Lake Superior survey: Michigan, 1892: Michigamme Mountain, Fence River, Brook's Line, and Felch Mountain Trough. No. 301 1892

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Notebook #301

LAKE SUPERIOR SURVEY.

MICHIGAN, 1892.

Michigamme Mountain, Fence River, Brook's Line, and Felch Mountain Trough.

Geological Notes by Samuel Sanford, Charles M. Fairchild and H. L. Smyth.

A true copy of the original notes.

H. L. Smyth.

THE FOLLOWING SPECIMENS ARE MISSING.

34014.	34213.	34627.	36089.
34020.	34374.	34695.	36100.
34034.	34420.	34696.	36124.
34047.	34423.	34807.	36126.
34050.	34482.	34808.	36134.
34062.	34483.	34815.	36450.
34075.	34600.	34927.	
34104.	34617.	34949.	
34134.	34626.	34452.	

INDEX OF SPECIMENS BY TOWNSHIPS.

T. 41 N., R. 30.W.

34000.	34000.	34000.
675-677.	908 A.	909-911.

T. 42 N., R. 30 W.

34000.	34000.	34000.	34000.
678-684.	744-768.	809-814.	901-908.
700.	781 & 782.	887-895.	

T. 43 N., R. 30 W.

36000.	36000.
358	361-364.
359.	

T. 44 N., R 30 W.

340000

26-33.

T. 45 N., R. 30. W.

34000.	34000.
484 & 485.	584-588.

INDEX OF SPECIMENS BY TOWNSHIPS.

T. 46 N., R. 30 W.

34000.	34000.
486.	589-595.

T. 47 N., R. 30 W.

34000.	34000.	34000.	34000.
602-616.	636.	701-720.	737-743.
618-625.	639-656.	724-736.	
628-633.	666-674.	736 A.	

INDEX OF SPECIMENS BY TOWNSHIPS.

T. 42 N., R 28 W.

34000.	35000.	36000.	36000.
896-900		71-88.	135 & 136.
956 & 957.		90-99.	127-133.
959-999.		101-123.	301-327.
		125.	401-436.

T. 41 N., R. 29 W.

36000.

17.

T. 42 N., R. 29 W.

34000.	34000.	34000.	36000.
685-693.	769-780.	928-948.	1-16.
693 A.	783-800.	950-955.	18-53.
694.	816-886.	958.	53 A.
697-699.	912-926.		54-70..

INDEX OF SPECIMENS BY TOWNSHIPS.

T. 43 N., R. 31 W.

34000.	34000.	36000.	36000.
1-9.	70-74.	141 & 142.	447-449.
15-18.	167 & 168.	328-338,	451-456.
35-39.	184-212.	338 A.	
52 & 53.	214-249.	339-357.	
60 & 61.		365-369.	
63-67.		437-443.	

T. 44 N., R. 31 W.

34000.	34000.	34000.	34000.
10-12,	48 & 49.	169-183.	558.
13.	51.	250-373.	36000.
19.	54-59.	375-419.	444-446.
21-25.	68 & 69.	421 & 422.	
40-46.	76-166.	424-428.	

On the line between 44 & 45, 31.

34000.

553 A.-557.

INDEX OF SPECIMENS BY TOWNSHIPS.

T. 45 N., R. 31 W.

34000.	34000.	34000.
429-449.	455-471,	559-583.
451.	501-553.	

T. 47 N., R. 31 W.

34000.	34000.	34000.
487-500.	634,	659 A.
596-598.	635.	659-665.
598 A. & 599,	637.	721-723.
601.	638.	801-806.

T. 45 N., R. 32 W.

34000.	34000.	34000.	34000.
450.	453.	454.	472-481.

34000

Specimen 1. 34001 Section 4, 43, 31. 1850 N., 130 W.

Sideritic graywacke? Strike of cleavage on N. face N60 E., dip 60 S. Jointing obscure. Whole exposure schistose, much broken up by weathering. Trend of N. face of outcrop is parallel to strike of cleavage. Ledge forms an irregular hill, 10 feet above swamp. To S. it is covered with drift.

Specimen 2. Section 4, 43, 31. 1850 N., 130 W.

Sideritic graywacke. Trend of ridge about N. E. Exposure small, perhaps not ledge, though ledge is probably near. Strike of cleavage N. 30 E., dip 60 E. Rock coarser grained than specimen 1.

Specimen 3. Section 4, 43, 31. 1850 N., 150 W.

Outcrop of siderite schist, finer-grained than preceding. Cleavage strikes N. 50 W. (about) magnetic, dips about 90. Weathered surface of rock has in places, appearance of pseudo-conglomerate or amygdaloid. Cleavage is not well defined. Seems like in places, a doubly schistose structure. Exposure has no well defined trend. Is low knoll, about 20 feet square.

Specimen 4. Section 4, 43, 31. 1980 N., 225 W.

Edge (bottom) of hill. (N. E. spur of Michigamme Mountain.) about 30 feet high, is from a test pit.

34000

Specimen 5. Section 4, 43, 31. 1925 N., 235 W.

This rock forms great mass of Michigamme Mountain. At this point are numerous exposures of it. It contains some obscure bands of cherty, or jaspery material. These bands strike about N. & S. and dip W. at a high angle. Going west from here get following series or gradations:--

Specimen 6. Section 4, 43, 31. 1925 N., 250 W.

Peculiar looking banded rock. Bands strike about N. & S.

Specimen 7. Section 4, 43, 31. 1925 N., 275-285 W.

Cleavage not well defined. Banding strikes N. 70 W. Good exposure.

Specimen 8. Section 4, 43, 31. 1925 N., 300 W.

Graywacke. Banding in it strikes about N. 70 W.

Section 4, 43, 31. 1890 N., 280 W.

Large exposure similar to 5, forms top of hill. Cherty or jaspery. Bands strike N. 20 E.

1985 N., 200 W.

Outcrop similar to 5. Cleavage or parallel joint planes strike N. 85 E., and dip 90 . Exposure also shows very obscure jaspery bands.

Section 33, 44, 31. 30 N., 280 W.

A ridge and little bluff, about 40 feet high. A N. E. spur of Michigamme Mountain. Rocks, sideritic schists. Something

like 3, but more schistose. Cleavage strikes N. 80 E. and dips 80-90 S. Going S. this rock becomes finer-grained. Ridge formed by rock crosses section line between 250 and 300 W. Line running N. 20 E. from 13 will run over outcrops or near outcrops for 300 paces.

Specimen 9. Section 4, 43, 31. 1910 N., 250 W.

Rock like 5 forms side of hill. Most of this rock differs from 5 in being without well marked cherty bands or segregations. Parallel joints strike N. 80 E. (magnetic) and dip 55 S. Striations on weathered surface may be glacial. Strike N, 60 W. (magnetic)

Section 4, 43, 31. 1900-1970 N., 300-350 W.

Side of mountain is covered with angular fragments of 5. Ledge evid evidently near surface.

Section 4, 43, 31. 1830-1870 N., 300-400 W.

Highest point of Michigamme Mountain. No. 5 forms an oblong ridge, outcropping on the sides of it. Longest axis of ridge is N. 25 E. Ridge is 20 paces or so wide. Striations on weathered surface. Perhaps glacial. Strike N. 70 E. (magnetic) Some cherty bands or aggregations strike N. 30 W.

Specimens 10-12. Section 33, 44, 31. 100 N., 425 W.

Outcrop of schist 10 feet high. E. face of ridge formed by this rock, trends N. 15 E. Cleavage is very well marked. Strikes N. 80 W., dips about 90 . Rock contains patches of soft red stuff. In places these patches are changed to a blue hematite, more or

less completely. Patches show no well defined parallelism of longer axes, unless possibly N. 25 W. On weathered surface, rock in places looks like a much squeezed conglomerate.

Specimen 13. Section 33, 44, 31. 125 N., 410 W.

Outcrop of schist. Cleavage strikes E. & W. , dips 25 S.

Specimens 15 & 16. Section 4, 43, 31. 1940 N., 1360 W.

Another exposure of limestone is on N. slope of hill and largest yet seen. Some layers are redder than others. Specimen 15 is from a red layer. It contains also a siliceous band about 1 foot wide, specimen 16. This band strikes N. 40 W., and dips about 65 S. Cleavage of limestone strikes and dips at about same angles.

Section 4, 43, 31. 1990 N., 1340 W.

Another outcrop of limestone like preceding except that it shows siliceous bands. Cleavage strikes N. 35 W., and dips 70 S. Outcrop trends N. 35 W. These readings, all magnetic.

Specimen 17. Section 4, 43, 31. 1860 N., 1295 W.

Outcrop last mentioned is here cut by a dike of rock like 17. This dike strikes apparently N. 15 W., and dips vertically. The cleavage of the adjoining limestone strikes N. 30 W. , and dips about 75 S.

34000

Specimen 18. Section 4, 43, 31. 1860 N., 1250 W.

A small test pit. Indications are that pit is bottomed.

Specimen is fragment of rock thrown out.

Specimen 19. Section 33, 44, 31. 50 N., 1020 W.

Pit farthest E. on this line, about 50 paces shows rock like 19.

Specimen 21. Section 33, 44, 31. 110 N., 1000 W.

Test pit. 21 is fragment of same rock thrown out.

Specimen 22. Section 33, 44, 31. 185 N., 980 W.

Test pit, probably struck ledge, a siderite and chlorite schist.

Same rock shown by pit at 150 N., 980 W.

