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Crystal Falls region, Michigan: neighborhood of Michigamme River: [specimens] 32160-32199, 32787-32929. No. 289 1892, 1896

Bayley, William Shirley, 1861-1943; Clements, J. Morgan (Julius Morgan), 1869-
[s.l.]: [s.n.], 1892, 1896

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

#289

Crystal Falls Region
Michigan
E. R. Maurer, H. A. Bayley

32160-32189; 32787-3292;

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

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

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

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of 2 x 2½ x ¾ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 1 inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

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Neighborhood
of
Michigamme River

1892

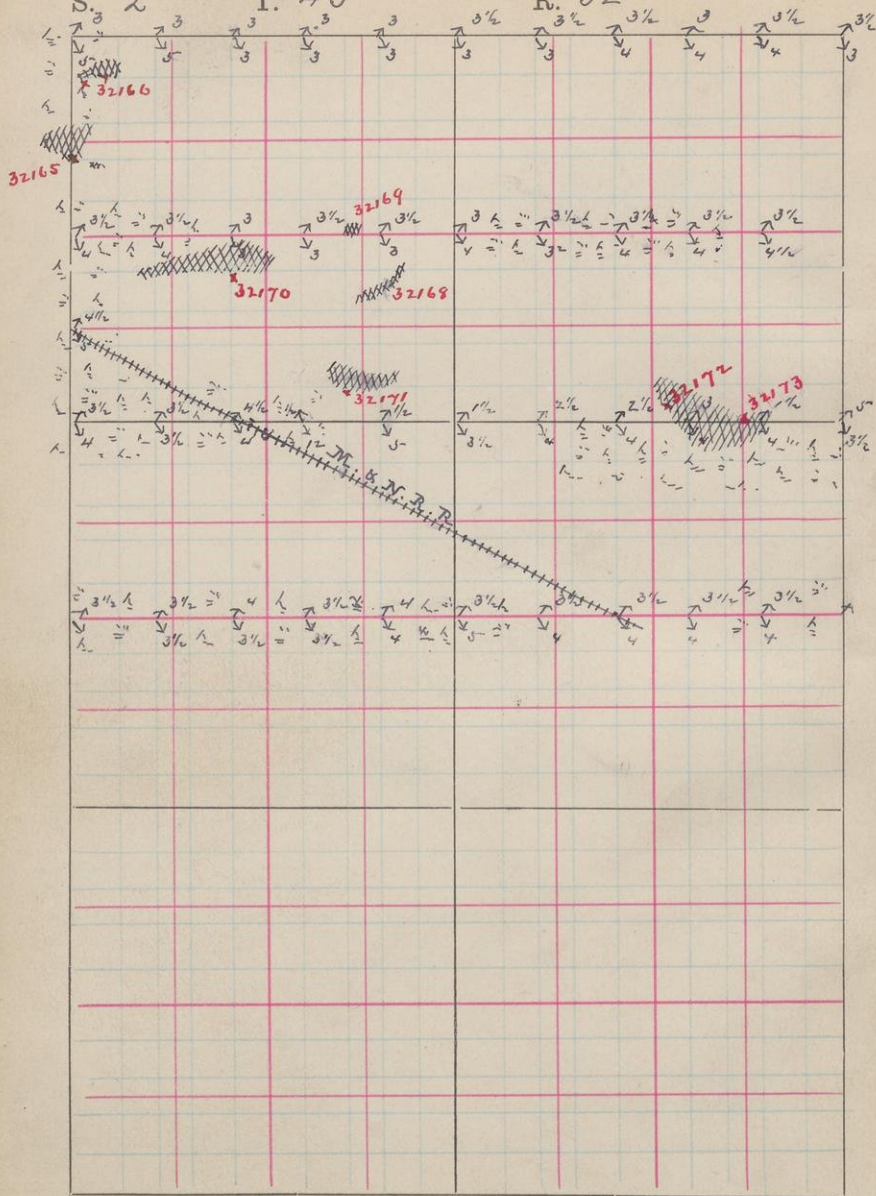
W. L. Bayley

N.W. 1/4

S. 2

T. 43

R. 32



In section 2 T43 R32. The following
ledges were found, all of fine or me-
dium grained gray Diabase.

32165 2000 W 1850 N of S.E. Cor. Sec. 2.

32166 2000 W 1950 N " " " "

32167 847 W 1745 N " " " "

32168 1580 W 1692 N " " " "

32169 1650 W 1710 N " " " "

32170 1800 W 1690 N " " " "

32171 1650 W 1540 N " " " "

32172 1240 W 1525 N " " " "

32173 1120 W 1500 N " " " "

32173 is a coarser phase of the same
gray Diabase. It is closely associated with
the latter by which it is surrounded,
and was obtained from same hill
as 32172.

32174 480 W 1460 N S.E. Cor. Sec. 2.

Dark crystalline greenstone, resem-
bling basic phase of above.

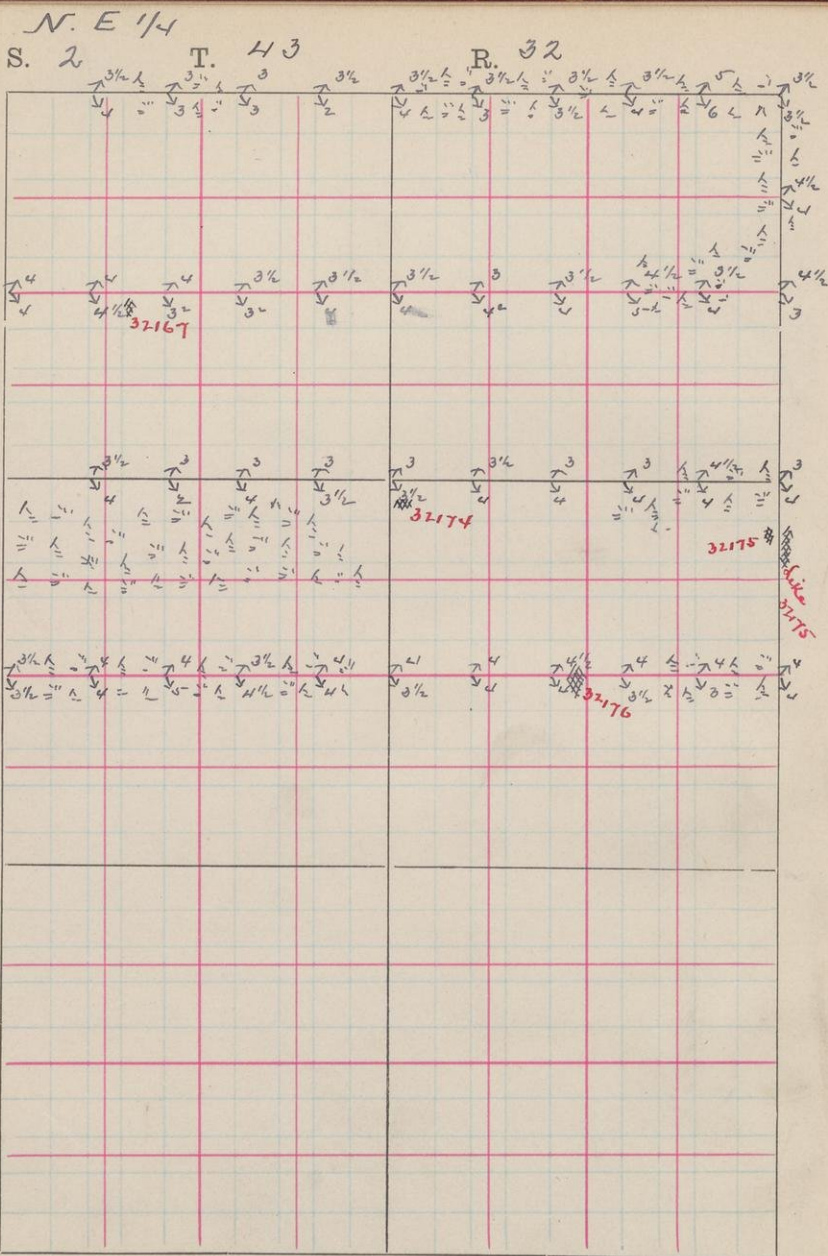
32175 20 W 1440 N of S.E. Cor. Sec. 2.

Like 32174 in composition, but slightly
schistose in structure.

32176 550 W 1250 N of S.E. Cor. Sec. 2.

In the East half of the North half
of the section the ledges are usually
small, but in the NW 1/4 they form

D.
a.



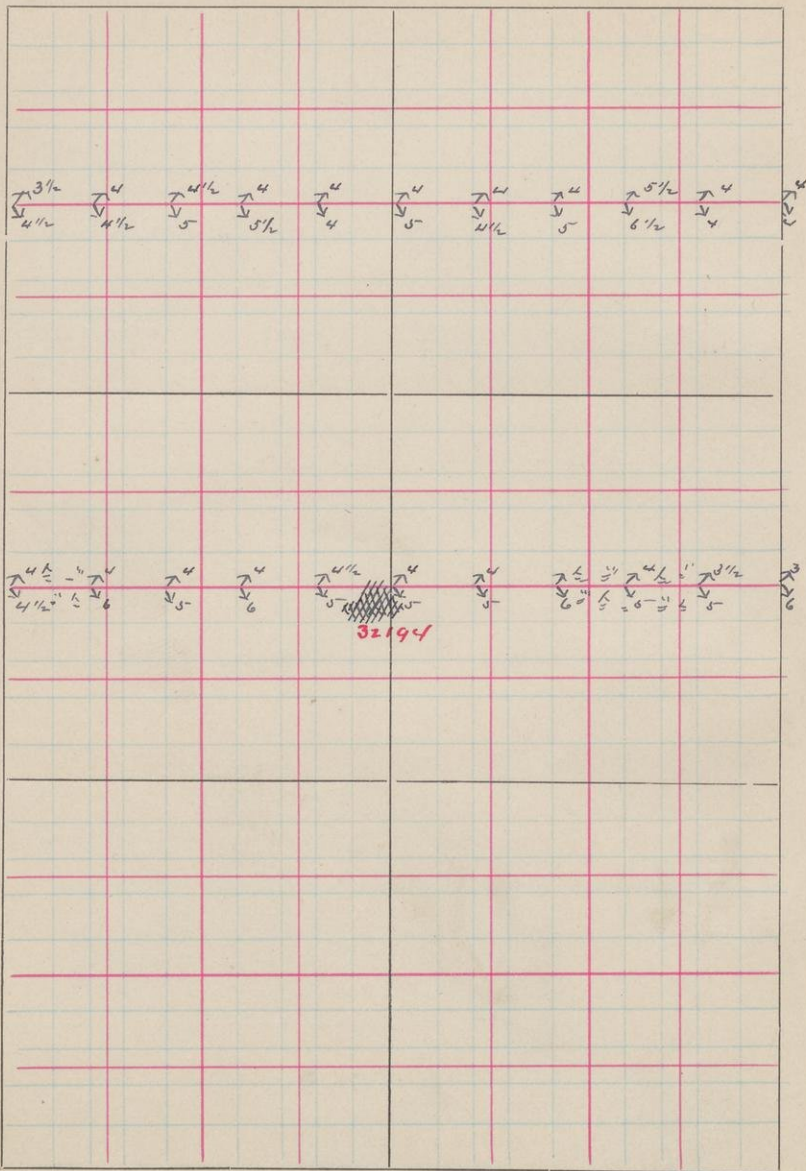
at times large hills, in which the
rock is well exposed.

NE 1/4

S. 11

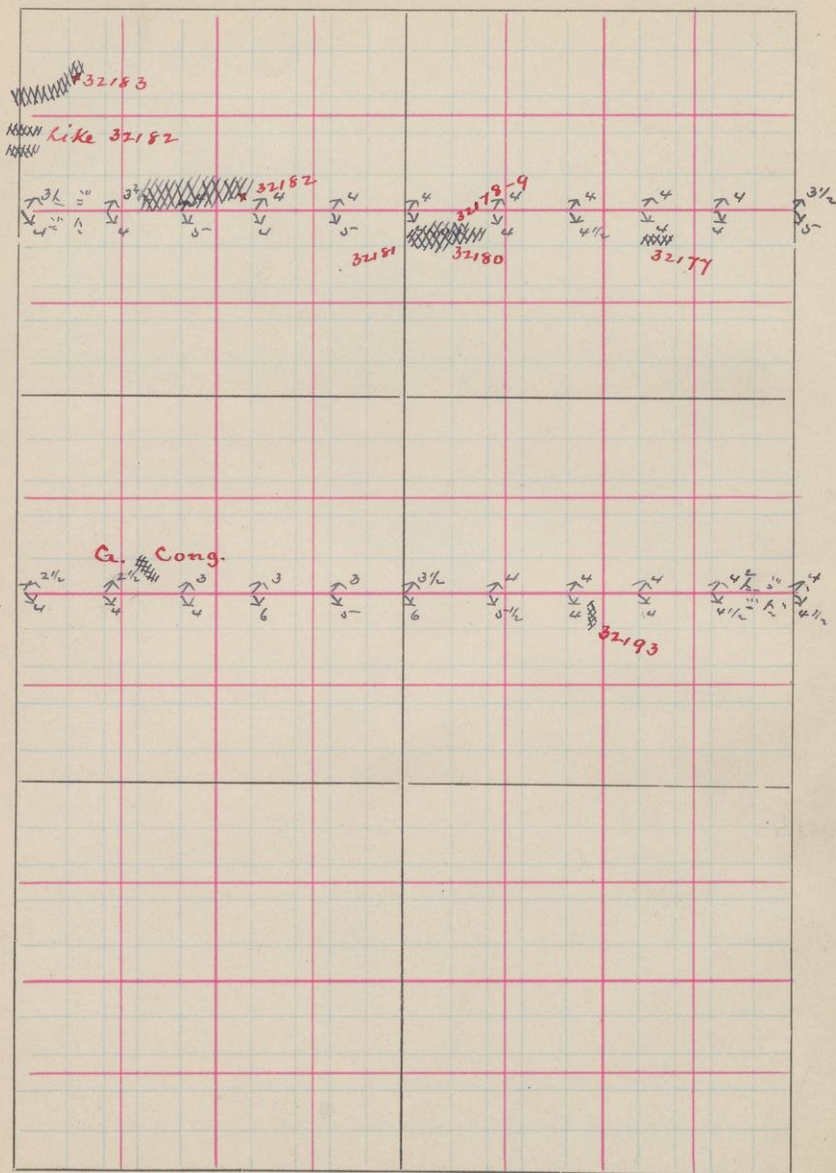
T. 43

R. 32



S. $N.W. \frac{1}{4}$ T. 43

R. 32



32177 1200 W. 1720 N of SE Cr Sec 11. 43-32.

