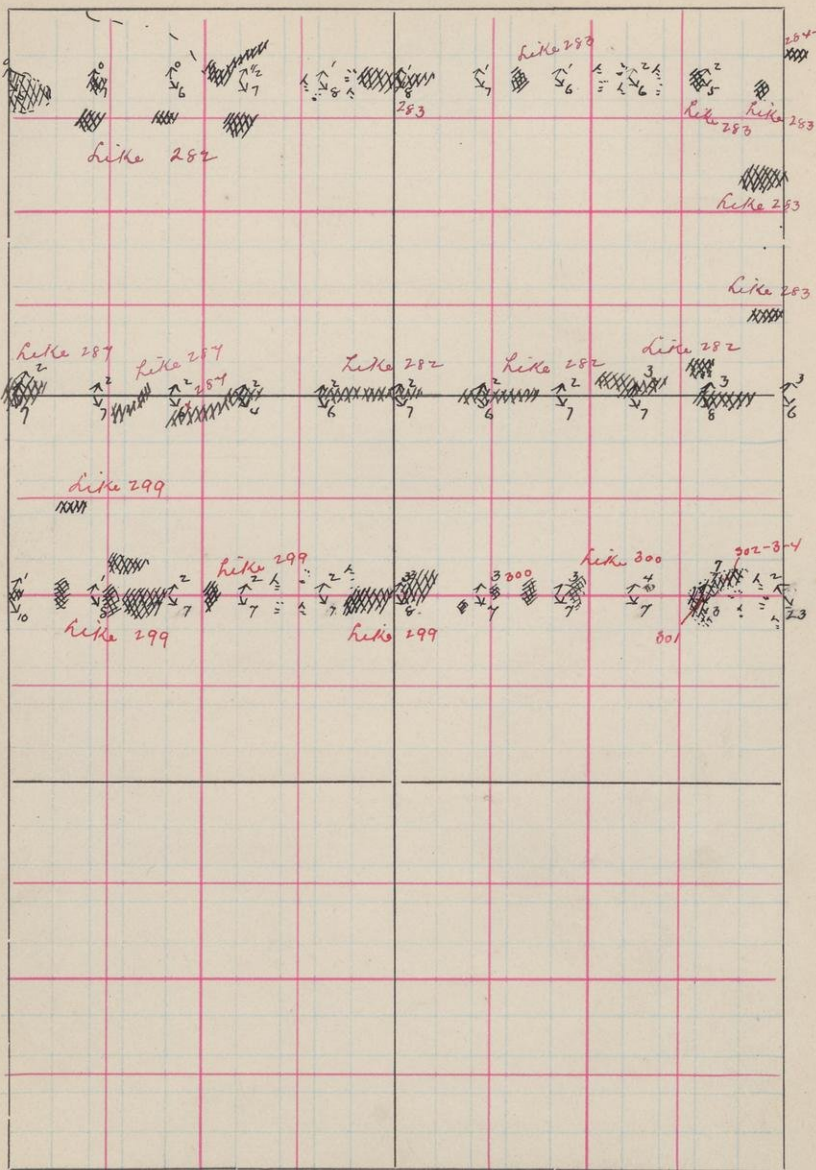
33264

C.

is from the narrow band of quartzite or sandstone interbedded with the conglomerate. It is the bed whose strike is above referred to.

S. S. E. $\frac{1}{4}$
 29 T. 43

R. 31



272-
33265
C.

Weathered surface of conglomerate
showing pebbles

273
33266
A.M.

Fine grained dense greenstone,
about 100 ft. S. of conglomerate ex-
posure and 50 ft. west.

274
33267

Greenstone pebbles

275
33268

" "

276
33269

Banded chert pebbles

277
33270

" " "

278
33271

White " "

All from conglomerate.

279
33272
G.D.

820 N. 1700 W. of D.E. Cr. Sec 29-43-31.
Coarse grained Diabase that cuts 1/2
conglomerate at the south.

280
33273
A.M.S.