Specimen 23. Section 33, 44, 31. 10 N., 1050 W.

Pit from which 23 was last rock thrown out. It is second of 4 test pits running N. 40 E.

Third pit is N. 20 E. , 20 paces from it. Material thrown out of third pit is probably a banded slate. Fourth pit is about 10 paces farther on. Material thrown out does not differ much from above.

Specimen 24. Section 33, 44, 31. 60 N., 1025 W.

Test pit, material thrown out is a much disintegrated chlorite schist. No. 24 is sample of it.

Specimen 25. Section 33, 44, 31. 110 N., 980 W.

Test pit, sample of rock on dump.

Specimen 26. Section 33, 44, 30.? 135 N., 850 W. Probably R. 31 W. (CEQ 4/14/52)

Test pit, chlorite ferruginous schist.

Specimen 27. Section 33, 44, 30. 160 N., 870 W.

Test pit. Altered siderite schist with chlorite.

Section 33, 44, 30. 65 N., 875 W.

Test pit. Cannot tell if fragments on dump are from ledge.

Section 33, 44, 30. 180 N., 875 W.

Test pit . Ledge probably siderite chlorite schist.

Specimen 28. Section 33, 44, 30. 205 N., 840 W.

Test pit, first of a line running N. 40 E. This first pit shows on dump rock like 28, a ferruginous chlorite schist. Second pit no bottomed in ledge. Third pit, 18 paces N. E. of first, shows same rock as that. So does fourth, 40 paces on; as well do the fifth and sixth, 50 paces on.

Specimen 29. Section 33, 44, 30. 240 N., 795 W.

Seventh pit. Shows a peculiar rock, an altered eruptive.

Specimen 30. Section 33, 44, 30. 250 N., 790 W.

Eighth pit, 65 paces N. E. Shows same rock, but less altered.

Specimen 31. Section 33, 44, 30. 257 N., 783 W.

Ninth pit, 75 paces N. E. Shows a ferruginous chlorite schist.

Specimen 32. Section 33, 44, 30.? 175 N., 815 W.

N. W. corner of Michigamme Mountain. Perpendicular bluff 40 feet

high. Rock is much like No. 5 in places, evidences of bedding can be found in fragments fallen from bluff, but on bluff itself I found none. Face of the bluff is much jointed. Saw no particular parallelism to joints, however, except possibly N. 20 W. Bluff due to a joint that ran N. 40 E. No. 42 probably forms W. slope of Mountain. Outcrops on or near surface, probably on a line 825 W., 100-200 N. It outcrops on brow of mountain from 175 N., 815 W., 100 N., 800 W.

Specimen 33. Section 33, 44, 30. 20-25 N., 800-825 W. Trench and test pit. Test pit at 25 N., 800 W. Rock ledge is clearly struck. No. 33 is sample. 33 also on dump of trench. Between hillside on E. end of trench 33 outcrops on hillside.

Specimen 35. Section 4, 43, 31. 1985 N., 690-790 W. Outcrop on hill side, evidently a more siliceous and jaspery phase of 5, 32, 33. Is very much jointed and broken up; in places finely brecciated. What looks like a small greenstone dike much squeezed. Strikes N. 50 W., and dips nearly vertically.

Specimens 36 & 37. Section 4, 43, 31. 1885 N., 720-820 W. Test pit, first of a line of seven running S. 45 W. This pit shows on dump much broken schist, impregnated with hematite. Going S. W. along line of pits. Second and third pits not bottomed in ledge apparently. Fourth and fifth pits also

show nothing plainly from ledge on dump. But sixth pit, 65 paces S. W. of first, shows rock like 36 was reached. A siderite schist. Seventh, 85 paces S. bottomed in No. 37. A sheared diorite. This pit is at the base of a low hill on which are numerous angular fragments of limestone. Same exposures may be in place. So cross whole series of rock between limestone and jasper.

Specimen 38. Section 4, 43, 31. 1830 N., 665 W.

Bunch of five test pits in shape of

Material on dump of all the pits is much the same, siliceous and jaspery. 38 is specimen of average.

Specimen 39. Section 4, 43, 31. 1960 N., 700 W.

Large outcrop forming crest of mountain. Rock shows definitely individualized crystals of quartz. Is much jointed. Parallelism of joints not very constant.

Specimen 40. Section 33, 44, 31. 0 N., 760 W.

Outcrop of supposed"original jasper"

Specimen 41. Section 33, 44, 31. 35 N., 700 W.

Small outcrops near here, also two test pits. Rock 41.

Section 33, 44, 31. 50-70 N., 700 W.

Numerous small outcrops, several test pits nearly in line, one at 70 N., one at 65 N., 695 W. Rock is in general like 41.

Specimen 42. Section 33, 44, 31. 110 N., 695 W.

Rock is here, in test pit seen distinctly bedded, stratification strikes about N. 60 W., and dips 10 S. Bands which show bedding are crumpled or crenulated, but in general, strike of bedding is that given. Specimen shows bands. Cleavage strikes N. 60 W., and dips 50 S.

Specimen 43. Section 33, 44, 31. 195 N., 600 W.

Rock just mentioned here outcrops in low ledge on hillside. Specimen is fair average of it. ~~Is in contact with 48~~. Line of contact runs irregularly N. 70 E., and dips 90.

Specimen 44. Section 33, 44, 31. 140 N., 620 W.

Test pit. Probably bottomed in ledge. Rock shows probable bedding. Is it a surface volcanic?

Specimen 45. Section 33, 44, 31. 130 N., 648 W.

Test pit, bottomed in ledge. Shows bedding. Is it a conglomerate?

Specimen 46. Section 33, 44, 31. 70 N., 645 W.

Test pit. Specimen is average of it.

Specimen 48. Section 33, 44, 31. 215 N., 680 W.

Small exposure of rock , massive.

Specimen 49. Section 33, 44, 31. 230 N., 660 W.

Ledge, more porphyritic looking. Exposure much jointed. Some joints run N. 45 W. Varying phases shown in outcrops along edge of hill and at 220 N., 550 W.

Specimen 51. Section 33, 44, 31. 0 N., 650 W.

Test pit and outcrop 50 x 10 feet. Outcrops trends N. 60 W. Knob at W. 670, N. 0-20 is jasper. 51 is average.

Specimen 52. Section 4, 43, 31. 1960 N., 510 W.

Probably ledged in 52.

Specimen 53. Section 4, 43, 31. 1985 N., 505 W.

Test pits bottomed in banded jasper, very pretty. Test pits deep.

Specimen 54. Section 33, 44, 31. 35 N., 495 W.

Test pits, bottomed in banded jasper, slightly coarser than 53. 54 is sample.

Specimen 55. Section 33, 44, 31. 35 N., 470 W.

Test pit probably bottomed in ledge. Specimen very interesting. Does it show origin of jasper like 52 & 53.

Specimen 56. Section 33, 44, 31. (1) 55 N., 505 W.

(2) 50 N., 510 W.

(3) 65 N., 500 W.

(1) 55 N., 505 W.

Specimen 56. Section 33, 44, 31. (2) 50 N., 510 W.

(3) 65 N., 500 W.

Test pits, all showing about same rock. Pit No. 2 is very interesting from gradations of rock it shows. Gives evidence that jasper like 56 is formed from rock as coarse grained and perhaps similar to 55.

Specimen 57. Section 33, 44, 31. 68 N., 475 W.

Pit showing a very good lean ore.

Specimen 58. Section 33, 44, 31. 85 N., 525 W.

Outcrop of much squeezed schist, cleavage strikes N. 80 E., and dips 70 S.

Specimen 59. Section 33, 44, 31. 85 N., 550 W.

Test pit probably bottomed in 59.

Specimen 60. Section 4, 43, 31. 1050 N., 500 W.

Outcrop here. Strike of cleavage is N. 85 E., dip 60-65 S.

Specimen 61. Section 4, 43, 31. 1800 N., 245 W.

Outcrop of jaspery rock much jointed.

Specimen 63. Section 4, 43, 31. 1700 N., 485 W.

Line of pits running N. 25 E. Pit at 1700 N. may have been bottomed in 63. Five pits to S. W. show all same kind of rock.

Specimen 64. Section 4, 43, 31. 1700 N., 485 W.

Are five pits running N. 25 E. They show no great difference

Pit No. 4 has on dump rock like 63, may be boulder. Specimen 64 is from pit No. 5

Specimens 65 &66. Section 4, 43, 31. 1750 N., 435 W.

Outcrop .

Specimen 67. Section 4, 43, 31. 1725 N., 600 W.

Outcrop of jaspery rock. Red bands seem to have no particular principal strike or dip, though latter is in general steep, 60-80 E. Some joints strike about N. 10 E.

Specimen 68. Section 33, 44, 31. 150 N., 625 W,

Outcrop of surface volcanic. Cleavage crumpled, no principal strike. Probably in place.

Specimen 69. Section 33, 44, 31. 125 N., 650 W.

Much same rock. Cleavage probably strikes N. & S. and dips W.

Specimen 70. Section 4, 43, 31. 1800 N., 965 W.

Outcrop of massive rock, jointed, but no apparent parallelism to joints. A diorite. Is at W. end of a little hill that trends about N. 60 W., exposure is about 10x15 feet. Going S. find angular fragments aparently, same may be rock in place. Outcropping on sides of hill, in width of 20 paces, for 65 paces.

Specimen 71. Section 4, 43, 31. 1800 N., 930 W.