A.D. Very fine grained dense gray massive greenstone without recognizable texture. It is a portion of one of the few greenstone already studied by Trauer and Uernum.

32178 } Are all from same hill at

32179 } 1300-1400 W. 1700-1750 N of SE Cr

32180 } Sec 11.

32181 }

A.D. The Knoll from which these specimens were taken is covered with moss, except on the south side of its top, where the rocks are well exposed.

On its north side, well down toward the bottom black slates occur, in which bedding planes are occasionally to be seen. The slaty cleavage strikes 100° N of W and dips high to the north, while ⁱⁿ the very small area of the bedded layers seen the dip is 40° - 50° South.

32178 Slates 1310 W. 1720 N SE Cr Sec 11.

B.52.

Just south of the slate is the fine

{ 32179 grained dense gray greenstone, which
32180 in the south side of the hill is much
G.C.M. jointed, and cut by quartz veins.

NE 1/4

S. 10

T. 43

R. 32

32187

32186-50

32184

Like 32187

32186 Cong

Tamarack and

Cedar

32191

G.C. 32192

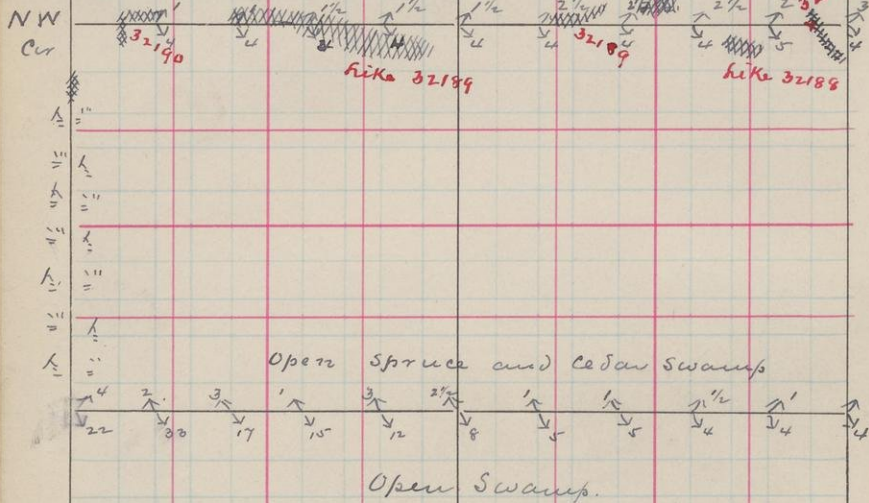
This grades into a coarse grained greenstone in which Diabasic structure is noticed, at the west end of the hill.

- 32181 1400 W. 1700 N of S.E. Cr Dec 11.
G.D.
- 32182 Fine grained gray Diabase forming
G.D. entire mass of hill at
1700 - 1850 W 1500 - 1550 N of S.E. Cr S. 11.
Specimen from S.E. Cr of hill.
- 32183 1950 W. 1925 N of S.E. Cr. Dec 11.
G.D. Dark Dioritic greenstone. Specimen from
S.E. end of hill.
- 32184 100 W. 2900 N of S.E. Cr Dec 10-43-32
G.D. Dark coarse diabase from about
half way down hill on 17. of which is
the NW Cr Dec 11.
- 32185 400 W. 1950 N of S.E. Cr Dec 10-43-32.
Bz. Sz. on north side of bluff forming hill
300 paces long is a facing of black
slate in which bedding planes are
easily discernible. These dip about
85° S.E. but their strike could not be
obtained.
- 32186 The main mass of the bluff at its
G.C. East end is greenstone conglomerate
which ends as a sheer precipice
about 50 paces S. of 32185.

S. 10 NW $1/4$

T. 43

R. 32



32187 500 W. 2000 N of S.E. Cor Sec 10-43-32.

G.C.M. The NW edge of this hill is the fine grained dense greenstone, which likewise occurs East as a narrow band between the slate and the conglomerate?

Another hill at 800 - 900 W is composed of the same fine grained greenstone (like 32187). The hill extends even beyond the $1/4$ post of Sec. 10, but no rocks are exposed in it beyond those at 900 W, until reach a little precipice at 1050 W. This little precipice is about 25 ft. high and it runs N.W. for at least 100 paces.

32188 1050 W. 2000 N of S.E. Cor. Sec 10. 43-32

G.C.M. From this precipice.

32189 1350 W. 2000 N of S.E. Cor. Sec 10. 43-32.

G.C.M. Fine grained gray dense greenstone. Other ledges were seen along the North line of this section, but they were located very far, as all were like 32189.

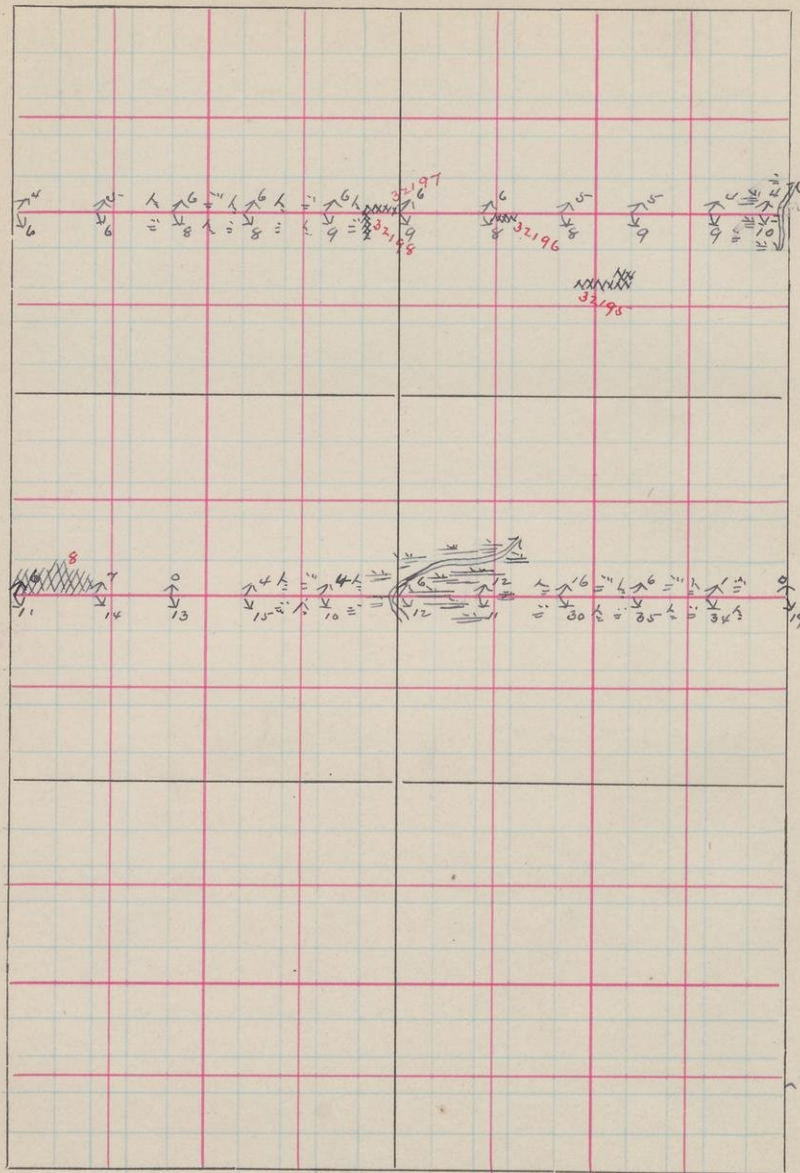
32190 1950 W. 2000 N of S.E. Cor Sec 10-43-32.

G.C. A dark schistose greenstone, looking conglomeratic in places.

S. 11

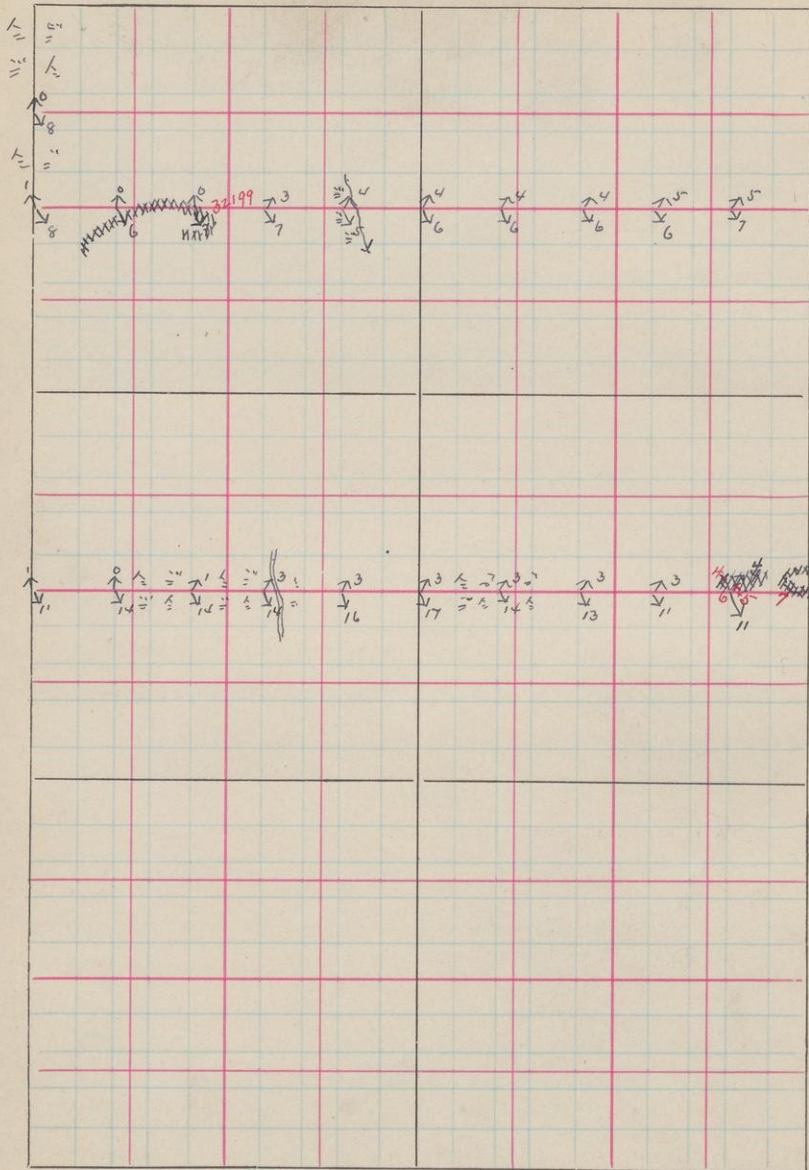
T. 43

R. 32



- 32191 ^W 100 E ^{1/2} 1500 N of S.E. Cor Sec 10-43-32.
 G.C. M Dark phase of very fine grained green-
 stone from west side of hill.
- 32192 1400 N of S.E. Cor Sec 10-43-32.
 G.C. Greenstone conglomerate from south
 side of same hill as furnished 32191.
 Another small ledge of conglomerate
 is at 1850 N. 1260-1300 N of S.E. Cor Sec
 11-43-32.
- 32193 1250 N. 1200 N of S.E. Cor Sec 11-43-32
 G.C. M Very small ledge of fine grained, dense
 greenstone.
- 32194 550 N. 1200 N of S.E. Cor Sec 11-43-32
 G.D. Coarse diabase from S.W. end of large
 hill exposing many bare ledges.
- 32195 650 N. 225 W of S.E. Cor Sec 11-43-32
 G.C. M. A fine grained, cliniferous greenstone
 with small white-weathering areas,
 causing rock to resemble a conglomer-
 ate.
- 32196 750 N. 395 W of S.E. Cor Sec 11-43-32
 G.C. N Schistose phase of the fine grained
 greenstone from north side of same

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



8

lie. A little further south the rock is like 32195.

32197 750 N. 570 W. of S.E. Cr. Sec 11-43-32
Q.C.M. a fine grained greenstone containing small white[?] porphyritic crystals of feldspar.

32198 40 paces further west the rock is
Q.A. amygdaloidal, with small black amygdolites.

32199 750 N. 1800 W. of S.E. Cr. Sec 11-43-32
Q.C. From East end of long hill. The rock is the greenstone conglomerate[?]. At the west end of the knob the schistosity[?] dips almost vertically, perhaps a little to the north.

For previous specimens also see Book 288

32787 570 N. 860 W. of S.E. Cr. Sec 10-43-32

Q.C.M. Fine grained gray greenstone forming west side of hill.

2
32788 570 N. 830 W. of S.E. Cr. Sec 10-43-32

Q.C. The southern portion of this same hill is greenstone conglomerate, in which are many rounded pebbles about an inch in diameter. On weathered surface they become white[?], and on fresh fracture they

S. 10 T. 43

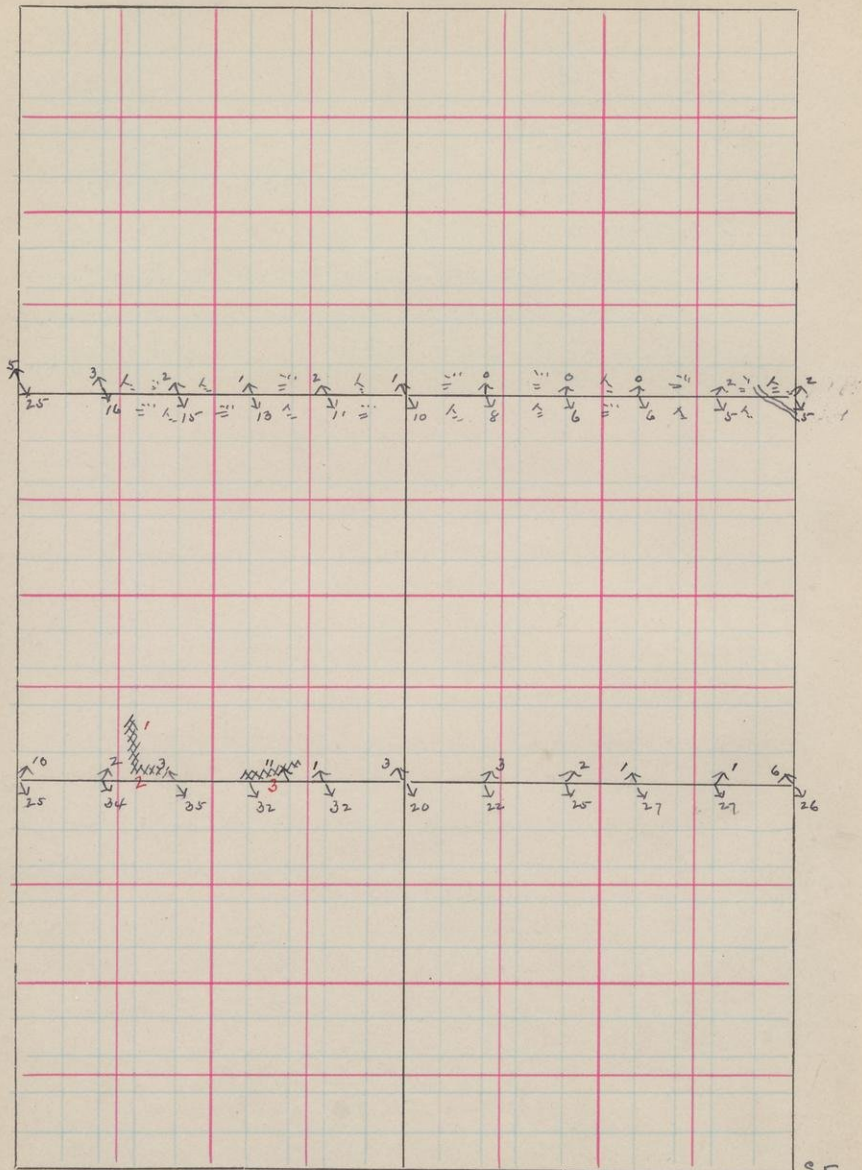
S.