925 N. 1700 W. of D.E. Cr. Sec 29-43-31
A narrow band of actinolite = mag-
netite schist striking 18° E of N
and dipping 47° W is separated from
the conglomerate by a wedge of
greenstone like 279. Its strike
would indicate an unconformity-
with the conglomerate, but this

difference may be due to the greenstone. The layers of the schist are not quite uniform in their strike. At their southern end they curve slightly and then strike more to the East. On both sides of the band (which is not more than 15 ft wide) is the greenstone.

281

33274

G.D.

925 N. 1600 W of S.E. Cr Sec 29-43-31.
Red weathering coarse greenstone, slightly schistose. On weathered surface it resembles granite. On fractured surface hornblende is abundant and quartz very rare.

282

33276

G.D.

900 N 1300 W of S.E. Cr. Sec 29-43-31.
Light colored, coarse gabbro, line mottled in fresh fracture.
This rock forms the hills throughout the entire section except near the river.

283

33276

G.D.

925 N. 500 W of S.E. Cr. Sec 29-43-31.
Gabbro, coarser grained and little darker than 282.

284 } 950 N. 25 E of S.E. Cr Sec. 29-43-31

33277

285

33278

286

33279

G.D.

At about 50 paces S of the E 1/4 part
of Sec 29 and 10 paces E is the west
end of a knob of fine grained
greenstone (284), whose rock is cut
by granitic veins and impregna-
ted with granitic material (285+286)
The rocks look remarkably like
some of the Marquette green schists?

287
33280

G.D.

450 N. 780 W of S.E. Cr. Sec 29-43-31
Coarse gabbro, cut by pink quartz-
veins.

288
33281

G.D.

500 N. 1150 W of S.E. Cr. Sec 29-43-31.
Coarse lustre mottled gabbro

289
33282

G.D.

525 N. 1500 W of S.E. Cr. Sec 29-43-31.
Coarse gabbro, with red feldspar.

At 500 N 1728 W of S.E. Cr. Sec 29
again met with acinolite^d magne-
tite schist, as a narrow band a-
bout 10 ft. wide striking 7° E of N.
It is beautifully bedded with its

actinolite^d bands $\frac{1}{2}$ in to 1 in. in thickness. Alternating with these are also narrow beds of soft green material that looks like tufa. Finely banded actinolite^d schist. Massive phase. Tufaceous(?) bed.

290
33283

291

33284

292

33285

A.M.S.

Again there is greenstone on both sides of the schist, as is the case further north, and again at the river bank is conglomerate.

This conglomerate, however, is unlike the conglomerate to the north in containing no large fragments and much fewer small ones - almost none of chert.

293
33286
C.

500 N. 1850 W of S.E. Cr. Sec 29-43-31.
Conglomerate^d

294
33287

Black fragment from same.

295
33288
G.C.M.

Fine grained, dense greenstone, from west side of river 1724 W of S.E. Cr. Sec 29-43-31.

296
33289
G.C.

Above and apparently grading into 295 is a greenstone conglomerate showing well defined pebbles in it.

north side, in a schistose greenstone groundmass.

297
33290
G.D.

100 N. 1700 W of S.E. Cr. Sec 29-43-31.

From a knot of coarse grained, massive, red weathering greenstone, containing large crystals of green hornblende. On its west side the rock is quite schistose. It is also much decomposed and redder than elsewhere, and is studded with secondary quartz, especially on its joint planes.

298
33291
G.D.

250 N 1600 W of S.E. Cr. Sec. 29-43-31

From west side of large hill of same rock as 297. In places the rock is coarser than elsewhere, and here and there are rounded, irregular, areas surrounded by rims of coarse hornblende and plagioclase. It seems as though these areas are the remnants of fragments or inclusions of other greenstones caught up in 298, as the texture is sometimes finer than that of surrounding rock and the structure diabasic.

299
33292
Q.D.