What may be 70 much sheared, outcrops possibly here on E. side of little hill. Exposure is 3 x 15 feet. Cleavage strikes nearly E. & W., and dips vertically.

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Specimen 72. Section 4, 43, 31. 1590 N., 1000 W,

Outcrop of limestone, perhaps 100 feet by 10-0 feet, trends about E. & W. at 30 feet E. of 1/4 line. Cleavage strikes N. 40-25 W. and dips 70 S.-90 .

Specimens 73 & 74. Section 4, 43, 31. 1590 N., 995 W.

S. W. end of trench, from which test pits run N. 20 E.

Rock on dump of pit shows that No. 73 immediately overlies the limestone. It is a greenstone schist, much harder than most seen thus far. Going N. 20 E., 26 paces from bluff, in second test pit, on dump, is rock like No. 74. In third pit, 45 paces from bluff, same rock, trifle more ferruginous. All pits show much same rock.

Specimen 76. Section 33, 44, 31. 120 N., 280 W.

A green schist, agglomeratic. The cleavage strikes N. 75-80 E. and dips S. E. at an angle of about 30.

Specimens 77-80. Section 33, 44, 31. 220 N., 267 W.

Greenstone conglomerate, striking about N. 75 E., dips S. E. 40. A coarse jointing dips S. at a low angle, and this may possibly be bedding. The rock is evidently a surface eruptive; parallel with the horizontal jointing are fine wavy lines and on one exposure the upper surface of a band of weathered holes agrees in direction with it. The rock is very tough, contains abundant carbonates, some quartz, very much broken up and breciated.

Specimen 81. Section 33, 44, 31. 230 N., 480 W.

Is a deep testpit, the dump shows green schist, and some greenstone conglomerate, like specimens 79 & 80.

Specimens 82 & 83. Section 33, 44, 31. 293 N., 1945 W.

Begin outcrops of greens tone conglomerate, which though not actually in place, probably are nearly so. The most northern is at 317 paces N. The rock is green and hard and has numerous discontinuous cracks in it in all directions; weathers from light green to dull brown, the latter often contains iron carbonate. It contains long lath shaped crystals of feldspar, to 1/2 an inch in length. Has inclusions which weather red, are aligned in cleavage direction, about N. 75 E. and are gashed

pretty constantly across the cleavage. The second structure is plicated, it strikes about N. & S. and dips low to the W. It is indicated on weathered surface by epidotic hard fine bands.

Specimen 84. Section 32, 44, 31. 400 N., 32 W.

Is test pit bottomed in material like specimen 84.

Specimen 85. 33, 44, 31. 430 N., 1865 W.

Marble, strikes N. 35 E., and dips 70-75 S. E.

This is the most evident structure; the rock weathers very light brown or yellow. It is seamed with little gashes of quartz, the probable E. & W. cleavage is marked by these quartz seams. Exposed fro 35 paces along the strike and about 80 paces across it. Pegmatite seams occur both with the bedding and across it.

Specimens 86-88. Section 33, 44, 31. 470 N., 1680 W.

Marble, striking very variably. At the top of the hill it strikes N. 6 E., and dips 75 to 80 W. Cleavage is well shown by quartz seams. At south slope of hill the cleavage is strongly developed, masking the bedding but not entirely, latter often recognizable, striking about N. & S. and strongly plicated. Specimen 86 shows marble. Specimen 87 is a rock occurring in the marble in a band 2 feet wide. Specimen 88 is from a pegmatitic band.

Specimens 89-93. Section 33, 44, 31. 1130-1275 N., 125-225 W.

We have here a series of outcrops of marble and of greenstone and chert. At the N. side of the series of exposures the marble

strikes N. 78 E., and dips about 80 to the S. This structure is shown by alternations of material. Pure marble alternating with bands of very calcareous greenish weathering schist. On the top of the hill, the rock is quite massive. It is reticulated with thin quartz seams, and occasionally quartz bands, up to 2 or 3 inches across; the latter have usually an E. & W. direction. At 1200 N., 200 W., there are loose pieces of greenstone conglomerate. Specimen 89. At the S. end of the exposure, we may see limestone, passing along the strike into a mass of chert, which carries streaks and masses of soft red ore. The chert is usually light colored, but some is red, i.e. jasper. Test pits south, in lower ground, adjoining chert, show nothing.

Specimen 94. Section 33, 44, 31. 1810 N., 1750 W.

The marble from a small exposure which strikes E. & W. and shows on the E. end very low S. dip.

Section 33, 44, 31. 1857-75 N., 1963 W.

Marble, large exposure, strikes N., dips high to the S. It is distinctly bedded and plicated. The structural observation is good. It is exposed as shown in the sketch.

At 1800 N., 1900 W. is a small exposure of limestone. On the top it is nearly flat with a westerly pitch.

At 1800 N., 1810-32 W., marble very massive, no bedding shown much crumpled, very breciated, much broken up. On the N. & E.

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sides it shows, however, bedding planes with the strike , and dip 60°-70° E. It is greatly contorted and faulted. It carries many seams and small veins of hematite, both in the bedding and in other directions.

Specimen 95. Section 33, 44, 31. 1900 N., 1575 W.

No note on this specimen.

Specimen 96. Section 33, 44, 31. 1975 N., 1550 W.

Cambrian sandstone from a test pit.

Specimen 97. Section 33, 44, 31. 1830 N., 1550 W.

Marble, strikes N. 78° E., dips S. 50°

Specimen 98. Section 33, 44, 31. 1880 N., 1600 W.

No note on this specimen.

Specimen 99. Section 33, 44, 31. 1875 N., 1420 W.

From the Lottie mine.

Specimens 100-103. Section 32, 44, 31. 100 N., 8-50 W.
Limestone, forms a low ridge. strikes about N. 70 E., dips S. E. about 65. Interbedded with it for quite the whole length is a mass of either felspathic quartzite or granite, very much sheared, in which the cleavage has the direction of the strike of the limestone and the same dip. The quartzite or granite being in the principal mass 10 to 12 feet wide, north of which is a band of limestone, then comes 4 feet of quartzite and then more limestone on the north side of the hill. Pumpelly and Van Hise have regarded this rock as quartzite.

Specimens 105 & 106. Section 32, 44, 31. 400-750 W., 300-475 N.
A group of exposures of limestone forming a ridge. On the E. side it strikes N. 60-65 W., dip 65-70 to the S. W. The limestone for the most part is dark blue, some of it carries little blue quartz pebbles, shown in specimen 106 and occasionally a grain of feldspar.

Specimens 107 & 108 Section 32, 44, 31.
Are from the western portion of this exposure. The strike there is a little N. of E. and dip about 65 to the S.

Specimen 109. Section 32, 44, 31. 550 N., 1850 W.
Limestone from a test pit.

Specimen 110. Section 32, 44, 31. 685 N., 1800 W.
Limestone from a test pit.

Specimens 111 & 112. section 32, 44, 31. 775 N., 1750 W.

These specimens are from an exposure of blue and green schists or slates, which strike about E. & W. and dip N. at a low angle. A good deal crumpled. The axes of the little folds pitch to the east.

Specimen 113. Section 32, 44, 31. 975 N., 1940 W.

From a test pit.

Specimens 114 & 115. Section 32, 44, 31. 825 N., 1750 W.

Black banded slates, strike N. 70 W., dip vertical.

These slates are full of carbonates. They carry pegmatite very similar to that in the limestone.

Specimens 116-119. Section 32, 44, 31. 1000 N., 1800 W.

Black slates, striking N.70 W. and dipping to the N. at an angle of about 80 . These slates form a ridge which runs east 700 paces. Interbanded in the slates are layers of impure, pyritiferous limestone.

Specimen 121. Section 32, 44, 31. 975 N., 1600 W.

From test pit, green schist or schistose greenstone.

Specimen 120. Section 32, 44, 31. 935 N., 1555W.

From a test pit.

Specimens 122& 123. Section 32, 44, 31. 1050 N., 900-950 W.

Black slates. Strike N.72 W., dip vertical.

Specimen 124. Section 32, 44, 31. 1567-1620 N., 400W.

Limestone is exposed at intervals, no bedding is recognizable

It is very much seamed. The predominant parallel lines strike N. 28 W.

The structure is cut at about right angles by a green schist which forms the easternmost outcrop on the hill. It is probably an altered dike. This is the rock in specimen 124.

A little south west of this knoll, 20 or 30 paces, much more thinly banded limestone. It strikes N. 32 W. and dips 75-80 S.

Specimen 125 & 126. Section 32, 44, 31. 1530 N., 450 W.

Is a similar thin banded limestone. The strike is N. 40 W. dip 80-90 to the S. W. This is also the direction of the bands In the green schist, which is interbedded with it. This green schist may possibly be eruptive, but there is no evidence of it. The general E. & W. cleavage is also observable.

Specimen 127. Section 32, 44, 31. 1550 N., 540 W.

Limestone, massive.

Specimens 128 & 129. Sec tion 32, 44, 31. 1675 N., 725 W.

At this point a dike cuts the limestone, which in the vicinity of both sides is represented by specimen 128.

Specimen 130 Section 32, 44, 31. 1725 N., 730 W.

Limestone.

Specimen 131. Section 32, 44, 31. 1750 N., 775 W.

Is a green schist and is squeezed in with the limestone.

Specimens 132 & 133. Section 32, 44, 31. 1725-1750 N., 350-425 W.