10

T.

43

R. 32



6—747

SE
Cor.

look like 1.

3

32789

G.C.

700 W. 510 U. of S.E. Cr. Sec 10-43-32
The conglomerate again appears a little further East in another knob. Here the groundmass is amygdaloid as are also some of the pebbles. The amygdaloides are sometimes a black substance, and at other times are red like jasper. The strike was thought to be 10° S of W. and dip, very high to the north.

4

32790

G.A.E.

270 U. 1100 W. of S.E. Cr. Sec 11-43-32
A massive purplish gray greenstone from north side of Little Hill, on whose south side is an amygdaloid with calcite and dark amygdaloides and often empty cavities.

5

32791

G.A.E.

6

32792

G.A.E.

About 10 paces U. of 5 the fillings are all drawn out like elongated amygdaloides, whose banding gives opportunity to determine the dip and strike of the rock. The dip is 75° to S.

7

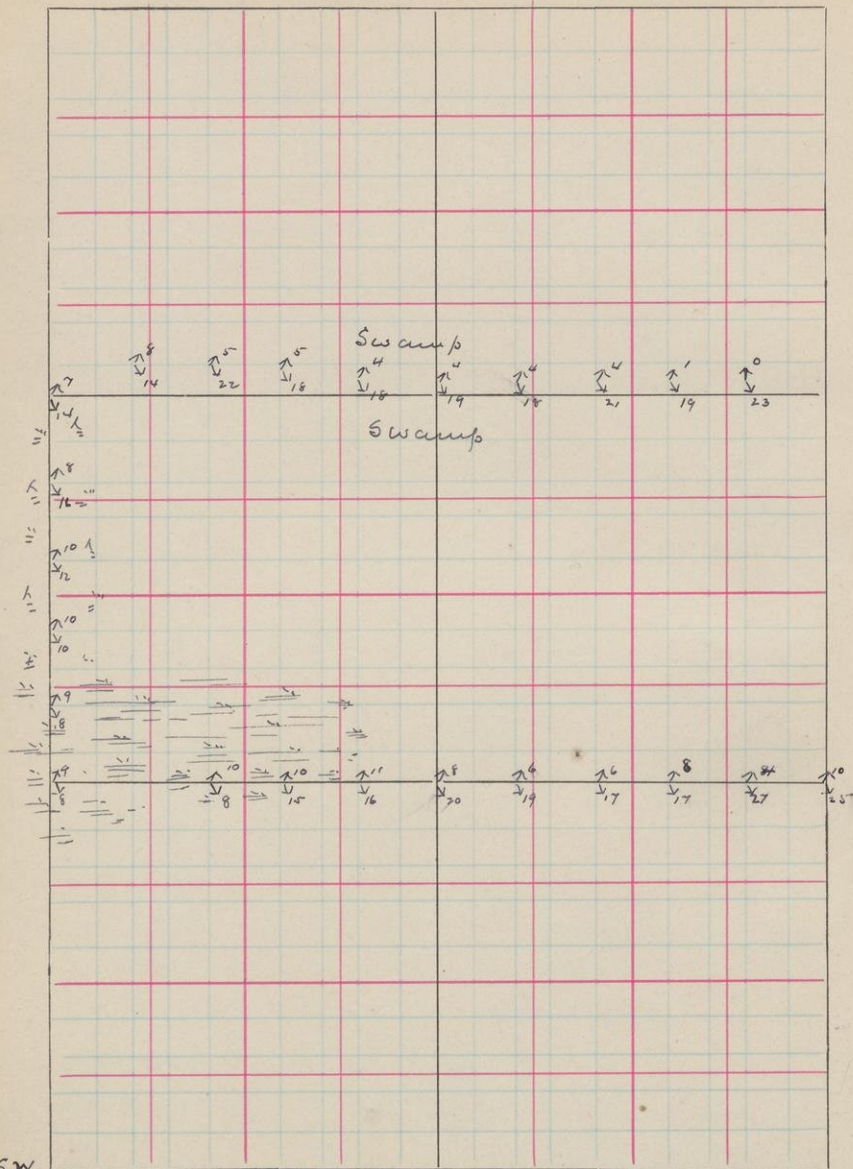
32793

G.A.E.

260 N. 1150 W. of S.E. Cr. Sec 11. 43-32
Greenstone amygdaloid, with cavities in weathered surface

S. 5 W 1/4 T. 43

R. 32



SW
Cor

6-747

8

32794

Q.A.E.

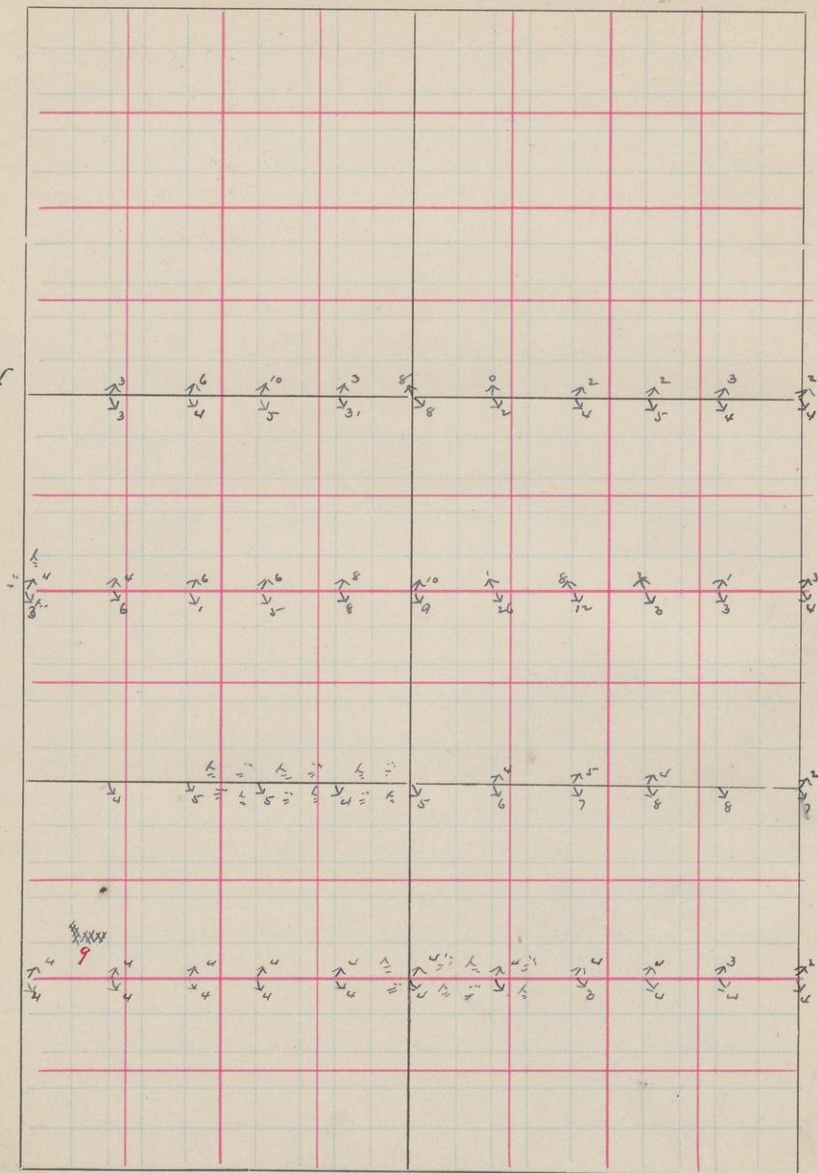
250 N. 950 W. of S.E. Cor. Sec 11-43-32.

Fine grained purplish greenstone
forming north side of hill and grading
into an amygdaloid on its south side.

S. N.W. $\frac{1}{4}$

T. 43

R. 32

NW
Cor

The north half of Sec 1. 43-32 is covered with hardwood. Its topography is made up of sand hills of various shapes and a single rock hill at

9

1310 N 1920 W of SE cor Sec 1. 43-32,

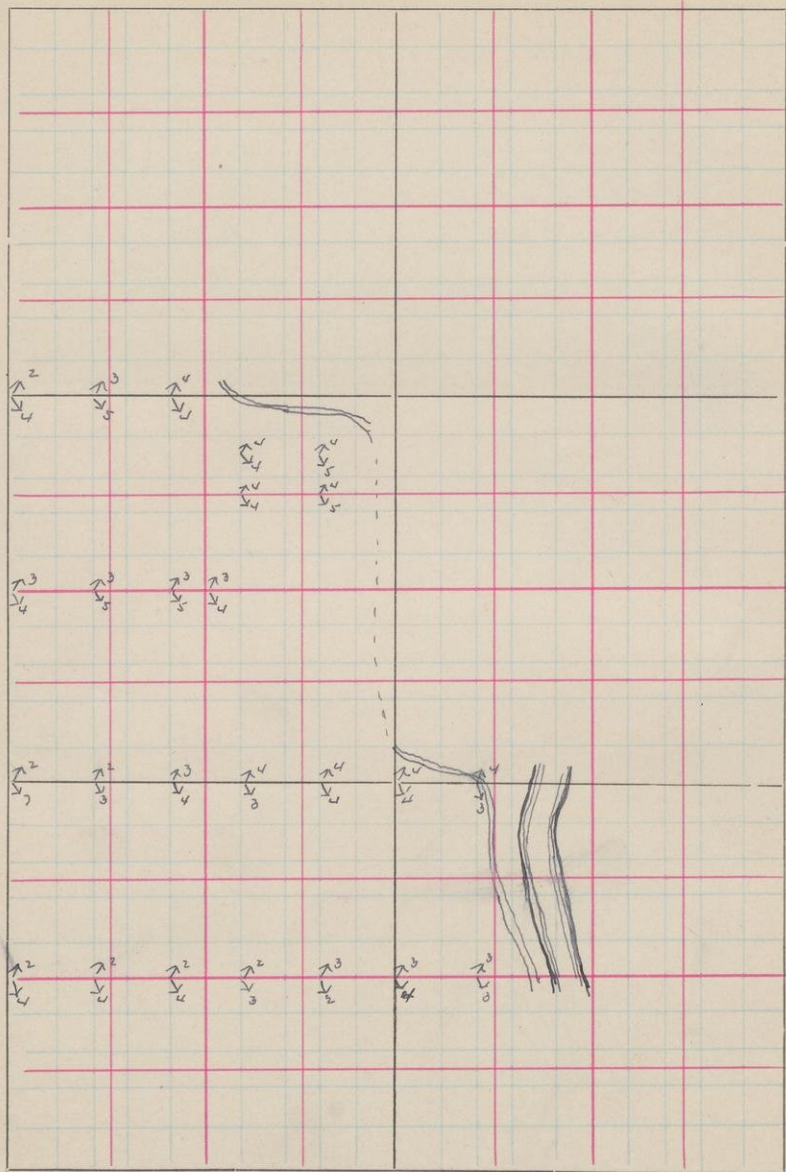
32795

G.D.

which consists of a fine grained dia-
base.

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

R. 32

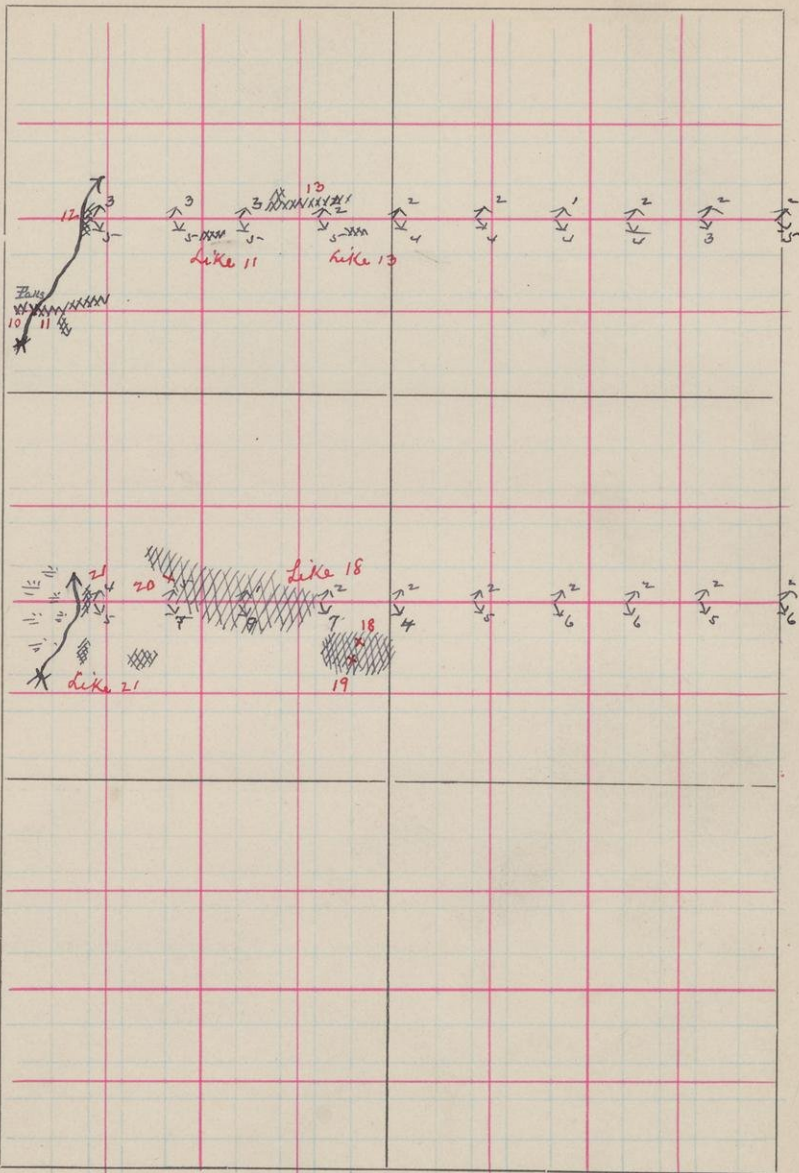


NE
Cr.