250 N. 1250 W. of S.E. Cr. Sec 29-43-31
Here begin the ledges of the white weathering, mottled, light colored gabbro

300
33293
Q.D.

250 N. 380 W. of S.E. Cr. Sec 29-43-31
Coarse grained phase of 299

301
33294
Q.D.

250 N. 150 W. of S.E. Cr. Sec 29-43-31
Diabasic phase of 299.

at 250 N. 80 W. of S.E. Cr. Sec 29-43-31,
on the south side of a cliff, which
further west is Diabase (301) There
thru an alternation of thin lay-
ers of various greenstones that is
as perfect as the alternations of
strata in a sedimentary

302
33295
Q.D.

The greenstone near the bands is
porphyritic.

303
33296

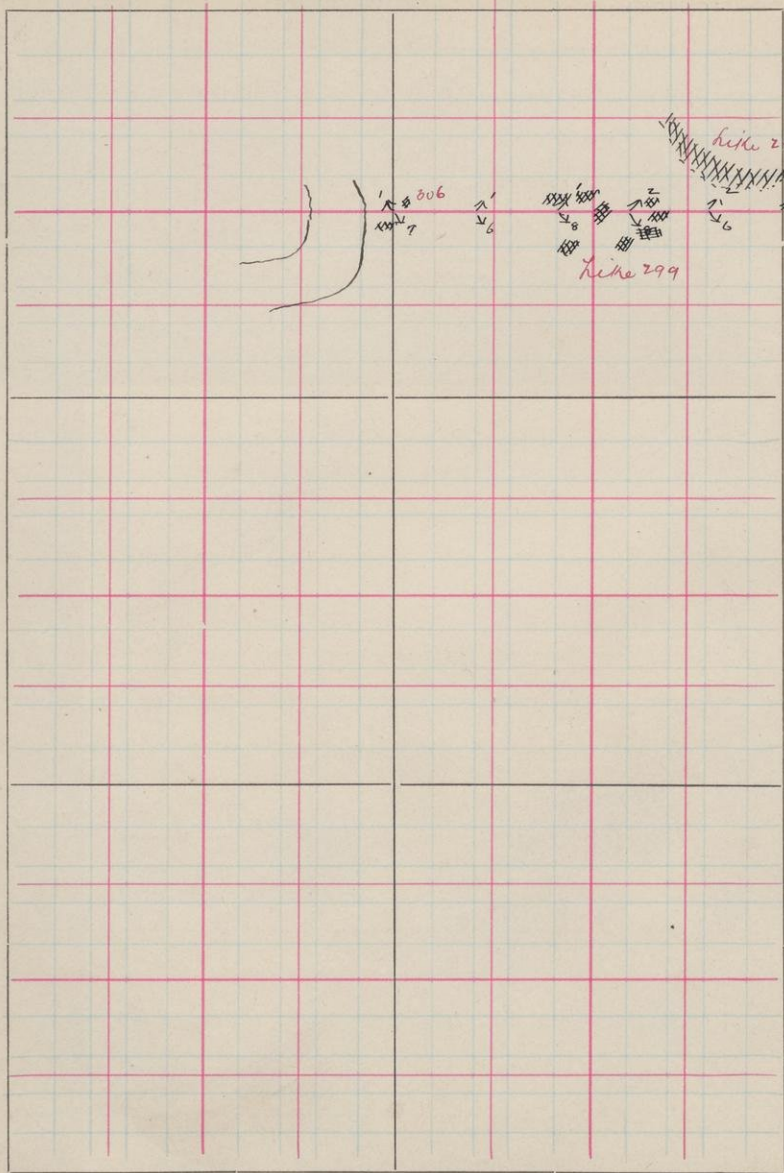
The bands themselves look like
the fine grained, dense, greenstone.
On weathered surface the bands
are plainly apparent, but on the

304
33297

fresh fracture they are invisible.
Since some of the bands are porphy-
ritic there is no question but that

S. 32° NW $1/4$ T. 43

R. 31



They are Eruptive flows. Strike
25° E of N. Dip, 50° N.