Limestone, forming a little knoll overlooking the river. Weathers light pink. Strike is on an average , about N. 60 W., dip is

to the S. on the whole. There are layers in this limestone which have a decidedly oolitic appearance. The nuclei being often red oxide of iron.

Section 32, 44, 31. 1600 N., 1750-1875 W.

Is a limestone ridge extending as far west as the bank of the river. The rock is rather soft. It is distinctly but not thinly bedded and weathers a light blue gray. It is not very crystalline, contains layers of calcareous shale. A darker color on a fresh fracture. Cleavage strikes N. 80 W., and stands vertical Still another parallel structure is a system of nearly horizontal joints having, however, perhaps a slight inclination to the west, running through both cleavage and stratification. The stratification is strongly but not minutely crumpled and seems to indicate an essentially flat structure on the hill with a low westerly pitch, both N. & S. dips being observed and the stratification of the rocks diverging in going west, from the cleavage. Exposures are few on the hill, although the hill is covered with loose pieces of rock. The strike of the stratification is from N. 65 W. to N: 80 E., dip from 45 S., to low N. The dip on the hill seems to be south. I should regard this hill as being located about on the crest of an anticline.

Specimens 135 & 136. Section 32, 44, 31. 1500 N., 1800 W.

Limestone, dark blue and soft, on the weathered surface light

and dark bands. Strike N. 67 W., dip 65-75 is to the S. The cleavage is not very strong but appears as a system of parallel joints. 20 feet farther E., the limestone strikes with the cleavage in the general direction N. 80 W.

Specimen 137. Section 32, 44, 31. 1480 N., 1575 W. Limestone, pink. Strike N. 76 W., dips S. 70 . Cleavage strikes N. 85 W., and dips N. 20 paces south of this exposure, the limestone is blue and white, strikes E. & W., and dips high south.

Specimen 138. Section 32, 44, 31. 1500 N., 1475 W. Marble, blue, white and pink banded. Strike N. 82 W., dip from vertical to high south.

Specimen 139. Section 21, 44, 31. This specimen represents sheared granite from the S. face of the bold bluff, about 250 paces W. of Crystal Falls road.

Specimen 140 & 141. Section 16, 44, 31. 100 N., 1150 W. This rock forms large exposures. The strike is N. & S., dip E. 65 . Strike, prolonged carries the western part of the exposure into granite. This rock is light weathering, but darker on a fresh fracture, carries little grains of blue quartz, of uniform size and feldspar augen, some of which are concentrically disposed with quartz in the middle. Has the look of an acis eruptive.

Specimens 142 -144. Section 10, 44, 31. 250 N., 1900 W.

A few paces N. of Crystal Falls road, magnetite actinolite schist. The actinolite is very coarse. Strike about N. 12 W. Dip 65 E. Interbanded with it are some layers containing a pink mineral that looks like limestone.

Specimen 145. Section 15, 44, 31. 1900 N., 1775 W.

On west side of the Fence river at the top of the hill. Mica slates, strike N. 12 W., dip E. not more than 40° or 50°

Specimens 145 & 147. Section 32, 44, 31. 1200 N., 1500 W.

Is the top of short ridge made up of black slates, ridge runs N. 85 W. The slates are very calcareous. The ridge runs about 150 paces to the E. for which distance the slates are seen in fragments; and W. it dies away gradually near the section line. The top is not more than 30 feet across.

Specimens 148 & 149. Section 31 44, 31. 1435 N., 800 W.

This is the north foot of a bluff. It is made up of green, very fine grained light weathering rock. It is massive with occasional ~~patches of thinly~~ thin layers showing induced developed schistosity. Dip is vertical, strike is N 75° E.

Specimen 150 Section 31, 44, 31. 1390 N., 800 W.

This specimen is from a band of greenstone conglomerate, which strikes N. 87° E. and dips from vertical to high to the S.

Specimens 151 & 152. Section 31 44, 31. 1300-1375 N., 800 W.

Greenstones are continuously exposed. They are represented by specimens 151 & 152.

Specimen 153. Section 34, 44, 31. 2000 N., 194 W.

From test pit on line. Green schist.

Specimens 154-156. Section 34, 44, 31. 2000 N., 1500 W.

These specimens represent a large exposure of jasper, containing some soft ore very similar to the jasper at the Lottie mine. The rock is brecciated. It seems to strike about N. & S. No very well marked dip, but perhaps the dip is from 20-30 E.

Specimen 157-159. Section 34, 44, 31. 1750-2000 N., 1600-1750W.

These specimens represent either a very felspathic quartzite or a sheared quartz porphyry. The strike is N. 20 W., dip to the E. 45-60. They are found in numerous exposures

Specimen 160 Section 27, 44, 31. 525 N., 1500 W.

Sheared squeezed felsite. Strike about N. & S. and dip E.

Specimen 161. Section 27, 44, 31. 1000 N., 1400 W.

Cambrian sandstone.

Specimens 162 & 163. Section 27, 44, 31. 850-900 N., 1500 W.

The same sheared felsite.

Specimens 164. Section 34, 44, 31. 200 N., 1525 W.

Sheared felsite or quartzite.

Specimens 165 & 166. Section 22, 44, 31. 1500 N., 170 W.
Mica slates on the Michigamme river. This rock is dark weathering and pitted on the weathered surface. A fresh fracture is blue gray. The principal cleavage strikes N. 12 W. and dips E. 65 . Besides these there are cross joints striking about N. 60 W. and 30 E. Calcite veins often fill these and on them as on almost all surfaces of fracture, calcite films are found.

Specimen 167. Section 4, 43, 31. 1960 N., 200 W.
Test pit, in a very ferruginous banded red rock, showing both banding and cleavage, the latter cutting the former almost at right angles. It is south of section line and 20 paces east of the jasper. 20 paces west on the line, a line of outcrops of the recomposed material. The outcrop to the east shows at the base 1 or 2 feet of squeezed ferruginous quartzite. The rock is all very massive, jointed coarsely and shows an E. & W. cleavage, dipping S. The fragmental character is very evident. It has intrusions of brownish, red chert, which do not constitute continuous bands. It is possible that they are pebbles, but I do not think it likely. They strike from N. to N.20 W. and dip W. 50° or less even. Some of the chert intrusions have the same spotted iron intrusions arranged in bands.

Specimen 168. Section 4, 43, 31. 1950 N., 300 W.
This rock contains iron fragments arranged in roughly parallel bands. Strikes N. 15-20 W. and dips W. on the whole, though

the observation is somewhat uncertain.

On the little hill, S. & E. of the old camp, between Michigamme Mountain and the road, the greenstone agglomerate outcrops. This h has numerous more or less rounded lighter weathering inclusions, oriented about N. & E. The cleavage strikes N. 85 W. The rock is green on a fresh fracture, besides these inclusions it has long single twin feldspars, the aligning is parallel to the long axis; these sometimes have a stellar arrangement. The largest crystal is about one and a half inches by 1/8. One inclusion has very numerous quartz grains up to 1/8 inch which cease at the bounding of the inclusion.

Specimen 169. Section 4, 44, 31. 1620-1690 N., 720-65 W.

This hill made of rock of varying texture. Outcrops are all small. Can never be certain they are in place. Samples are from rock probably in place.

Specimen 170. Section 4, 44, 31. 1745 N., 880 W.

Low small outcrop of limestone, may be in place; cleavage strikes N. 70 W., dips 70 S., is much crumpled.

Specimen 171. Section 4, 44, 31. 1740 N., 840 W.

Test pit ledged in 171, a green schist.

All T44N probably T43N (CED - 4/14/52)

Specimen 172. Section 4, 44, 31. 1715 N., 875 W.

Test pit, bottomed probably in more compact siliceous and ferruginous rock.

Specimen 173. Section 4, 44, 31. 1700 N., 885 W.

Test pit bottomed in probably sheared phase of 172.

Specimen 174. Section 4, 44, 31. 1690 N., 910 W.

Outcrop of lime schist. Strike N. 60 W., dip 80-90 W.

Specimen 175. Section 4, 44, 31. 1490 N., 735 W.

Probable outcrops of limestone. Exposures all small. Cover an area of 300 feet x 10 feet. Cleavage strikes N. 75 W., dips about 75 S.

Specimen 176. Section 4, 44, 31. 1450 N., 730 W.

Another outcrop of limestone, more schistose. Strike of cleavage is about N. 60 W., dip 75 S.

Specimen 177. Section 4, 44, 31. 1600 N., 665 W.

Large outcrop of greenstone, apparently eruptive, forms knoll 20 feet high x 40 feet x 20 feet. Rock much jointed. Longest axis of ridge runs N. 70 W., no general cleavage unless it be about N. 65 W., and dip 60. S.

Specimen 178. Section 4, 44, 31. 1540 N., 665 W.

Small outcrop of much squeezed schist, 3 x 15 feet, longest axis about N. E. and S. W. Near top of hill, S. side. Cleavage strikes as whole about N. 45 W., and dips about 70 S. Almost in contact with it is small outcrop of limestone. Cleavage in this strikes about N. 45 W. and dips about 80 S.

Specimen 179. Section 4, 44, 31. 1555 N., 835 W.

Outcrop of limestone, 40 x 10 paces, cleavage strikes N. 10 W., dips near 90 . Contains band of more siliceous material. It has same strike and dip as limestone cleavage.

Specimen 180. Section 4, 44, 31. 1500 N., 1000 W.

Limestone strikes N. 50 W., and dips 75 S. A siliceous band like those before seen, has sme cleavage as limestone. 180 is from band.