S. NW 1/4
12

T. 43

R. 32



The rocks in the NW 1/4 Sec 12 43-32 are usually coarse grained gneisses occurring in isolated knobs.

10
82796
G.D.

1625 N. 1990 W of S.E. Cor. Sec. 12. 43-32.

A schistose diabase, whose schistosity strikes 20° by W and dips nearly vertically.

11
82797
G.D.

1625 N 1950 W of S.E. Cor. Sec 12-43-32

Massive, dark, coarse diabase, apparently phase of 10.

12
82798
G.D.

1750 N. 1910 W of S.E. Cor. Sec 12. 43-32

Coarse grained, light colored diabase. Evidently an intrusive.

13
82799
G.D.

1790 N. 1815 W of S.E. Cor. Sec 12. 43-32

Similar to 12, from one of a number of small ledges.

G.D.H.M.
82800
15
82801
G.D.

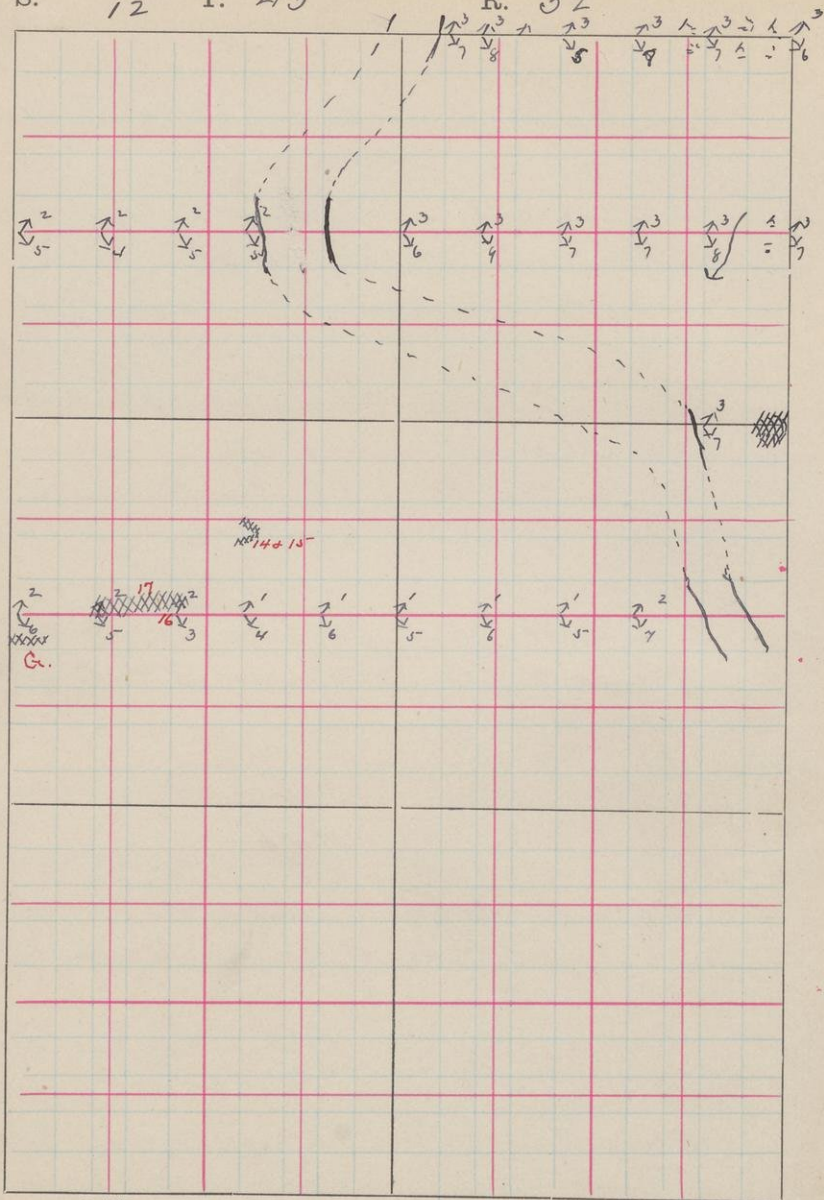
1350 N. 800 W of S.E. Cor. Sec 12. 43-32.

These two rocks occur in the same ledge which is so thickly covered with moss that it is difficult to study their relations.

14 is a fine grained, schistose greenstone and 15 is a red weathering pink grained looking rock, with an emp-tive contact between them. Both specimens were taken from near this

S. N.E. 1/4 T. 43
12

R. 32



contact, where the red rock appears to be the intrusive.

16
32802
G.D.
1260 N 1200 W of S.E. Cor Sec 12-43-32
Fine grained greenstone
Diabase. Coarser phase of 16, from
32803
G.D.
little further north and west in same
line.

18
32804
G.D.
1190 N. 1450 W of S.E. Cor Sec 12-43-32
Coarse gabbro-like rock, forming
large knolls whose north side is
thus located.

19
32805
G.D.
From top of same knoll. A dark schis-
tite phase.

20
32806
G.D.
1275 N 1800 W of S.E. Cor Sec 12-43-32
From western end of large knoll, whose
main mass is like 18. At its west
end feed spar is less common and
the dark components more abundant,
producing a beautifully crystallized
dark heavy rock like an amphibolite.

21
32807
G.D.
1250 N. 1900 W of S.E. Cor. Sec 12-43-32
Slightly schistose, coarse grained
greenstone, with cavities on weathered
surface. It contains many quartz
grains, and other evidences of decam-
pation.

22
32808
G.A.

720 N 1100 W of S.E. Cr. Sec 12-43-32.
From one of two small ledges outcropp-
ing from a sand hill. The rock is
a schistose amygdaloid, with its schis-
tosity striking E-W and dipping high
to the S.

23
32809

725 N. 1050 W of S.E. Cr. Sec 12. 43-32
A little further East in the same hill
is a small ledge of the fine grained
gray gneiss, that is one of the char-
acteristic members of the flow series.
Here it shows signs of schistosity.

24
32810
G.C.M.

740 N 900 W of S.E. Cr. Sec 12. 43-32.
Another small ledge of the fine grained
gray gneiss.

25
32811

750 N 600 W of S.E. Cr Sec 12. 43-32

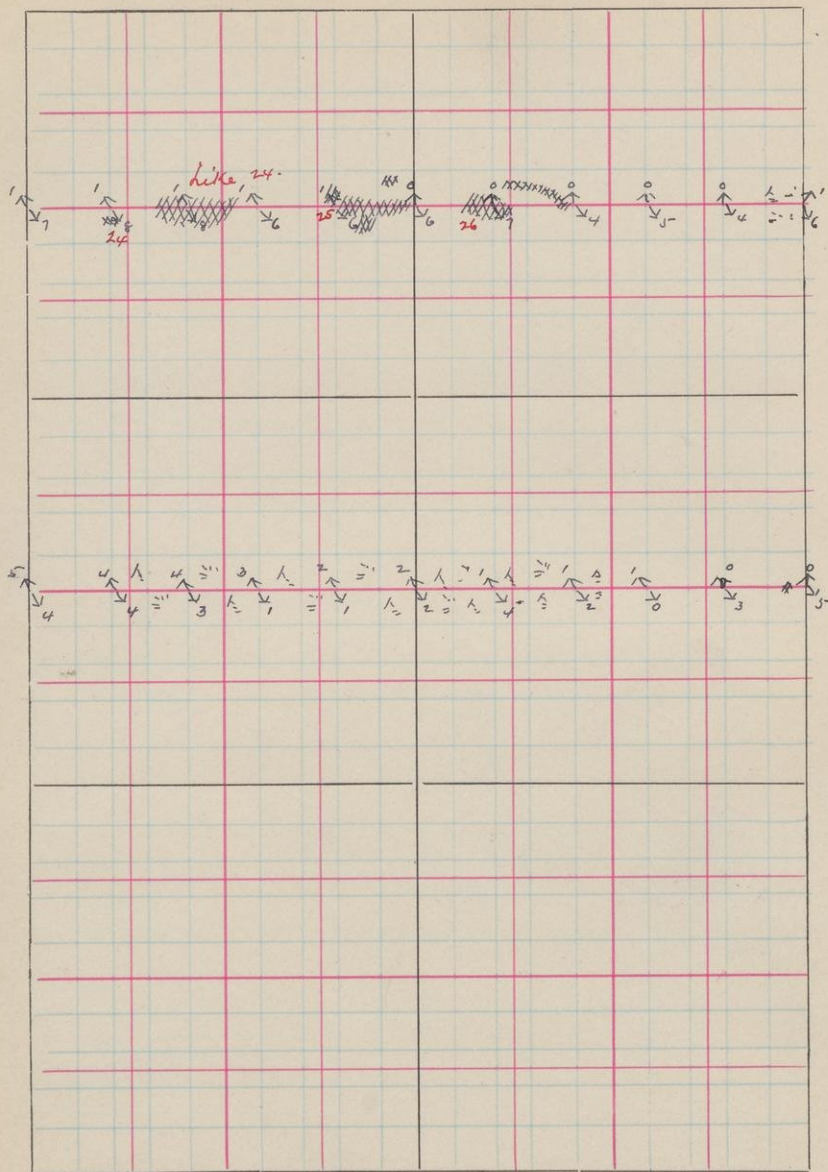
26
32812
G.C.M.

740 N 400 W " " "

Two specimens of same fine grain-
ed gray rock from west ends of two
hills.

S. S.E. $\frac{1}{4}$ T. 43
12

R. 32

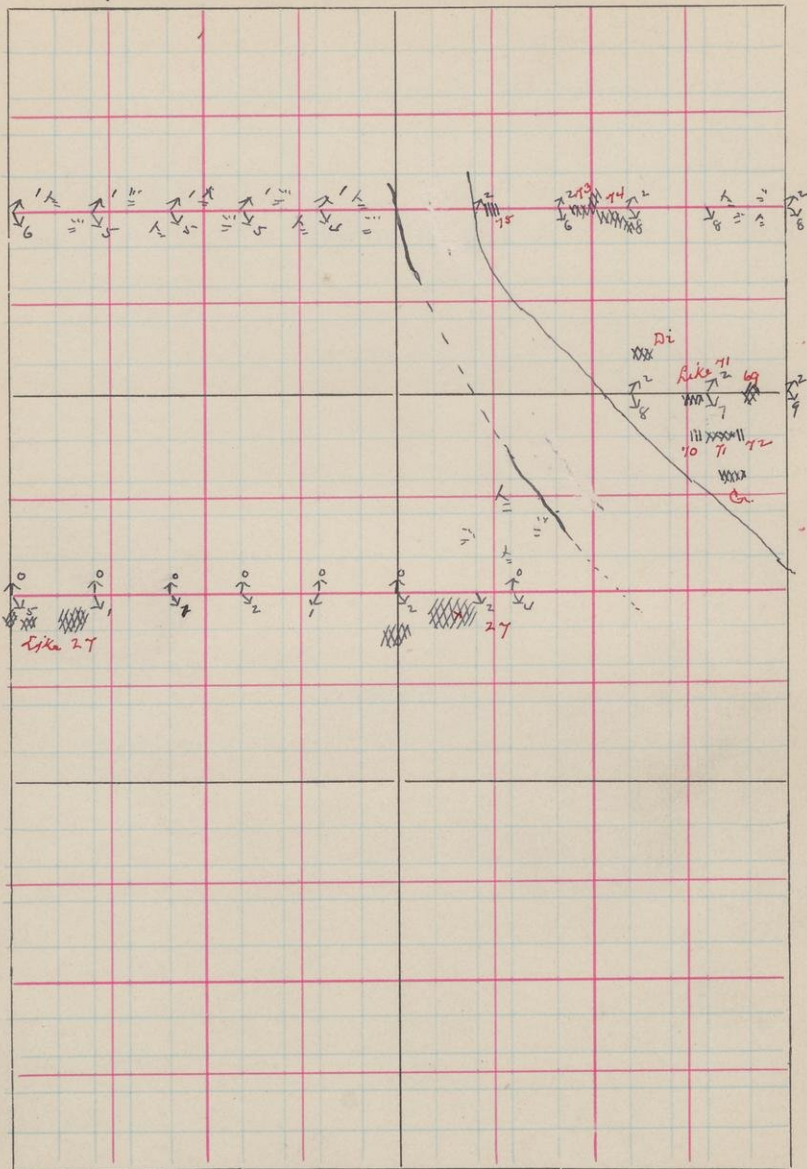


27

32813

S. 5 W 1/4 T. 43

R. 31



27
328/3
Q.C.M.

225 N 1425 W of S.E. Cr Sec 7. 43-31
Fine grained gray gneiss, forming
entire mass of the two hills at 175-250
N, 1400-1500 W of S.E. Cr Sec 7.

28
328/4
Q.C.

400 W 1350 N of S.E. Cr Sec 12-43-32
Gneiss conglomerate in very
small ledge. Its strike as nearly as
could determine is 20° N of W.