These observations would indicate that the breccia from which the Diabasic greenstone 302 was taken belongs with the flow rocks through which the gabbro intrudes.

305-
33298
G.D.

1900 ft of S.E. Cr. Sec 32-43-31

Fine grained black greenstone,
strongly magnetic.

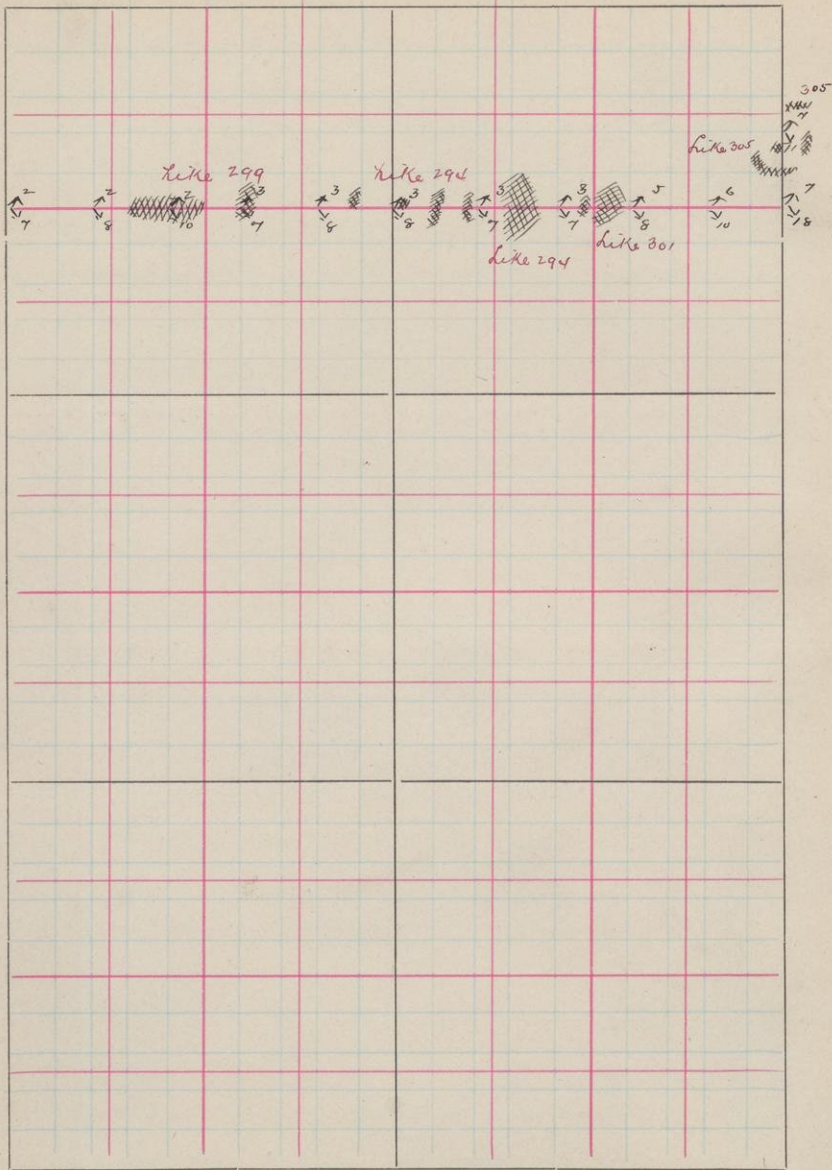
306
33299
G.D.

1750 N. 1480 N of S.E. Cr Sec 32-43-
-31.

Coarse, white-gabbro.