Specimen 181. Section 4, 44, 31. 1490 N., 825 W.

More limestone, strike of cleavage is N. 25 W., dip 85 S. Specimen of rock apparently parallel to cleavage of limestone, contact not visible.

Specimens 182 & 183. Section 4, 44, 31. 1460 N., 970 W.

A siliceous band about 10 feet thick can be seen cutting across bedding, or cleavage of the limestone. Cleavage is N. 25 W., dip 65 S. Siliceous band strikes N. 30 W. 182 is limestone, 183 is band.

May 17, P. M. Going W. on line 750 S. of N. section line of Section 4, 43, 31., from E. section line. Locate from line.

Specimen 184. Section 4, 43, 31. 1100 N., 160 W.

Specimen 185. Section 4, 43, 31. 1035 N., 160 W.

Specimen 186. Section 4, 43, 31. 885 N., 95 W.

Test pit ledged.

Specimens 187-189. Section 4, 43, 31. 970 N., 115 W.

Test pit, ledged in greener looking rock, but yet jaspery. Fourth pit in this line is 50 paces S. W. from first. It is bottomed in still greener and more schistose rock, 188. Fifth pit, 65 paces S. W. is bottomed in somewhat similar rock, No. 189, but more distinctly siderite schist.

Specimen 190. Section 4, 43, 31. 815 N., 150 W.

Green schist.

Specimen 191. Section 4, 43, 31. 875 N., 250 W.

Test pit, ledged in a fair looking jasper.

Specimen 192. Section 4, 43, 31. 900 N., 205 W.

Test pit, ledge in jaspery stuff. This pit is on S. side of low knoll, perhaps 40 x 50 paces. Longest axis N. & S. Rock as seen in sides of pit is much jointed. One system of joints strikes about E. & W.; another about N. 15 W., and dips 70 S.

Specimen 193. Section 4, 43, 31. 930 N., 225 W.

Test pit.

These pits show with one at 1000 N., 300 W., gradations from chert and hematite to a greenstone agglomerate.

Specimen 194. Section 4, 43, 31. 980 N., 185 W.

Pit bottomed, rock showing gradations.

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Specimen 195. Section 4, 43, 31. 990 N., 185 W.

Deep shaft, W. shaft of Inter Range Mine. Rock on dump is principally a greenstone schist, changing to hematite, average is like 195.

Specimens 196-198. Section 4, 43, 31. 975 N., 145 W.

Main shaft of Inter Range Mine. Dump shows gradations of jasper greenstone and soft chlorite schists. Schist underlies the ore in the shaft.

Specimen 199. Section 4, 43, 31. 1025 N., 170 W.

Pit ledged in jasper.

Specimen 200. Section 4, 43, 31. 955 N., 255 W.

Test pit bottomed in red jaspery rock.

Specimen 201. Section 4, 43, 31. 900 N., 325 W.

Limestone. Here the cleavage is N. 18 E. Exposures cover an area of 20 feet, are all small. Rock is massive, cleavage not well developed. Rock looks like angle of a fold.

Specimen 202. Section 4, 43, 31. 1080 N., 590 W.

Possibly from drift.

Specimen 203. Section 4, 43, 31. 1035 N., 635 W.

Pegmatite vein at least 25 feet wide which has same cleavage as the limestone, line of contact with limestone probably irregular, may be N. E. and S. W.

Specimen 204. Section 4, 43, 31. 625 N., 200 W.

Large ridge of quartz porphyry, much jointed.

Specimen 205. Section 4, 43, 31. 740 N., 225 W.

Top of outcrop of limestone before seen, exposures small. Ridge trends about N. 60 W.

Specimen 206. Section 9, 43, 31. 1990 N., 1510 W.

Low mound on which are angular fragments of a greenstone surface eruptive. The rock is probably in place.

Specimen 207. Section 4, 43, 31. 1620 N., 1220 W.

Limestone, outcrop 15 x 3 feet, contains band of pegmatite, which varies in width from 8-12 inches, has same cleavage as limestone, which is N. 45 W., dip 70 S.

Section 5, 43, 31. 1900 N., 1975 W.

Test pit, near a big rounded boulder, 5 feet square, and some

angular fragments of jasper, much like that of Michigamme Mountain. Fragments probably from broke n boulder, test pit not bottomed or in greenstone.

Section 5, 43, 31. 1880 N., 1975 W.

Test pit, which may be bottomed in a jasper.

1855 N., 1975 W.

Test pit, dump shows nothing but water worn pebbles, many kinds, one a coarse grained quartzite.

1850 N., 1970 W.

Pit not ledged.

1845 N., 1900 W.

Pit, water worn pebbles like other, among them are sub-angular fragments of jasper.

Specimen 208. Section 5, 43, 31. ~~1800-1900~~ 1300-1400 N., 1800-80 W.

Large mass of greenstone forms ridge 30 feet high. Rock is very fine-grained. Cleavage not very well marked, but strikes about N. 80 W., and dips about 85 S.

Specimen 209. Section 5, 43, 31. 1210 N., 1980 W.

Outcrops of schist, cleavage well developed. Strikes N. 80 W. , and dips 90 S. Rock is much like all the rest, but little gradation in all outcrops. This outcrop 25 feet high.

Specimen 210. Section 5, 43, 31. 1200 N., 1650 W.

Low knoll, greenstone. This whole country underlaid with it.

Going W. on line 9 10, S. of N. section line of 5.

Specimen 211. Section 5, 43, 31. 1250 N., 150 W.

Outcrop of greenstone, 100 paces long, 25 wide. No one well disposed cleavage. Rock looks like an eruptive. No outcrop, on sides, of other rock; forms knoll 15 feet high in swamp longest axis trends N. 84 W. Cleavage at W. end E. & W. and N. & S. (quartz filled seams) At E. end, N. & S., and N. 65 E. Dip 60 E., E. and W. about vertical.

Specimen 212. Section 5, 43, 31. 700 N., 1400 W.

Large hill of greenstone, 278& 279. 278 is sheared specimen It grades into unsheared within 1/6 inch along a joint plane. Shows gradation nicely.

Specimen 214. Section 5, 43, 31. 670 N., 1350 W.

End of ridge, joint strikes about N. 50 E. In some places rock is fine-grained, but is then more schistose. Am inclined to think fine grains may be due to shearing.

Specimen 215. Section 5, 43, 31. 620 N., 1800 W.

Brow of slope running about N.& S. , dipping S. W. Greenstone outcrops along it, fine grained. Cleavage N. 85 W., 75 S.

Specimen 216. Section 5, 43, 31. 570 N., 1950 W.

Coarse greenstone, W. 2000, S. 200, brow of ridge, rock coarse grained like above. Ridge runs N. E. and S. W. Rock jointed but no very evident cleavage or parallel jointing.

On west section line of 5.

Glacial striae, strike about E. & W.

Specimen 217. Section 9, 43, 31. 1990 N., 1550 W.

Low knoll, 10 paces across, presumably underlaid by 217.?

Specimens 218 & 219. Section 5, 43, 31. 100 N., 1120 W.

Big outcrops of greenstone. Forms a rounded knob 70 feet high. Longest axis is E. & W. Is close to W. bank of creek. Fine-grained Cleavage is N. 75 W., dip 50 S. Also another set of parallel joints or cleavage, N. 75 W.-50 N. Outcrop is 15 x 200 paces.

On W. slope, rock is more sheared, weathered surface has very agglomeratic look. The S. dipping cleaving is the principal one; W. dipping not at all prominent. In places a horizontal jointing. No. 218 is E. end, 219 W. end.

Specimens 220 & 221. Section 5, 43, 31. 300 N., 740 W.

Outcrop of greenstone forms knoll, 40 feet above swamp at E. end, sloping W. Axes E. & W., 75 x 40 paces. Rock coarse-grained, much jointed, principal system at E. end. Strikes N. 45 E., dip 80 W. 40 paces west of there on W. slope see, probably, an almost horizontal jointing striking N. & S., also N. 75 W., and dipping W., but no wel marked E. & W. jointing or cleavage.

Section 4 , 43, 31. 980 N., 190 W.

At Inter Range Mine, on N. W. slope of hill behind engine house, small exposure of jasper. Banding of stratification, strikes N. 25 E., dips 30 E.

Specimen showing replacement of ferruginous material by chert is from pit 10 paces N. W. of above.

Section 4, 43, 31. 2000 N., 780 W.

Outcrop of recomposed jasper, which strikes N. & S., and dips 70 E.

Specimen 222. Section 10, 43, 31. 1000 N., 540 W.

Pit, showing on its dump a ferruginous rock- a much squeezed schist, pit probably bottomed in it.

10 paces N., then run N. 50 E., 40 paces on this line.

Specimen 223. 10, 43, 31. 1180 N., 375 W.

Pit probably bottomed in a rock like 223.

Specimen 224. 10, 43, 31. 1115 N., 415 W.

Trench bottomed in rock much like, but more siliceous in places, specimen 224, siliceous is in middle of pit and E. end rather than W.

Specimen 225. Section 10, 43, 31. 950 N., 560 W.

Going S. W. 48 paces, under upturned tree, small exposure of rock like 225. Probably in place. Cleavage strikes N. 40 W., dips V. This rock is on N. E. slope of rounded knoll, 15 feet high, probably underlaid by it.

Specimen 226. Section 10, 43, 31. 560 N., 20 W.