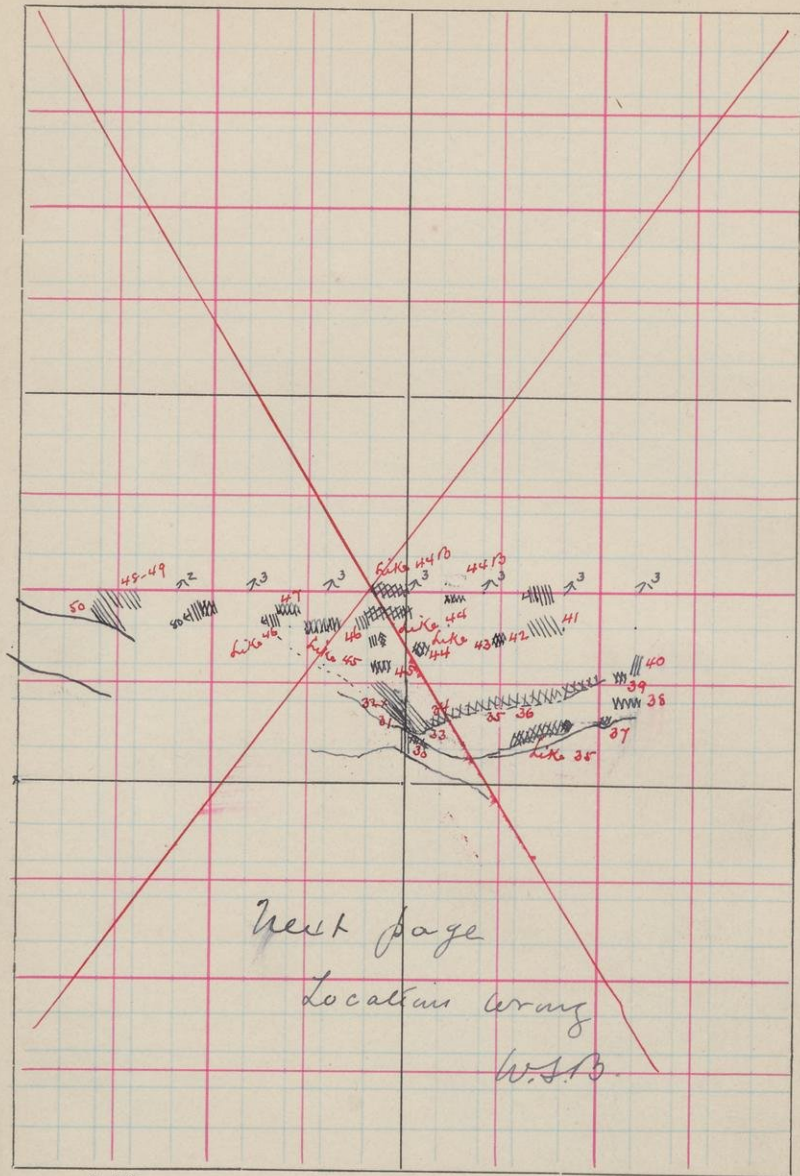
29
328/5
Q.A.

North of it a few paces is a schistose
amygdaloid, whose schistosity's strike
parallel to the strike of the conglomerate.

S. SE 1/4
7

T. 43

R. 31



next page

Location wrong

W.S.B.

The S.E. 1/4 of Sec 7. 43-31 is especially interesting because the river cuts a gorge through its southern portion exposing well the rocks.

30
32816
G.C.S.

On the north side of the dam there rise a high bluff on whose south side are banded slates striking 45° N of W and dipping vertically. These are cut by small veins of quartz, and contain druses of the same mineral and quartzite in their joint cracks.

30
32818

70 ft. 500 N of S.E. Cor Sec 7-43-31

31
32817
32
32818
G.C.

North of this rock the face of the cliff is nearly perpendicular, showing a very dense rock, slightly ochristose, but without well marked bedding planes. The material of the rock seems to be like 30, but the bedding, if there is any is very obscure.

33
32819
G.D.

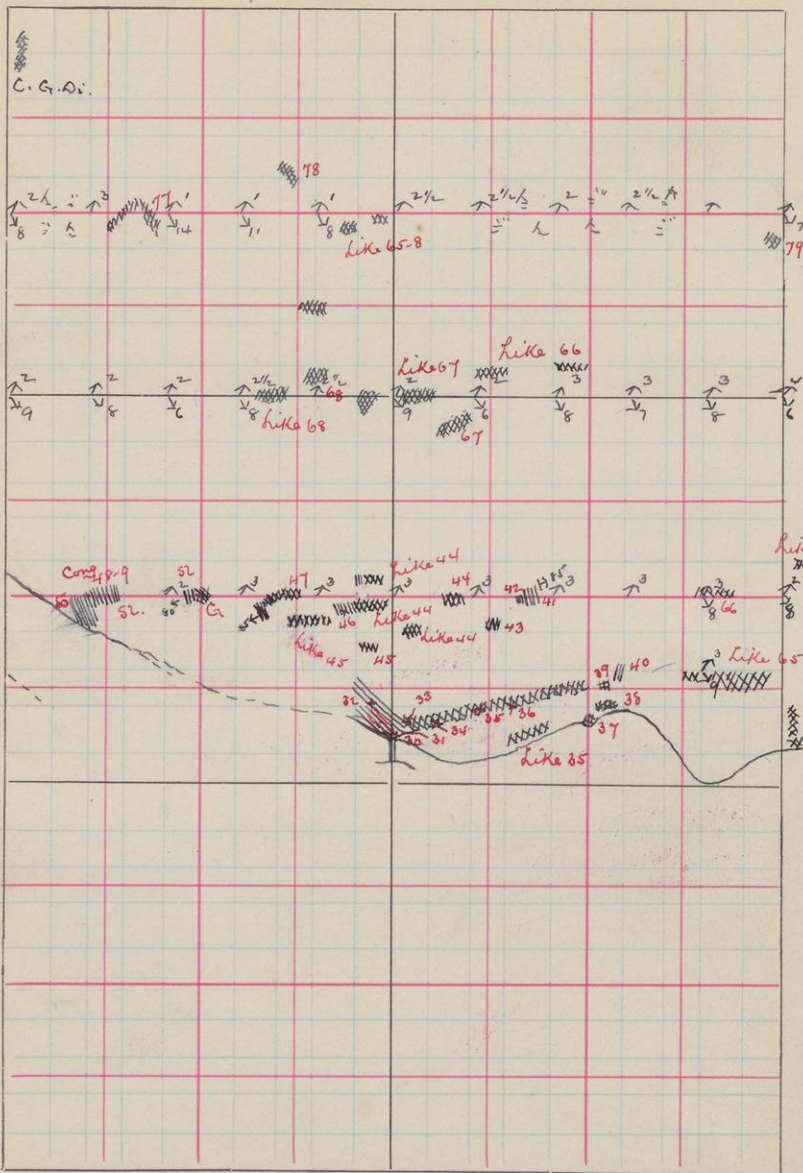
East of this the cliff for some distance appears as though composed of an eruptive, of which specimens, a dark green rock, weathering brown, and

34
32820
G.D.

were taken. 34 looks crystalline, and seems to grade into 33. It was taken from a point high up in the cliff.

S. E 1/4
7 T. 43

R. 31



and 40 paces E of 30.

35
32821.
G.C.M.

from about 100 paces E of 30. A gashed and jointed rock that looks in its weathered surface not unlike a conglomerate.

36
32822.
G.C.S.

From the face of the cliff 140 paces E of 30, where the rock again becomes banded. The bands though regular for short distances are usually faulted by small cracks, and much contorted as seen in face of cliff. The hand-specimen, which does not show the banding was taken from the west side of the bed.

37
32823.
G.C.M.

To N. 230 W of S.E. Cr Sec 7-43-31
From flat ledge near water's edge.

38
32824.
G.D.

100 N. 200 W of S.E. Cr. Sec 7-43-31
Fine grained diabase.

39
32825.
G.D.

120 N 215 W of S.E. Cr. Sec 7-43-31.

The north side of the Eastern end of cliff is a crystalline greenstone cut by veins of red feldspar.

40
32826.

Just north of 39 is an exposure of banded chert and greenstone or slate, projecting from under the root of a tree. The strike of the bands is 10° E of N, but this cannot be depended upon as their true

strike as the exposure may have been moved slightly from its original position. At 200 N of S.E. Cr of the Sec (7-43-31) went north 250 paces then west crossing a high hill on which at

41
32827
G.C.S.

325 W. 250 N found banded slates striking 150 N of N and dipping about 85° to the East. But this high dip to the East may be due to the influence of 42 since only a narrow layer of 41 occurs alongside of 335 W. 250 of S.E. Cr. Sec 7-43-31.

42
32828
G.C.A.

43
32829
G.C.M.

210 N. 375 W of S.E. Cr Sec 7-43-31. This is a small exposure of the fine grained gray greenstone.

44
32830
G.C.M.

250 N. 430 N. of S.E. Cr. Sec 7-43-31. Another ledge of same rock.

Most of the hill is composed of this rock, which however outcrops only as indicated on map.

45
32831
G.A.

180 N. 550 N of S.E. Cr. Sec 7-43-31. The same rock with small angular boulders.

At 275 N. 550 N of S.E. Cr Sec 7 is another exposure of the slates, with

band striking 20° N of U. on the west side of a large ledge of the gray rock.

It is noticeable that the slate is exposed only in association with the dense greenstone. It looks as though it were quite abundant under ground, but that it is exposed only where protected from erosion by the enduring greenstone in contact with it.

46
92882

235 N. 575 N of S.E. Cr. Sec 7-43-31.
Well banded green and white rock
striking 40° N of U and dipping almost
vertically.

47
92883
G.D.

250 N. 640 N of S.E. Cr. Sec 7-43-31.
Medium grained Diabase.

At 235 N 680 N of S.E. Cr Sec 7 is still
another patch of slate that here strikes
 40° N of W and dips $65-90^{\circ}$ S.W. It
is cut off in its strike by 47.

48
92884
49
92885
G.C.

At 250 N 900 N of S.E. Cr. Sec 7-43-31
is a large ledge of the banded rock,
dipping at a high angle to the west.
At its west end the bedding is so

disturbed as to resemble fluvage of an
 eruption. It here includes many
 fragments of its own material and
 many of the fine grained porous
 rock (49)

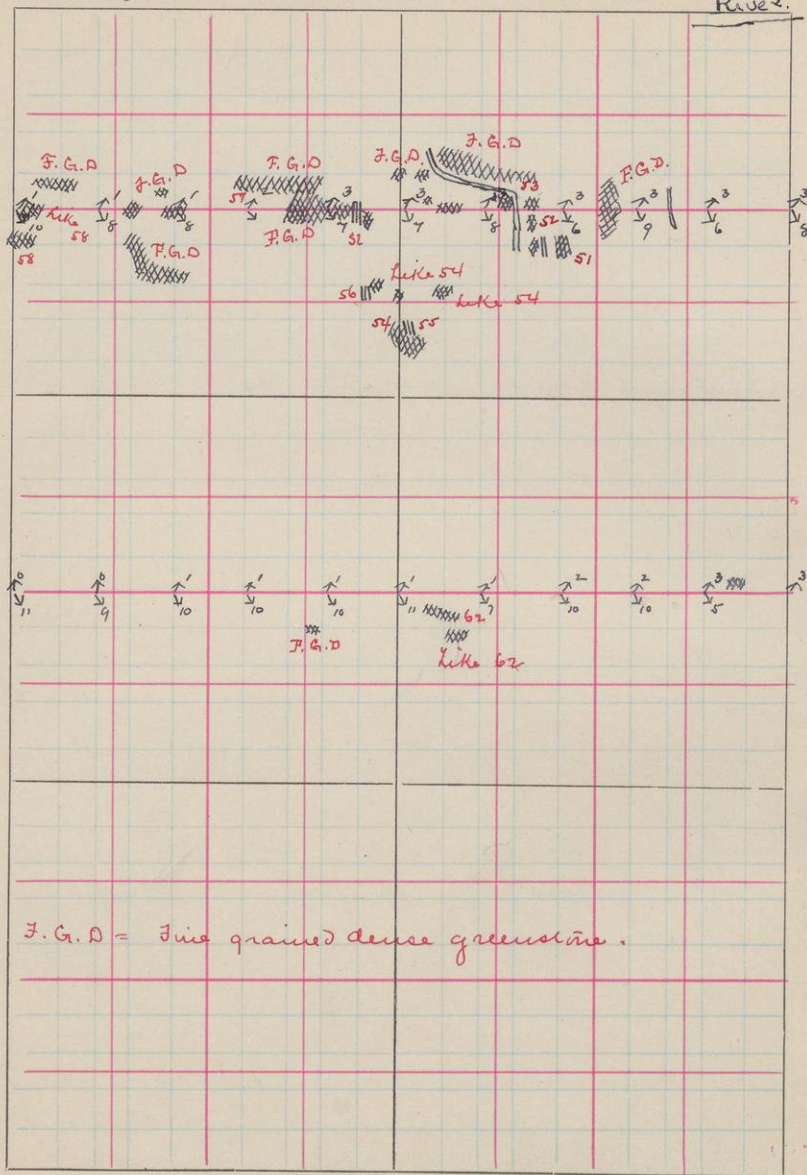
Further west the fragments become
 smaller until the rock becomes a
 well marked fine grained conglomerate,
 very characteristic in appearance
 near the ~~west~~ bottom of the hill.

50
 32826
 a.c.

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

R. 31

River.



F.G.D. = Fine grained dense greenstone.

The North half of the U.C. 1/2 of Sec 18 43-31 is a series of interbedded greenstones, amygdaloids and slates, forming a country with an exceedingly rough and rugged topography.

At 1750 N 210 W of D.C. Cr Sec 18-43-31 begins a knob of the so-common fine grained gray greenstone, or what is taken for greenstone.

51
32837
G.C.

At 1710 N. 290 W is a hill on north side of which is the dense gray greenstone and whose Southern portion consists of the greenstone conglomerate^d (51) which seems to grade into the former.

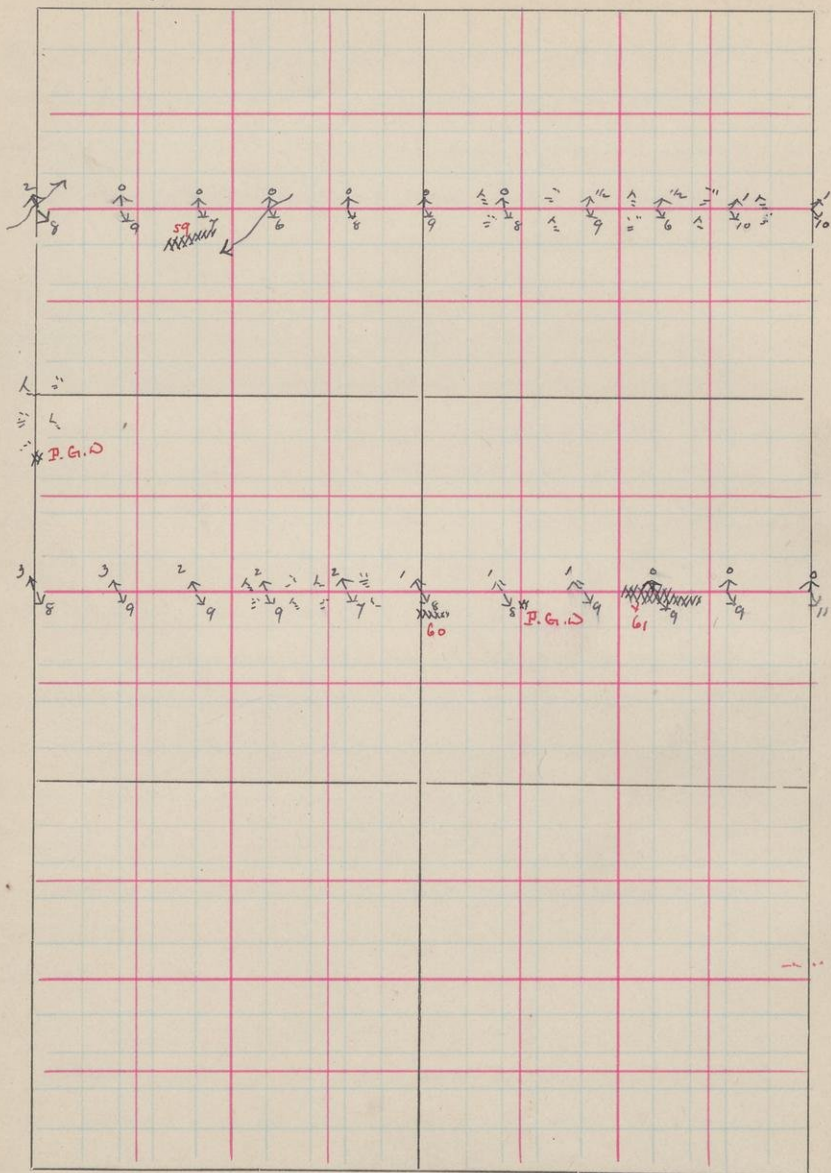
A little to the west are small exposures of the same greenstone, which here has the spheroidal parting well developed, though not as markedly so as in the pictures sketched by Merriam (Note Book No. p. 1).