S. $NE \frac{1}{4}$
32 T. 43

R. 31



For descriptions of rocks in U 1/2
Sec 29 - see

307.
33300

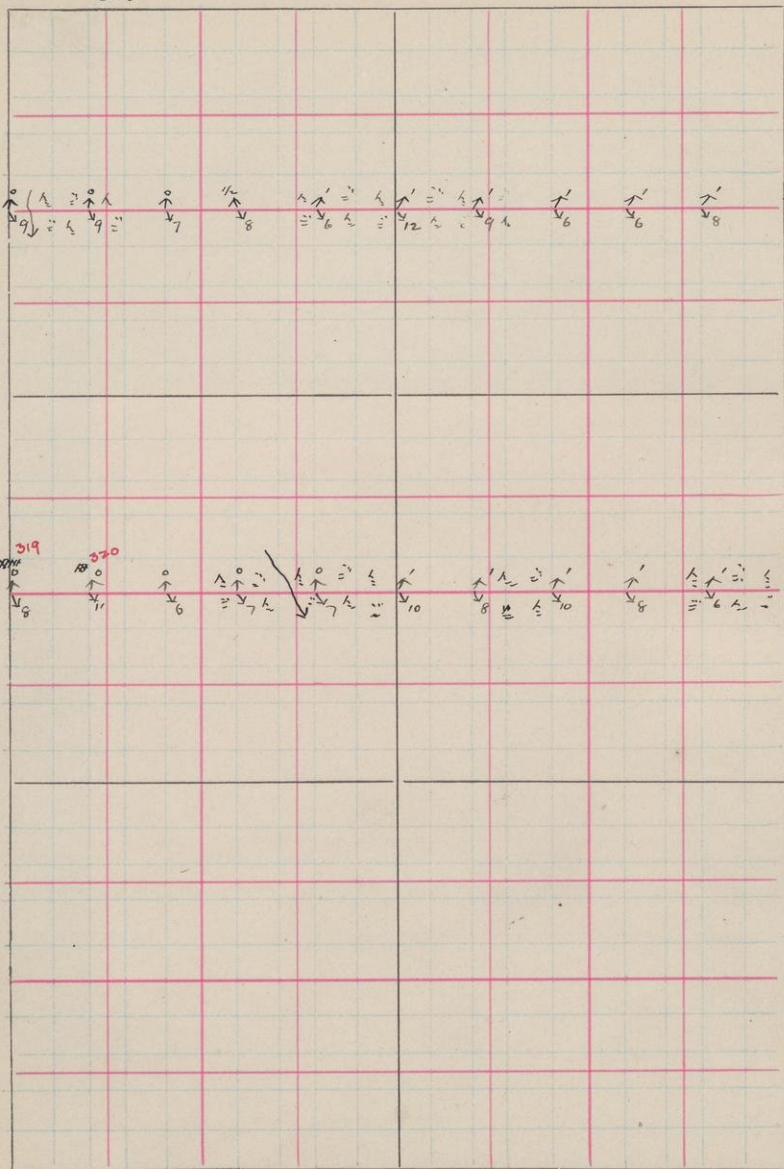
G. P.

750 N. 1950 W of S.E. Cr. Sec 29-43-
31.

Fine grained gray greenstone
in hillock near the river bank.
Rock becomes porphyritic near
western end of hill.

S. S. E. $1/4$ T. 43

R. 31



308

33301

G.A.

730 N. 1500 W of O.E. Cr. Sec. 30. 43-31.

The sand plains here end with a sink in a steep declivity on which are many fragments of 308. The rock is in place a few hundred feet to the west.

A much decomposed schistose amygdaloid.

309

33302

G.C. M.

750 N. 1980 W of S.E. Cr. Sec 30 - 43-31.

Small ledge of fine grained, dense, gray greenstone.

310

33303

G.A.F.

750 N. 1510 W of S.E. Cr Sec 25 - 43-32.

Small ledge of fine grained greenstone with tiny crystals of iron carbonate?