Test pit, looks as if bottomed in sandstone. Materials last taken out are sand and some angular fragments of sandstone. Red piece is one of these, the other piece shows conglomerate of green schist.

Specimen 227. Section 10, 43, 31. 530 N., 500 W.

Test pit, dump shows drift, rounded boulders and pebbles of diorite and a calcareous quartzite, also a sandstone, also angular fragments of a schist.

Specimen 228. Section 10, 43, 31. 530 N., 520 W.

Test pit, quite possibly bottomed in ferruginous schist. Angular fragments of it on dump.

Specimen 229. Section 10, 43, 31. 520 N., 550 W.

Test pit, bottomed in much squeezed greenstone siderite schist.

Specimen 230. Section 10, 43, 31. 505 N., 565 W.

Test pit bottomed in what looks like a sheared conglomerate like 228, but more so.

Specimen 231. Section 10, 43, 31. 505 N., 580 W.

Test pit, bottomed in same rock, 230, which shows signs of bedding, also in soft slate, 231.

Specimen 232. Section 10, 43, 31. 505 N., 653 W.

Test pit, bottomed in green slate or schist.

Specimen 233. Section 10, 43, 31. 505 N., 623 W.

Test pit, bottomed in sheared granite or orthose.

Section 10, 43, 31. 510 N., 710 W.

Test pit, bottomed in rock much like 223.

Specimen 234. Section 10, 43, 31. N. 0, 395-420 W.

Four test pits in irregular trench, on or near section line. Rock on dump of pit on line, squeezed conglomerate ferruginous schist. Two pits N. W., soft schist. Largest pit, 20 S. W., squeezed conglomerate and schist.

Specimen 235-249. Section 4, 43, 31. 2000 N., 850 W.

These specimens are from the "Original Jasper" locality, on the section line between 4 & 33.

235 is the recomposed jasper 12 feet below the contact,

236 is original jasper 5 feet above the lower contact.

237 is original jasper 3 feet above the lower contact.

238 is original jasper 6 inches above the clower contact,

239 is recomposed jasper 3 or 4 inches below the lower contact.

240 is original jasper very near upper contact,

241 is original jasper about at the upper contact.

242 is quartzitic graywacke at the upper contact.

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243 is quartzitic graywacke at top of hill.

244 is jasper at top of hill.

245 & 246 are acid eruptive, N. end of Michigamme Mountain.

847 & 248 are sheared varieties of the same.

249 is olive schist, back of the old camp, section 33, north of Michigamme Mountain.

Section 15, 44, 31. 500 N., 2000 W.

On the section line in section 15, 10 paces south of the 16th post, we find fine-grained marble, thin bedded, strikes N. & S., and dips 58 E. 15 paces N. of the same post and 10 paces W. of line, marble is exposed. Ledge is about 15-20 feet long. Strike N. & S.

Specimen 250. Section 10, 44, 31. 0 N., 150 W.

Is a low ridge of green epidotic slate, ridge strikes a little E. of N. by the line. Dip of the rock cannot be determined. Well marked slaty cleavage, but not fissile. In the cleavage planes, both biotite and chlorite. Very fine banding 1/16 of an inch apart, due probably to weathering. The bands are not continuous and are not strictly parallel. They divide the rock into very long thin lenses.

Specimens 251-253 & 256. Section 10, 44, 31. 0 N., 1075 W.

The line crosses ridge of green schist, which strikes N. & S., and dips E. 65 , cleavage. This ridge is made up of rock very similar to that of specimen 250, except that it is more crystalline. Certain layers appear to be an actinolitic, and parallel to the cleavage are some vein quartz seams and lenses of pink carbonate.

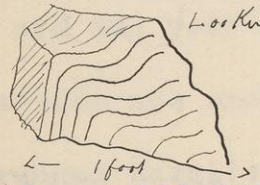
Specimen 254. Section 10, 44, 31. 0 N., 1030 -1050 W.

Ridge of green slates. No granular structure. Softer than above. Strikes and dips about the same. Much carbonate(?) pinkish infiltrations and some quartz.

Specimens 255, 257 & 258. Section 10, 44, 31. 10 N., 920 W.

At the river, green slates strike N. & W., dip 60 E. These rocks all have a marked granular texture, and are banded showing

alternations in material. All have abundant magnetite crystals. and this causes the high dip of the magnetic needle above them. Two principal cleavages:-- The first agrees with the banding; the 2nd strikes with the banding, and dips at a lower angle, 25-30 E. There are numerous carbonate veins in the rock, agreeing with the first cleavage, but occasionaly they cut the strike. Much desseminated carbonate in all varieties of the rock here exposed and apparently much ~~fine~~ free silica also. The river follows strike to the N., for 200 yards and then turns W. At the point where the line strikes the river beautifully ~~foliated~~ folded structure is seen, which shows that this rock had a banding previous to the development of cleavage. No actinolite was seen.



Figure

Specimens 259-262. Section 15, 44, 31. 1820 N., 900 W. These rocks strike about N. & S., they dip E. at about 60 . They have a fragmental appearance. Specimen 259 is the upper most, 262 is the lowest. The exposure is from 15-20 paces across and about the same along the strike.

Specimens 263-266. Section 15, 44, 31. 1000 N., 375-410 W. These rocks form a ridge 10 or 15 feet high. It is covered with fragments of graywacke and mica schist s, very similar to the rocks seen in the section along the river. The structure is pseudo conglomeratic. The strike is about N. 25 W. and dips to the E. On the eastern side of the ridge, the rocks are more

granular and contain a large amount of carbonate.

Specimens 267 & 268. Section 16, ~~44~~, 31. 80 W., 500 N.

Marble exposed at 40 paces. The ctructure cannot be determined, ~~so~~

Some of the marble is almost sandy and some contains crystallized carbonate of iron.

Specimen 269. Section 21, 44, 31. 1944 N., 25 W.

Marble, strikes about N. & S., dips E. 20-30 . Exposed pretty continuously in a low bluff, ~~68~~ 6-8 feet high for 50 paces along the strike.

Specimens 270-274. Section 9, 44, 31. 1500 W., 50 N.

Gr anite, at 1425 W., and 50 N. very much sheared granite is exposed just south of the logging road. We seem to have here an old and very much altered and sheared granite in which the quartzes are wholly *Sugared*, containing many seams or lenses arranged parallel to cleavage, of quartz, represented by specim n 270, and a newer red granite porphery, 271, not so much squeezed with fresh quartz veins. The latter rock shows much variety of grain. There is much medium grained pegmatite, the new red granite is sometimes much sheared and squeezed.

Specimens 275-279. Section 16, ~~44~~ 31. 950-1100 N., 850- 900 W,

On the west bank of the Fence river. Just at the point we have soft light colored schist, with a greenish tinge. They strike N. 12 W., and din E. 52°. Distinctly and rather thinly bedded. Planes of stratification show none of the lenticular structure seen in the sheared massive rocks. The stratification planes are

also marked by distinct ferruginous stained bands. Principal cleavage agrees closely in strike but dips at a considerably higher angle. From this point exposures are continuous at low water, and under water in the river, of very soft schists, yellow reddish and dark weathering. They strike as above, about N. 12 W. with a few little waves in direction. All are so much weathered that specimens cannot be obtained. For the most part, they ressemble specimen 275, in showing both banding and cleavage, although those farthest N. suggest somewhat an altered eruptive. These soft schists continue to outcrops between high and low water mark just at the surface until the marble exposures on the point are reached. They vary much in texture. They all exhibit a very finely parallel banding, continuous along the strike and more discontinuous cleavage. Sometimes the one and sometimes the other predominates, and impresses itself on the exposure to the extent of determining its apparent dip. The marble is exposed on the point as shown in the sketch.

From a width of 20-25 feet across strike, dip is to the E. 45 . It is exposed also under water in the river. This limestone shows a good deal of movement. In mineral character quite similar to the marble seen in other localities; much of it is very

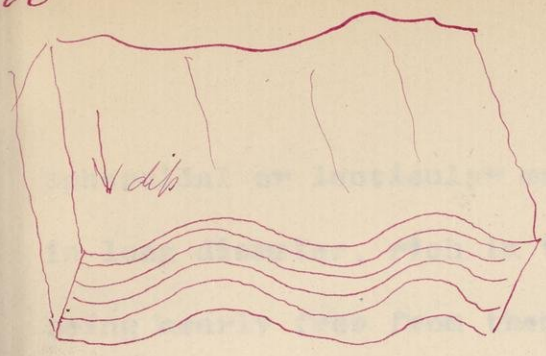
sandy. Somewhat seamed with quartz and carbonate partly altered to red oxide of iron, and has a great deal of pale green brilliant lustrous mineral in very small crystals or scales. Disintegrates very easily to a sandy clay. Many specimens may be squashed between the fingers.