The fragments, or parting blocks are usually of the same material as the matrix, but are in a ledge at 1710 N 320 W of D.C. Cr. 18. 43-31 seems to be of slate.

52
32838

S. $N\ W\frac{1}{4}$ T. 43
18

R. 31



53
32839
Q.D.

1750 N. 250 W. of S.E. Cr. Sec 18-43-31.
From a small ledge of fine grained
Diabase.

On the west side of the road, at
1810 N. 465 W. is a smooth area
of greenstone, on west side of which
is a small ledge of greenstone conglomerate?

54
32840
Q.D.

1600 N. 500 W. of S.E. Cr. Sec 18-43-31.
Fine grained Diabase.

In the same ledge, about 10 paces

55
32841
SZ.

S.E. of 54 is a narrow exposure of
slates striking NW and dipping
about vertically. An attempt was
made to trace this belt NW, but it
failed, greenstone being upon the
strike.

56
32842

At 1627 N. 510 W. is another exposure
of slates in which the rock strikes
 40° N of W and dips 80° S.W.

At 1650 N. 520 W. is a small ledge
of fine grained Diabase like 54, ex-
cept that it is amygdaloidal, with

S. NW $\frac{1}{4}$ T.
17

43

R. 31

$\frac{7}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$ $\frac{1}{5}$

$\frac{1}{5}$

$\frac{1}{5}$

$\frac{1}{5}$

black, flattened amygdulæ scattered through it.

57
32843
G.D.

1780 IV. 700 W. of S.E. Cr. Sec 18-43-31
Another ledge of the fine grained Diabase.

58
32844
G.A.

1710 N. 1000 W. of S.E. Cr. Sec. 18-43-31.
A no inconsiderable ledge of amygdaloid is exposed here. The rock is gashed and much cut by quartz-veins.

59.
32845
G.C.M.

1725 N. 1820 W of S.E. Cr. Sec 18-43-31.
The fine grained massive gray greenstone occurs here as a small exposure, which is brecciated on its west side, forming a rock resembling somewhat a fine greenstone conglomerate.

60
32846
G.C.

1220 N. 460-500 W of S. E. Cr. Sec 18-43-31.
Fine grained greenstone conglomerate.

61
32847
G.A.

amygdaloid zone
1240 N. 1240 W of S.E. Cr. Sec 18-43-31

62
32848
G.C.M.

Fine grained gray greenstone, so dense that it rings like quartzite

when struck. From

62 1230 N. 450 W of S.E. Cr. Sec 18-43-31.
 32848
 G.S.M.

63 1260 N. 75 W of S.E. Cr Sec 18-43-31.
 32849
 G.D.
 very fine grained Diabase.

64 Black slate on north side of Michigan
 32850
 32.82, River, a hundred paces or so N.E. of S.E.
 Cr. Sec 7-43-31. Located more accu-
 rately later (see Book p. 1).

Also 522 blk 288 for spots 32787-32850

65 Just East of the East line of Sec 7 is a
 32857
 G.D. great ledge of coarse Diabase containing
 large lath shaped crystals of red weather-
 ing feldspar. The same rock occurs
 throughout north half of S.E. 1/4 Sec 7

Ran north on East line of Sec 7, along
 east side of large hill of rock like 65, and
 at 250 N of S.E. Cr, turned west, finding
 another ledge of same rock at
 260 N. 100 W of S.E. Cr - Sec. 7. 43-31

66
 32852
 G.D.

67 460 N. 400 W of S.E. Cr Sec 7-43-31
 32853
 G.D. very basic phase of coarse grained

rock.

68

J2855

Q.D.

500 N. 550 W of S.E. Cr. Sec 7-43-31

Another ledge of same coarse grained Diabase.

69.

J2856

Q.D.

500 N. 1055 W of S.E. Cr Sec 7-43-31

Dark coarse grained Diabase, here more or less schistose.

70

J2857

Q.D.

450 N 1100 W of S.E. Cr Sec 7-43-31

At about 50 paces S of 1100 W is a high ledge of the fine grained, dense greenstone, and of the banded slates. The fine grained dense rock is in the west of the ledge (70), then a few paces to the East a slightly schistose greenstone or slate, and East of this banded slates for a few paces and and again further East some greenstone. The weathered surface of 71 is blotched with white specks as though it were porphyritic. 71 is banded in the weathered surface like a sedimentary, with its bands striking 40° N of W and dipping about 80° West.

71

J2857

72

J2857

At 564 N. 1200 W. on the side of a hill

overlooking the river is an exposure of the coarse grained Diabase.

73 At 750 N 1300 W a spur makes its way westward from the hill and runs as a bare ledge some 3000 ft. This spur is the coarse grained Diabase, more or less schistose in places where slipping has occurred.

A little to the north of 73 (10 paces) in the same ledge the schistose rock is plainly seen where a squeezed amygdaloid. It is consequently a different rock from the massive coarse grained Diabase to the east.

75 750 N. 1380 W of S.E. Cor Sec 7-43-31.
At the river bank, at the foot of the hill of schistose amygdaloid is a small ledge of the banded rock. Here contrary to the usual case, the bands are much contorted into wavy lines, broken ones and others that are slightly bowed or curved.

Especially is this contortion noted where the rock is in contact with the fine grained dark gray rock, supposed to be a few greenstone

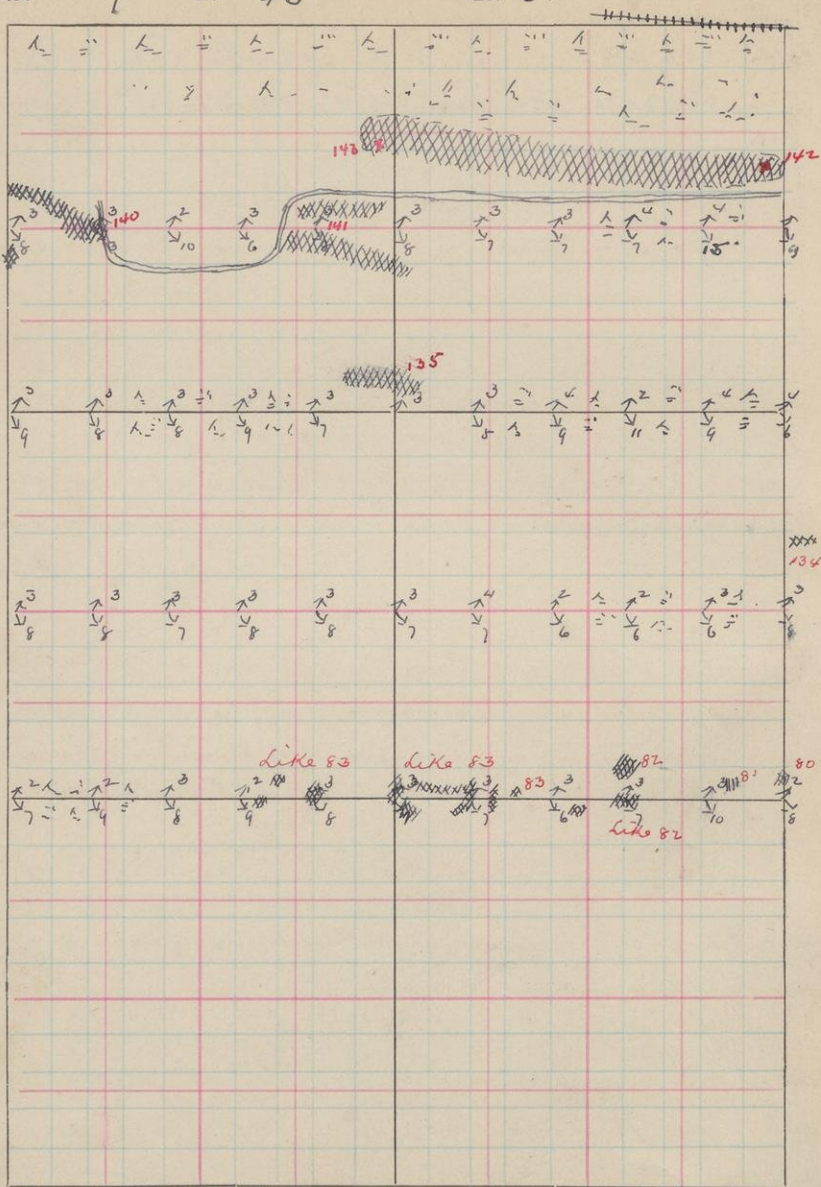
77 750 N. 500 W of S.E. Cr. Sec 7. 43-31
 G.D. Coarse Diabase, massive.

78 800 N. 650 W of S.E. Cr Sec 7-43-31
 G.D. Same rock

79 700 N of SE Cr Sec 7-43-31
 G.D.

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

R. 31



80 1020 N of S.E. Cr Sec 7-43-31.
 32866 Q.D. Coarse grained dark Diabase. In places
 341 the rock is very fine grained, in others
 quite coarse, with large crystals of horn-
 blende or augite forming a completely
 granular aggregate without the addition
 of feldspar. Most, however, is like sam-
 ple.

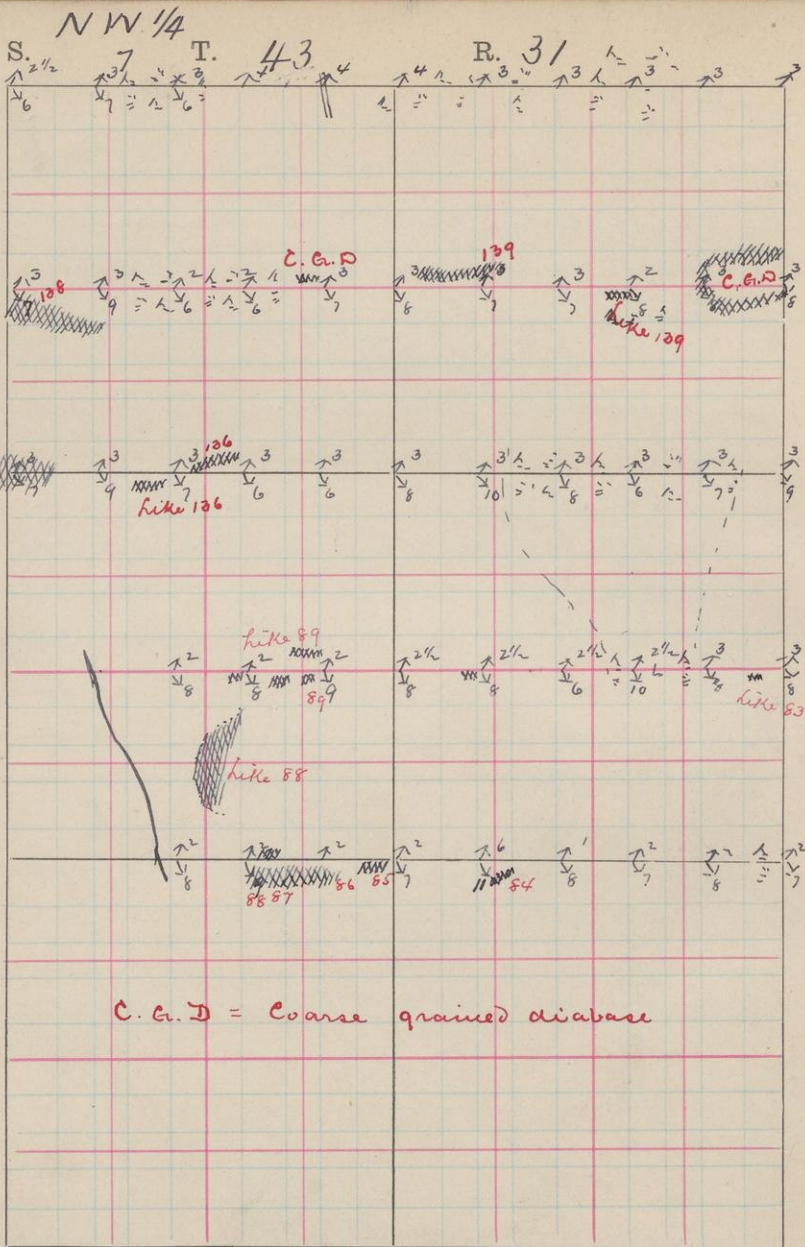
81 1020 N. 80 W of S.E. Cr Sec 7-43-31
 32867 Small moss covered ledge of black slate,
 striking 40° N of W and dipping about
 80° NW. (32861-32862)

82 1050 N. 200 W of S.E. Cr Sec 7-43-31.
 32868 Q.D. Medium grained Diabase. Probably an
 intrusive, though at 990 ft in same
 ledge the rock is schistose.

83 1015 N. 330 W of S.E. Cr. Sec 7-43-31
 32869 Q.D. Rock like 82.

84 980 N. 1375 W of S.E. Cr. Sec. 7. 43-31
 32870 Q.D. Coarse Diabase.

85 990 N. 1510 W of S.E. Cr. Sec. 7-43-31
 32871 Q.D.



Coarse grained, slightly schistose Diabase
 Same rock, from South side of large
 hill, whose main mass extends west
 from 1600 N to 1675 W, forming a high
 ridge about 40 paces wide and very
 steep on both sides.

On top the rock is weathered like a
 granite? Except for the fact that it
 shows big black hornblende ^{3 in. long} crystals
 shooting through it with their long di-
 rections parallel to its obscure schisto-
 sity.