311

33304

312

33305

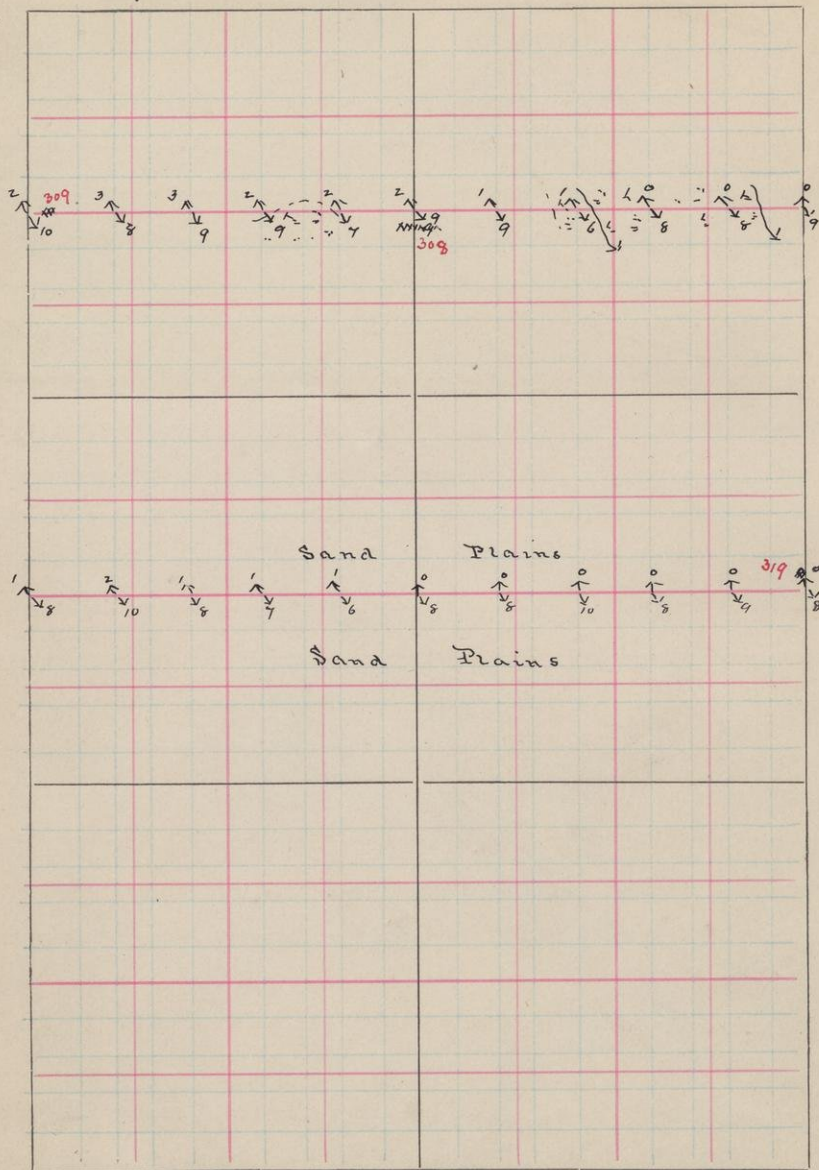
G.A.F.

800 N. 1650 - 1700 W of S.E. Cr Sec 25 - 43 - 32.

Schistose, light colored rocks that look like limestones, but are occasionally amygdaloidal. 311 is

S. $\text{SW } \frac{1}{4}$ T. 43
30

R. 31



the massive phase and 312 the
schistose zone.

313
33316

Schistose greenstone from west end
of knob from which 311-12 came.
The three rocks appear to grade
into each other.

33307

314.

G.C. 21

250 N. 1330 W of S.E. Cor. Sec 25-
43-32.

From south side of hill of slightly
porphyritic greenstone.

315
33308

G.A.

200 N. 840-870 W of S.E. Cor. Sec
25-43-32

Much decomposed schistose
greenstone.

316.
33309

G.A.F.