Specimens 280-286. Section 15, 44, 31. 100 N., 1120 W.
Slate conglomerate, identified by Mr. Pumpelly with the lower slate conglomerate of Logan. This rock consists of very numerous blue quartz grains of uniform or nearly uniform size and often rounded outlines and much larger rounded grains of feldspar, usually red on weathered surface. These feldspar grains often have a hard rim of deeper red, more resistant, surviving when feldspar mass has washed out, give in both cases pseudo amygdoloidal aspect to rock. As Mr. Pumpelly pointed out, both rim and interior in fresher specimens flash as a unit. Both of them are imbedded in a remarkably uniform matrix, finely granular but not

crystalline, seemingly very feldspathic and weathering like a felsite. Weathering seems very feldspathic. General tone of weathered surface is a very warm gray. Besides the quartz and feldspar the rock is mottled with quite uniformly arranged areas of biotite, which seems to represent for each area an original integral crystal of hornblende. Besides the quartz feldspar and bisilicate the rock contains composite inclusions of a granitic aspect usually and also sometimes we see a large integral crystal of microcline? These composite inclusions vary in size from 1/8 or 1/4 inch up to 3 or 4 inches in diameter, with one exception; this is an inclusion of extremely coarse granitoid gneis, the dimensions of which are 4 feet x 3 x 2. The rock is shown in specimen 280. It has a cleavage which runs through the porphyritic feldspars, faulting them often, about parallel to that of the adjoining rock, differing only in dipping at a lower angle to the E. The long axis of the inclusion strikes with the inclosing rock. Its major transverse, dips E. considerably less than the enclosing rock. It lies on its broad face. Contact with the enclosing rock may be traced all round. Granite is neither a dike nor pegmatitic. It is either a pebble or a comparitively unsheared core of the original rock from which both it and the enclosing rock were derived.

On the east face there is a very sharp line between inclusion and matrix; on west side a less sharp. While general aspect is that of a transition, there is a sharp passage from the

large feldspars and quartz grains of the granite to the small even grains of the matrix. Specimen 281, weathered surface, shows this imperfectly. Granite has a great deal of vein quartz, in fact it is seamed with it. These quartz veins cease at the boundary. I do not doubt that it is a pebble, but it is hard to understand why there are no intermediate sizes between this and the smallest. Contact is extremely unlike that between inclusions of unsheared granite in sheared granite, and is just such as would be expected in a granite boulder buried in a gneiss of granite debris such as this whole rock may have been. Specimen 281 is from the W. side of boulder and under it. Specimen 282 sheared rim of boulder, specimen 283 immediately adjoining above, containing a large feldspar. Specimen 284 shows matrix about a foot beneath inclusion. Rock near boulder, two cleavages N. 11 E., true, to N. 4 E., true, both diping E. about 60 . These are alternately dominant. Specimen 285 shows most sheared phase of rock near base. At 200 W., 140 N. from 1/4 post, granite, red weathering, very fine-grained showing enormous movement; the foliation strikes N. & S., and dips E. about 40 . Foliation extremely irregular and in wavy surfaces. Rock is not evenly banded gneis but granite, sheared along surfaces approximately parallel to the contact with slate conglomerate above. These surfaces are not planes. See sketch below.



Specimens 287-344. Sections 10 & 15, 44, 31.

These specimens are from the Fence river and represent the E & W. section exposed along the river near the E. & W. line between sections 10 & 15.

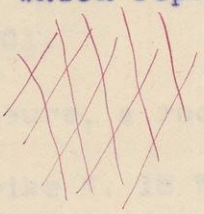
In making this section, the distances from outcrop to outcrop were measured with a tape line, and in the following notes are given in feet.

See the large scale plat for locations of the outcrops.

Specimens 287-294. ~~968 / N. 5 E.~~

Here begins the line of exposures extending nearly continuously up the river. The rock is light, green gray weathering. On fresh fractures it shows in more massive phases a slate color with a purplish tinge. In texture the rock is aphanitic. on the fresh fracture, for the most part; it contains , however, very many areas, and perhaps some zones of matted hornblende crystals od considerable size, these are both light and dark in color. The usual disposition brought out in weathering is in

spheroidal or lenticular masses never exceeding 2 or 3 inches in long diameter, rich in these crystals, the enclosing rock being nearly free from them. These spheroids appear as light reddish weathering inclusions on the exposed surface. Specimen 287. Another class of inclusions remains dark on the weathered surface, they probably are wholl made up of minute scales of red iron oxide, specimen 288. While whole exposure shows great compressive action, degree of developed schistosity varies greatly. The cleavage is not developed along a single set of parallel planes, nor is there any trace here of sedimentary lamination. The whole rock was originally massive and reached its present aspect through fracture and compression. The more massive portion retains an original rhombohedral parting as below in sketch which represents a level surface.



Some comparatively little squeezed cores still remain, surrounded with films of chlorite, or glistening green mica. Cleavage is developed about equally well in both directions. One will predominate and control weathering for a few inches and then the other. In the more schistose aspects of the rock the lozenges are very much drawn out, the acute angles become more acute and the obtuse angles more obtuse. The rock even yet does not have cleavage in a single plane, however, the 2 directions, although approaching each other with their bisectrix as a

limit are entirely distinguishable. With greater degree of squeezing we have a much greater development of chlorite, hydromica and biotite, all of which appear to be present, with much infiltrated calcite or other carbonate. Specimen 289, massive 290 showing zonal actinolite, 291 schistose.

Average strike is N. 24 W., dip 57 E. There is an exposure of rock 30 feet south on E. bank of river. In going N. along the strike, we find the same rock, varying in degree of schistosity and in crystalline texture. Specimens 292 & 293. At 20 feet S. W. of 116 post. A green light weathering aphamitic rock, specimen 294. Two cleavages as usual and very perfect; rock is not very schistose, its parting is a slaty parting and not schistose.

Specimens 295-301.

At 1161 on exposure, a rock which suggests a felsite, compressed and broken. Strike N. 18 W., dip 70 E. Strikes fire under hammer. Shows same lozenge breaking. Unsheared cores are light weathering. Some bands of the rock consist of these cores fitting in to each other, separated by films of chlorite. Specimen 295. Specimen 296 is just at blazed tree. Rocks are exposed E. of 1161 to the river, 15 or 20 feet. There is no apparent difference between these and those first seen down the river, except that actinolite is much more abundant. It occurs as both coarse and fine crystals. There seems to be no regularity in distribution of the two. Actinolite is not evenly disseminated through the rock as may be

seen on weathered surface. The distribution is still in augen in spheroids as that seen at 968, only here the spheroids constitute the bulk of the rock and the non-hornblendic parts apear as inclusions. A little fault cuts diagonally across the strike about N. 30 W., and dipping very high E. Marked by a selvage of chlorite in which are grown beautiful feldspar (ortho. or micro.) crystals. Specimen 297 also shows the result of the movement in a fibrous pulling out of the rock, and the gradual change from non. actin. to actin.-bearing condition. Specimen 298 shows coarser phase, 299 shows finer phase of rocks here. Specimen 300 more actinolitic at water. Specimen 301 shows sheet fault parallel to a joint traversed by cleavage. Extent of this across the cleavage structure is only 4 or 5 feet.

Specimens 302-308.

On the river, on both north and south sides at stake 660. We have here a very brittle, apparently siliceous dark rock, for the most part massive or heavily bedded. It contains little augen of unstriated feldspar which are only occasionally large enough to be to visible to the eye on fresh fracture and are brought out as red weathering pulled out lenses on the weathered surface; and also inclusions, not bands or veins, of quartz, and of composite material. The rock is lacking in lines of sedimentation, it has the usual double cleavage with schistose development along both. That determining major surfaces strikes N. 8-12 W., and dips E. 55-60 .

The other strikes N. 25 W. and dips at a somewhat lower inclinatin As a whole the rock is massive, slaty and brittle, lacking the chlorite and hydromicaceous elements. Some mica is developed along cleavage planes dark colored and probably biotite. A few narrow pegmatite gashes are found, the 2 or 3 thus seen being horizontal nearly. Phases of greater schistosity alternate with the more massive. Specimen 302 is same composite inclusion ~~from~~ for slides, 303 is specimen with quartz inclusion granulated. Specimen 304, massive type showing double cleavage 305 is variety with pseudo bands, 306 specimen ~~from~~ for slides Outcrop from 20 feet N. to 12 S. of stake. Well exposed across river. The same rock continuing to within 22 feet of next stake Specimen 307 represents the more massive and 308 the more sheared phase.

Specimens 309-314. 1060

About 20 feet north of the 1060 stake, we find a very light weathering granular rock, which in the fresh fracture appears of a blue gray color and contains a great deal of unarranged biotite. The rock while very massive, still shows the E. dipping cleavage of the region in its major planes of separation. Most massive and usual variety shown by specimen 309. Another variety contains small quartz grains which look like pebbles in the weathered surface. On fresh surface they are seen to be thoroughly granulated. This phase

is represented by specimen 310. The rock has a decidedly fragmental appearance to my eye. On the east this rock is overlaid 6 feet to the east by a hornblende biotite schist, which shows a distinct foliation, distinct from the cleavage. This foliation is very strongly plicated both minutely and on a medium scale. The structure on the whole dips E., although local westerly dips in the little folds of 2 or 3 feet are common. Specimens 311 & 312. The graywacke of specimens 309 & 310, itself shows very indistinct traces of a bedded structure, essentially horizontal in the central portion and westerly dipping at the west. East of the banded hornblende biotite schist, comes in somewhere the rock of 313, which looks amygdaloidal; it is represented by loose angular blocks and is not certainly in place. E. 60 feet from the stake comes in the pseudo conglomerate of specimen 314, which consists of angular inclusions of a massive rock encircled by a biotite matrix. It strikes N. 11 W., and dips 85-90 E.

Specimens 315-318. 1160.