Shows this weathered surface.

Fresh piece of same rock from top of hill.

The rock may be either the coarse
 grained Diabase or the schistose amygdaloid.

1250 N 1600 W of S.E. Cor. Sec. 7-43-31
 Fine grained Diabase.

1730 N 540 W of S.E. Cor. Sec 13-43-32
 Small ledge of fine grained, dense
 greenstone, that looks conglomeratic
 in places.

1760 N. 1000 W of S.E. Cor. Sec 13-43-32

91
32877

Black scales, banded in weathered surface. Since top of ledge covered with soil could not determine strike nor dip.

92.
32878
G.A.E.

1850 N. 1200 W of S.E. Cr. Sec. 13-43-32.
Fine grained porphyritic greenstone.

93
32879
G.A.E.

1820 N. 1200 W of S.E. Cr. Sec 13-43-32
Like 92 but containing amygdules.

94.
32880
G.A.E.

From north side of this same hill.
Well developed amygdaloid filled with quartz and chlorite amygdules with epidolitic borders. It is schistose with strike of schistosity 22° N of W.

95.
32881
G.A.E.

1770 N. 1270 W of S.E. Cr. Sec 13-43-32
Fine grained purplish greenstone, cut by numerous quartz veins and with many quartz druses in joint cracks.

96.
32882
G.A.E.

1830 N. 1310 W of S.E. Cr. Sec 13-43-32
Same rock with amygdaloidal cavities in weathered surface.

97
32883
G.A.E.

1750 N. 1340 W of S.E. Cr. Sec 13-43-32

NW 1/4

NW 1/4

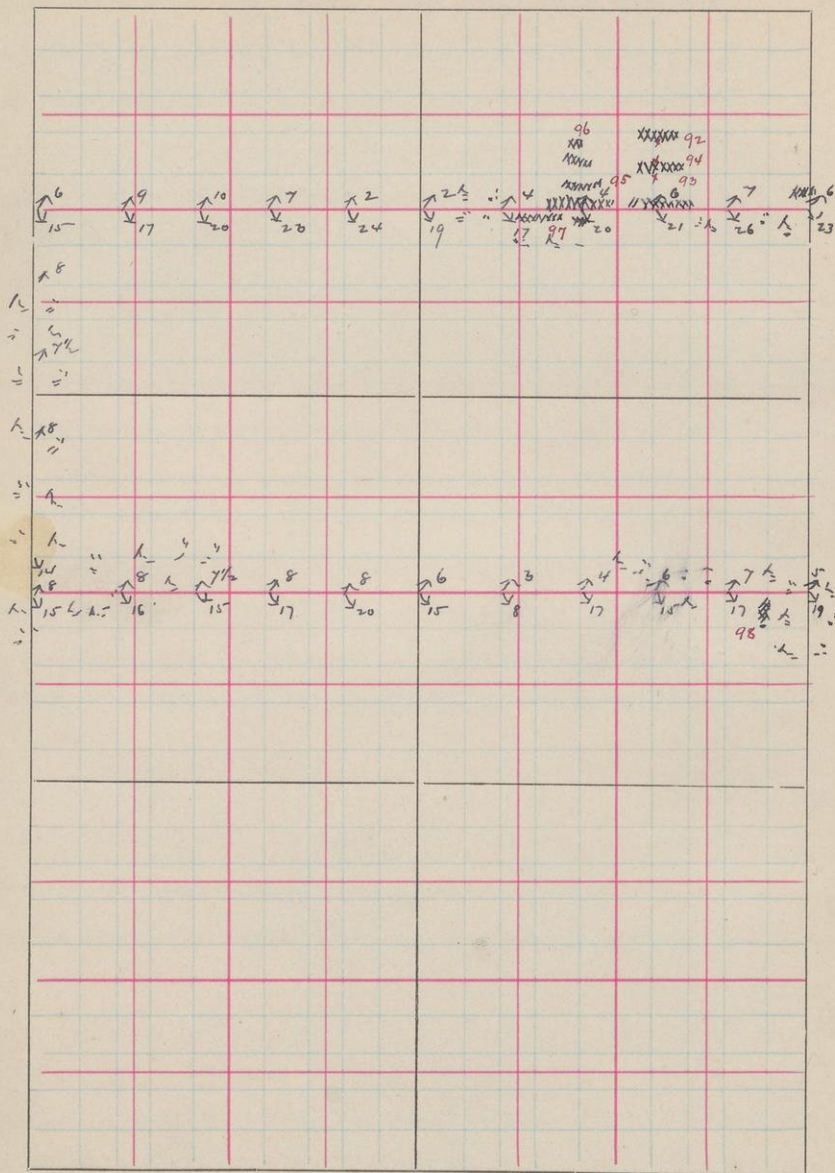
S.

13

T.

43

R. 32



97 Schistose amygdaloid.

98

1240 N. 1060 N of J.E. Co. Sec 13-43-32

JB884

G.A.E

Schistose, fine grained purplish
greenstone, with occasional amygdaloid
cavities.

NW 1/4

S. SE 1/4
13

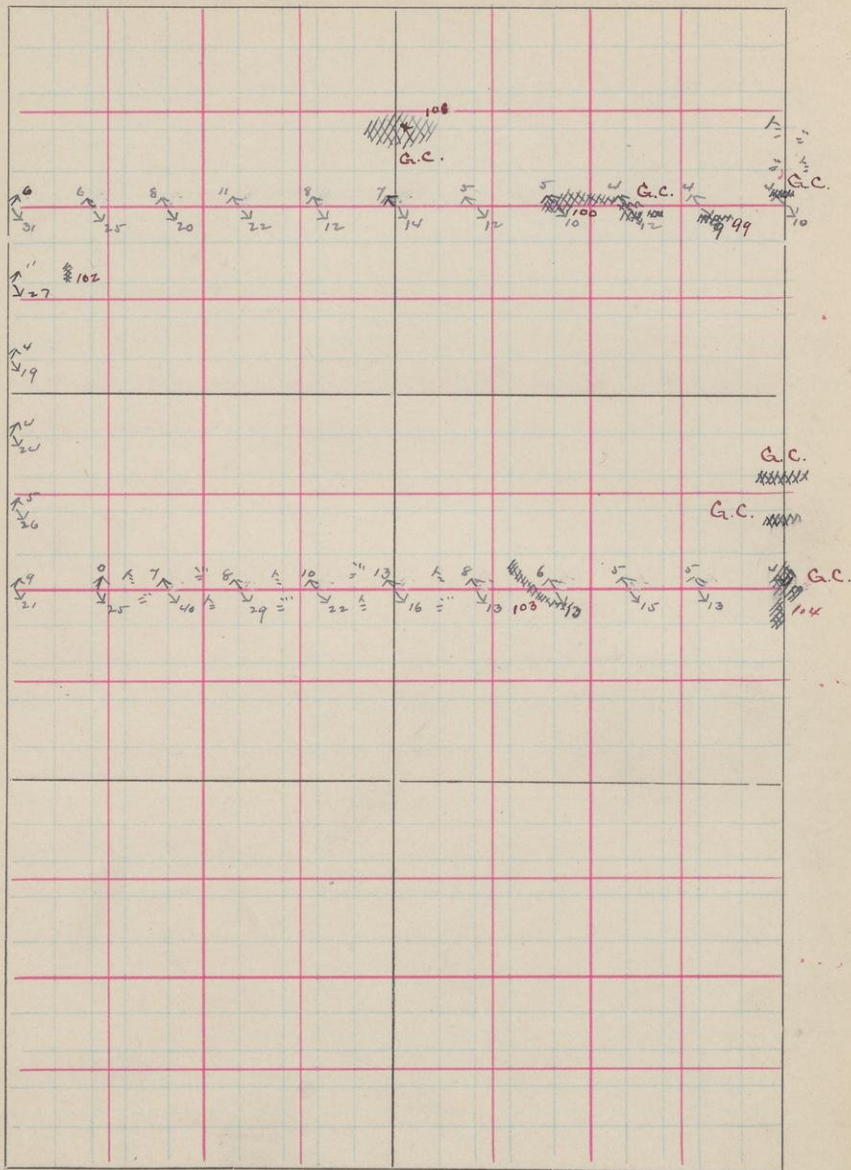
S.

13

T.

43

R. 32



99
32885
A.C.

750 N. 85 W of S.E. Cr Sec 13-43-32
Greenstone Conglomerate.

100
32886
A.C.

750 N. 280 W of S.E. Cr. Sec 13-43-32
Greenstone Conglomerate

101
32887
A.C. M

850 N. 500 W. of S.E. Cr. Sec 13-43-32.
From high hill of fine grained, gray,
dense greenstone, filled with veins
of white quartz looking almost like
chert.

The south side of the bluff is the
greenstone conglomerate.

102
32888
A.A.F.

770 N. 930 W of S.E. Cr Sec 13-43-32
Small exposures of a schistose amygd-
daloid from S.E. corner of high hill.
The rock is fine grained and not
certainly amygdaloid.

103
32889
A.C. M

250 N. 300 W of S.E. Cr. Sec 13-43-32.
High mass covered hill of dense,
gray greenstone has a perpendicular
cliff some 20 ft. high on its west and
south sides. The rock resembles 101,
but without any traces of conglomeratic
character.

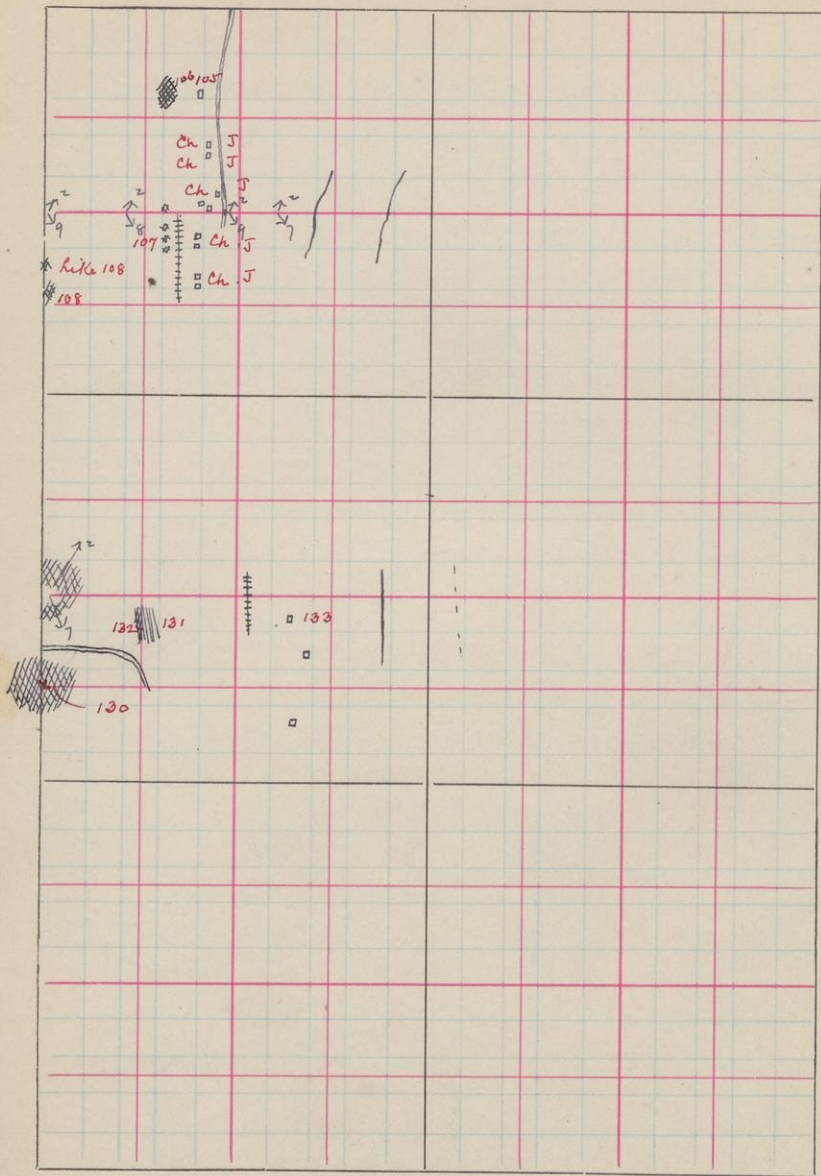
104
32890
G.S.

250 N of S.E. Cor. Sec 13. H3-32.

Large exposures of greenstone conglomerate? The bare ledges show well the angular character of the fine grained gray greenstone fragments and the bending of the schistose bands in the matrix around them. The rock is not uniformly conglomeratic throughout, but the conglomeratic portions are in lenticular areas with curving mass of the fine grained gray greenstone around them. In some place there is also apparent a brecciation of the rock mass, so that the entire exposures may be breccia rather than conglomerate?

NW 1/4
S. 17 T. 43

R. 31



105
32891
Ore

900 N. 1800 W of S. E. Cr Sec 17. 43-31

The old shaft thus located is in jasper and lean ore, a specimen of which was taken from its dump heap.

Back of this at

106
32892

900 N. 1840 W. of S. E. Cr Sec 17-43-31

is a little knoll whose East half consists of a fragmental rock filled with fragments weathering white? a fluting noted on portions of the ledge may be ripple markings.

The west portion of the ledge is an impure greenstone

[Studied more at length by Merriam and Vanhise]

The row of pits located at 1800 W.

1650 - 1850 N are all in lean ore and jasper, and schistose greenstone (chert? schist) in case of pit at 755 N.

107
32893
etc.