240 N. 760 W. of S.E. Cor Sec 25-
43-32.

Apparently a bedded non-schis-
tose rock full of sugary quartz,
and weathering so as to yield
a thick coat of yellow ochre.
Fine grained massive greenstone
in same ledge, a few pieces south
of 316.

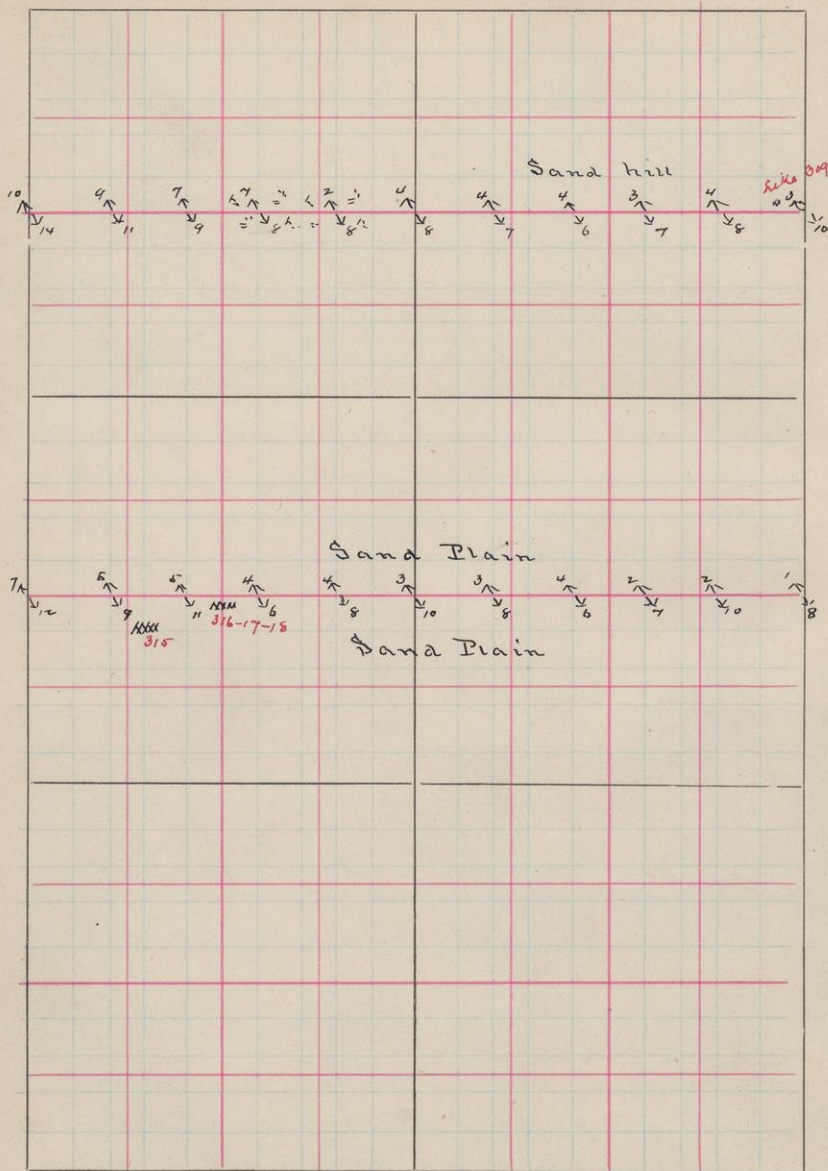
317.

33310

G.A.F.

S. $\$ E 14$
25 T. 43

R. 32



318
33311

(L)

very dense and massive phase of
316. East end of same ledge.

319
33312

(L)

285 N. 1000 N of S.E. Cr. Sec 30-
43-31.

Schistose greenstone.

33313

320

(L)

285 N. 930 N of S.E. Cr Sec 30-43-
31.

Massive, jointed, fine grained
greenstone with large crystals
of pyrite?

S. SW $\frac{1}{4}$ T. 43
25

R. 32