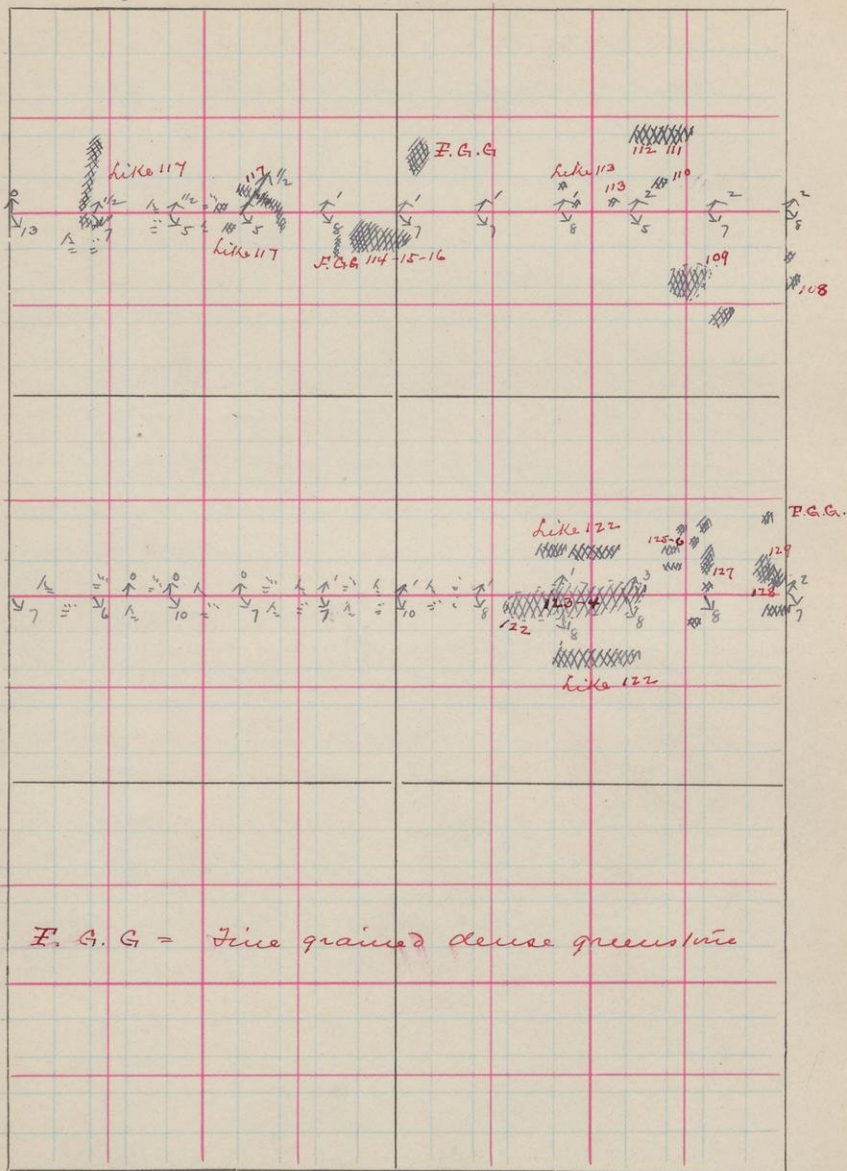
727 N. 1840 W of S. E. Cr Sec 17-43-31

Conglomerate like 106 occurs here and in small ledges at

700, 735 and 755 N. 1840 W 2 S E Cr 17.

NW 1/4
S. SE 1/4 T. 43

R. 31



F. G. G. = Fine grained dense greenstone

108
32874
G.D.

710 N. 1980 N of S.E. Cr Sec 17-43-31.
Small ledge of fine grained Diabase.

109
32875
G.C.M.

680 N. 100 N of S.E. Cr Sec 18-43-31
Fine grained gray Diabase. Looks not
unlike 108, but has small amygdaloidal
cavities on weathered surface.

110
32876
G.A.

800 N. 150 N of S.E. Cr. Sec 18. 43-31.
Fine grained amygdaloidal green-
stone.

111
32877
G.C.M.

850 N. 150 N of S.E. Cr. Sec 18-43-31.
A south facing vertical cliff ap-
pears to be composed of a fragmen-
tal rock at its East end, but this
grades into a rock that at 170 N.
is undoubtedly a greenstone.

112
32878
G.C.M.

760 N 210 N of S.E Cr Sec 18-43-31
Small ledge of fine grained, dense,
gray greenstone.

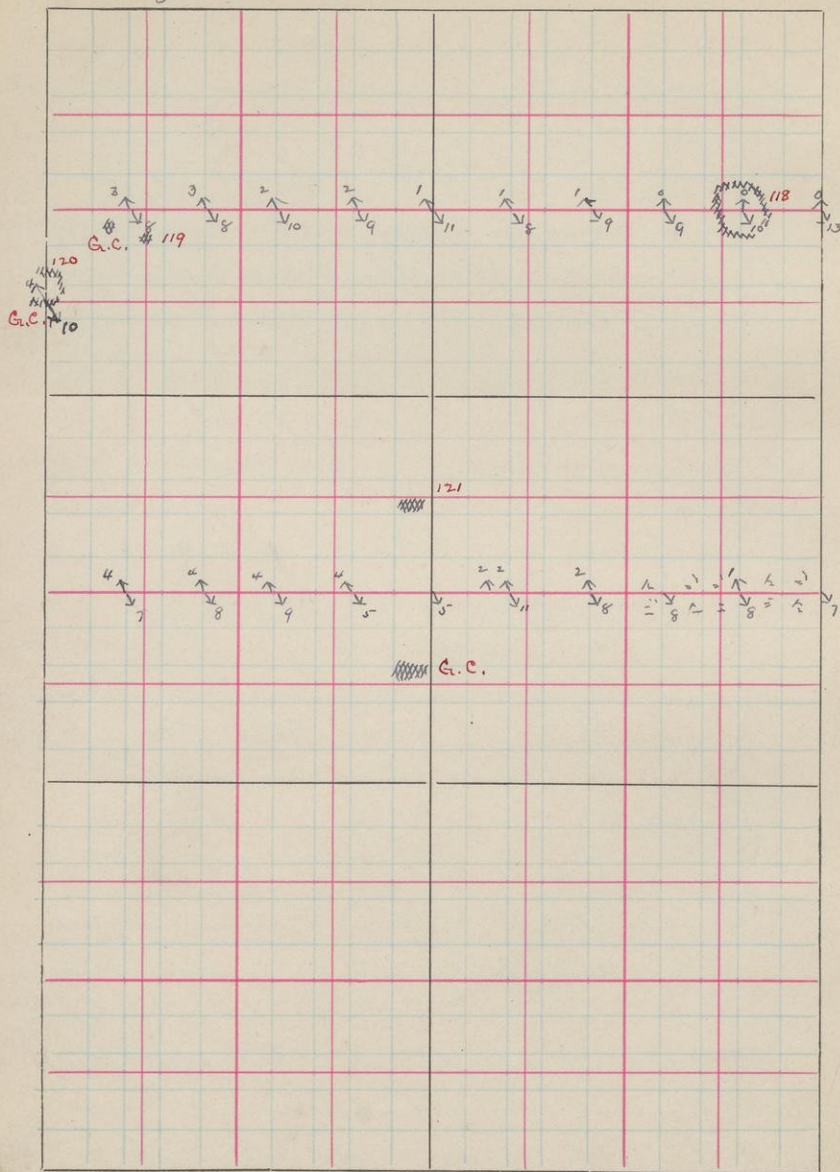
113
32879
G.C.M.

At 800 W 850 N 470 N of S.E. Cr Sec 18
is a hillcock of this fine grained
rock, with amygdaloidal portions.
On its north side the Spheroidal

NW 1/4

S. $S\ N\ \frac{1}{4}$ T. 43
18

R. 31



parting shows well.

114.
32901
G.C.M.

750 N. 500 W of S.E. Cr. Sec 18. H3-31.

The north side of this big hill is the fine grained amygdaloid, but on its south side we find the very dense gray greenstone that rings like a quartzite when struck. On the extreme south side the spheroidal parting is very pronounced. The fragments (115) are often rounded, but as often they are angular, while the cementing material is probably a squeezed amygdaloid.

115
32901

116
32902
G.A.

At 750 N. 625 W of S.E. Cr. Sec 18, is a little ridge of fine grained, dense greenstone, with little white porphyritic feldspar showing on the weathered surface.

117
32903
G.A.

780 N 700 W of S.E. Cr Sec 18- H3-31.

Fine grained greenstone amygdaloid.

118
32904
Q.A.E

750 N. 1060 W of S.E. Cr. Sec 18-43-31
On the East side of a high bluff are
exposed ledges of fine grained green-
stone, amygdaloidal in places. The
amygdaloid portions are in bands, sepa-
rated by other narrow ones of schistose
greenstone. These are best seen in
west face of bluff where the bands
strike low and dip high to the S.

119
32905
Q.C.

720 N. 1880 W of S.E. Cr. Sec 18-43-31.
Small ledge of greenstone conglomer-
ate.

120
32906
Q.C.

665 N. 200 W of S.E. Cr. Sec 18-43-31
North side of hill of greenstone con-
glomerate containing eyes of quartz.

121
32907
Q.C.

355 N. 1500 W of S.E. Cr. Sec 18-43-31
Schistose greenstone conglomerate form-
ing isolated knoll. Contains a few
pebbles of red weathering amygdaloid

At 150 N is another knoll in which
many of the pebbles are scoriaceous

S.

T.

R.

J. P. 45-
for further
notes on this
occurrence.
J. M. C.

with quartz filled cavities.

122

32906
G.C.M.

250 N 380 W of S.E. Cr. Sec 18-43-31

West end of hill of fine grained, dense, gray greenstone, which rings like quartzite?

On top of the hill this is spheroidally pitted, with large nodules of the fine grained rock cemented by a porous black substance looking like rotten wood

123

32909
G.F.S.P.

124

32910
G.A.

320 N. 150 W of S.E. Cr. Sec 18. 43-31

Fine grained gray greenstone spotted with rusty dots as though it were amygdaloidal.

125

32911
G.A.E.

126.

32912

Ichistone rock, comprising an area 3 ft square in 125.

1

292 N. 150 W is a small ledge of porphyritic fine grained greenstone. and at

325 N. 110 W another, showing spheroidal pitting.

127
32913
G.C.M.

At 320 N. 100 W of S.E. Cr Sec 18-43-31
is a nest of ledges of the fine grained
gray rock, occasionally exhibiting
the spheroidal parting in an inferior
manner.

128
32914
C.M.

260 N 25 W of S.E. Cr. Sec. 18. 43-31.
Fine grained gray, dense greenstone
facing the west side of the hill in
whose top is an exposure of the con-
glomerate like 106. The hill runs
north 55 steps, retaining the same
character throughout so far as the
greenstone is concerned, except that to
the north this is spheroidally parted.

129
32915-
G.C.M.

300 N 20 W of S.E. Cr. Sec. 18. 43-31
Predominant rock at north end of
hill.

130
32916
G.C.M.

125 N of S.E. Cr Sec 18-43-31
From a hill of fine grained, dense
greenstone forming a high bare
bluff on the line between Secs 17
+ 18 - 43-31.

131
32917

200 N 1865 N of S.E. Cor Sec 17-43-31
On the west side of the road at this
place is an exposure on the side of
a hill, in which are evenly banded
black slates striking 15° N of U and
dipping about 75° to W. The cleavage
strikes about E to W.

132
32918
A.C.M.

Above these, a little to the west is
a bed of the fine grained, gray,
dense greenstone, the contact between
which and the slates is not suit-
able for careful study.

133
32919
D. M. P. Ch.

250 N 1700+ N of S.E. Cor Sec 17-43-31
From the old pits near the river only
lean ore and chert were taken, of
which 133 is a sample.

- 134
32920
Q.D. 1330 N 20 E of S.E. Cor. Sec 7. 43-31
Coarse dark Diabase.
- 135
32921
Q.D. 1550 N. 500 N of S.E. Cor. Sec. 7. 43-31
Fine grained gray Diabase forming
mass of large hill.
- 136
32922
Q.D. 1510 N. 1760 N of S.E. Cor. Sec. 7-43-31.
Decomposed Diabase.
- 137
32923
Q.D. 1500 N. 2000 N of S.E. Cor. Sec 7. 43-31
Coarse, schistose dark Diabase, with
large hornblende crystals. Schisto-
sity strikes about 35 W of N.
- 138
32924
Q.D. 1740 N. 1990 N of S.E. Cor. Sec. 7-43-31
Coarse massive dark greenstone
- 139
32925
Q.D. 1760 N. 1350 N. of S.E. Cor. Sec 7-43-
31.
Coarse grained, dark Diabase, from
south side at East end of hill.
- 140
32926
Q.D. 1750 N. 930 N of S.E. Cor. Sec 7-43-31.
Thin bare ledge of coarse Diabase
forming East side of top of hill.

141
32927

1750 N. 600 W of S.E. Cr. Sec 7. 43-31

142
32928
G.D.

1834 N. 100 W of S.E. Cr. Sec 7-43-31.

Coarse grained diabase forming
mass of long narrow hill in which
the rock is uniform throughout.

143
32929
G.D.

1860 N. 525 W of S.E. Cr. Sec 7-43-31.

From west end same hill.

45

N 250 W 380 SE Cor. Sec. 18-43-31

In the fall of 1896 I visited this locality and collected some specimens supplementary to 32809-10 collected by Bayley & also to 23640-1 collected by myself. The specimens show various characters of the spheroidally spotted rock with matrix attached. This matrix is very carbonaceous. This siderite & calcite matrix seems to me to be a replacement of the original ^{green} schistose mass which we usually find between the spheroids. The leaching out of the carbonate leaving a filling of silica which was between the carbonate grains gives the rotten wood porous character of the filling.

See specimens 32800 & 23640-1 and Bayley's description p. 40 of this note book. Slides 32809 A. B. C. D. E show character of spheroid & matrix. Just east of this spheroidally spotted rock with the peculiar matrix then occurs in the same exposure an exceedingly conchoidal & broken part of the

ledge which to my mind represents the surface of the flow. This is thoroughly impregnated with carbonate the weathered surface showing its pumiceous character. As we go to the east the rock becomes less & less amygdaloidal and likewise contains a less amt. of Calcite. 38209F. is a piece of the less amygdaloidal part. Even in it some large cracks have been healed by CaCO_3 . Still farther east the amygdaloids practically disappear and the rock becomes the usual dense spheroidally fractured gneiss with green calcite veins between spheroids. From this gradation it would appear that the flow was from east to W. the spheroidal part representing the central or at least denser part of flow.

The excessive amt of carbonate introduced into the surface of flow & spheroids to west of it does not seem explicable by the pumiceous character alone & for spheroids but it is probably due to action of percolating H_2O at

47

that place which contained a lot of CaCO_3 . Such did not touch the less altered parts of ledge & the soil.

At one place on this ledge I noted the fact mentioned by Whiman that in the spheroids containing amygdaloids they were accumulated on western side of spheroid, that being also side nearest flow surface as ledge has been interpreted.

- 39909G. From ledge just on side of road slightly N-W. of old Mansfield mine. Conglomeratic rock made up of rounded volcanic pebbles & ashes and flat fragments of slate. Slates appear to have been relicified in ledge & judge macroscopically. No distinct bedding but flat fragments all lie uniformly about N-S. Going to W and above this with very sharp line of demarcation exposure only about 4 ft N-S. — is found a spheroidally pitted greenstone. Is this conglomerate a bed of ashes mixed with

48

slate fragments from slates
through which eruption took
place & which has fell in
 H_2O or on dry land (which?)
and was then covered by a
lava flow?

I can not quite understand
lack of scoriaceous bottom
part of lava flow.

Exposure is only about 1' wide
that is E-W showing just the
line of contact.

1896.

Clements