Outcrop from the post, E. 60 feet extending to the water. We have here again hornblende schists, quite similar to those first seen this morning. The rock consists of an extremely fine-grained, dark green, ground mass in which yet appears a mottling due to a lighter epidote aparently and a darker mineral; in this ground mass we find the same lozenges

or ellipsoids in which actinolite predominates that we found this morning. These actinolite bearing ellipsoids are on the whole arranged in a zone. These ellipsoids within this zone may or may not coincide with the lozenges into which the double cleavage divides the rock. Some of these ellipsoids carry very coarse actinolite, others finer, and the actinolite whether coarse or fine may be closely packed or comparitively sparsely distributed. Coarse and fine, closely packed and sparse come in without regularity. The little thin ~~iron~~ schistose bands between cleavage bounded lozenges do not carry actinolite which thus would seem to be original. The 2 cleavages are about evenly developed. One strikes N. 8 E., the other N. 26 W. average of several observations on both. The general strike of the edge of the ledges is N. 10 W. or about exactly a mean between them, as of course it should be when both are equally developed. The edge of the ledge exposure is a broken line, the directions being about equally divided in continuity between the 2. On the 2 cleavage surfaces, a great deal of mica was developed. Both cleavages dip at the same angle--83 E. Specimens 315 & 316 are coarse actinolite phase variety. Specimen 317 fine grained, very schistose variety, with sparse and small hornblendes. Specimen 318 free from fine hornblende and slaty. This rock is very brittle under the hammer.

Specimens 319 & 320. 1260 N., 60 W.

Are outcrops 10-15 across strike of green aphamitic and brittle rocks, weathering a dul brown; of the upper numbers seen E. of 1160 Rock contains occasional large altered crystals of feldspar, which are usually represented by blotches of light mica and chlorite. Same double cleavage, medium shown in specimen 319,, dividing the rock into rhomboihedra. Specimen 320 contains a partially altered feldspar with irregular micaceous rim. Whole rock has considerable mica along cleavages. Average strike N. 8-12W

Specimens 321-324. 2290.

No outcrops until after passing 2260 at 2290, a massive rather tough reddish weathering greenstone, of a slightly coarser texture than usual, but not at all crystaline, containing abundant though small hornblende needles, unoriented. This rock has a banded appearance, simulating bedding. The bands, however, are not conttinuous, nor strictly parallel, although nearly so. They run across each other at very acute angles. These bands appear to be due to fine and very regular cleavage and not to any variation in mineral content or development. On the weathered surface, they appear merely as fine and evenly spaced cracks in cleavage partings. The double cleavage is evident besides in major cracks, which strike N. 13 W., and N. 4 E. The average strike of the ledges is between, or

N. 8 W., 62 E. The westerly striking is that mainly represented in the banding, and hence it turns the average strike west of a mean position. Specimen 321.The same rock continues as far as 2304, showing on the whole a strong cleavage. Distribution of actinolite appears to be irregular as far ascan be determined. Specimen 322 represents non-hornblendic variety. Specimen 323 that which has strongest cleavage, which at 2304 strikes N. 8 W. At 2304 the rocks are continuous across the river, making a rapid and being exposed at a cedar tree on the north shore. Overlying the last rock and exposed for 3 feet across strike is the rock of specimen 324.

Specimens 325 & 326. 2360-2366.

Light green weathering fissile greenstone schist, with epidote. The rock contains hornblend needles unoriented and the large knots of aggregate of epidote calcite and feldspar, seen in specimen 324. Strongest simulation of sedimentary banding yet seen, appears on the weathered surface. It appears as very regular alternations of thin 1/32 to 1/16 inch , lighter and darker weathering bands, some of which (though only occasionally) are due to infiltrated vein quartz. These bands are not continuous; they are very long lensess, nor are they perfectly parallel. They cross each other at very acute angles about 3-5 . They are controlled by two directions in the rock which make a very small angle with each other. A light line

will continue for several inches along one, then change into the other. Often the lines cross each other. We seem to have here a case where the 2 cleavages are about equally developed and very nearly coincide in directionIs there a tendency for them to approach a mean position as a limit? The distribution of the hornblende needles cannot certainly be made out. While confined to certain zones apparently within these zones there are areas of greater accumulation and areas of less accumulation. Specimen 325 is an average specimen, specimen 326 shows a knot of calcite and epidote.

Specimens 327 & 328. 2388-2398.

From 2388-98, black weathering, tough and pitted hornblende and biotite schist with abundant desseminated magnetite. Rock weathers blue black. Contains very brittle dark inclusions which have a lenticular shape, often with rounded outlines. Not very abundant and large, from 3or 4 to 15 inches in long diameter. Inclusions are lighter weathering and almost invariably have a cross structure making an angle to the north, with the cleavage of the rock, of about 60 Specimen 327 shows inclusions and matrix and weathered surface. Specimen 328 shows average of the rock.

There is a decided bend of the strike to the south with a flattening in the dip where the S. end of this exposure ~~pits~~ juts into the river.

Specimens 329-334. 2426-2440

Same pitted hornblende schist is exposed with similar inclusions except that they have here more irregular shapes. At 2440 come in the greenstones again. The line is a sharp one and is distinctly a plane of movement with striations. It dips E. at a very high angle. The greenstones for 2 or 3 feet above the contact have pseudo pebbles of quartz. There is on the edge of the bush interpenetration of the 2 rocks.

Specimen 329 is from the interior of the greenstone tongue. Specimen 330 is from the edge of the greenstone tongue. They certainly show a finer grain than the average of the rocks represented by specimens 331 & 332 which show also the quartz pseudo pebbles and the irregular areas of mica due to shearing of feldspar, similar to that seen in specimen 320. Specimen 333 shows the hornblende biotite schist, and is characteristic of much of the rock except that it does not show the characteristic pittings. Prof. Pumpelly saw this locality and deemed it possible that these pittings signified a crenulation of a pre-cleavage structure. This cannot be established but it is very possible. The whole aspect of this rock is very similar to the pseudo-conglomerate lying immediately east of the graywacke and first seen yesterday afternoon. Specimen 334to be cut and polished for evidence of crinkling. If the pittings mean plication, the dip is nearly horizontal. The greenstone has the hornblende needles. The pseudo-pebbles which are mostly of quartz are concentric in structure. Round the quartz is a film of chlorite, and the quartz is often merely a shell round some mineral which hasweathered out. It is quite possible that they may be amygdules. Strike of contact of greenstone with hornblende and biotite schist is N. 5 W. Dip of contact

85-90 E.

Specimens 335-337. 2987-3040.

Exposed for this distance along thes trike and for a maximum of 20 feet across it about at the 3020 post, is a rock presenting various gradations between a rather coarse biotite schist and a fine-grained rock carrying but little biotite. The mica is evidently an alteration product from hornblende, traces of which still remain and the mica is not oriented with the cleavage. Rock is not very schistose, is brittle under the hammer, rather than tough and has a splintery siliceous fracture. Weathers a dark green. Contains much pyrite. The rock two principal systems of breaking planes, diverging in strike and dipping E. at the same angle,--viz. about 50 . These planes intersect and divide the rock into rather coarse rhombohedra, the rock cleaving parallel to both sets with nearly equal ease. They strike N. 11 W. and N. 5 E., the westerly striking being the dominant, on the whole although each has its turn. The local dominance of one over the other, mav and does produce an appearanceof sedimentary banding in the strike, which of course is entirely illusory. This rock forms the bed of the river to the south. The rock also contains lenses of calcite. Not ~~containing~~ Continuous veins. Weather/ ~~little~~ like fragments of

marble; usually aligned with one or the other of the cleavages, and sometimes with both, when they occupy the rounded obtuse angle at the intersection. West across the river from 3020 is the large pine tree N. of greenstone conglomerate, about 60 feet from stake. Specimen 335 coarsely crystalline, 336 fine grained, 337 with calcite lines.

Specimens 338 & 339. 3180-3185.

12 feet across strike. This is the highest member in the section. A very schistose gray rock with abundant chlorite and sericite. The two cleavages here are barely distinguishable in direction; practically they coincide. Dip about 56° E.

Specimen 338. A coarse hornblende schist is exposed from 3260-3310 and extends 20 W. 3300 post into river. Probably immediately underlies preceding. This rock has a decidedly banded aspect, due to layers with hornblende and magnetite being interlaminated with layers free from them. Two cleavages while still separable on close examination, substantially coincide. This rock appears to be practically at the limit, in the coincidance of the two cleavages, in producing a banded aspect.

Specimen 339, dip 56 E., strike N. 8 W.

Specimens 340-344.

At 3360 across the river, 60 at right angles to line is the point where the section line comes to water, either there or directly opposite 3400 which is at the bend in the river. The locality I visited on the S. W. bank is between 3300-3340 On the south bank of the river, between posts 3020 and nearly to 3200, is exposed nearly continuously a pseudo-conglomerate or conglomerate-breccia. It consists of inclusions of various sizes, from 1 or 2 inches up to 2 or 3 feet or more in long diameter. These inclusions are of 2 kinds only: first, a purple weathering and very brittle, constituting only a small proportion of the smaller sizes, and a rather hard aphanitic, greenish weathering variety constituting all of the larger inclusions and some of the smaller. In shape these inclusions have extremely regular and flowing outlines; at the ends they come to narrow but distinctly rounded terminations. The matrix is a crystalline schist, almost altogether chloritic, although it has also in places the quartz eyes, which characterize the rock below the conglomerate. Both large inclusions have cleavage. That of the large inclusions is axial, that of the matrix sweeps round the inclusion in flowing curves. The inclusions fit into each other,-- i.e. the large. The conglomerate does not occupy a zone more than 20 feet wide and within this it occurs in two bands. The rock between is a greenstone schist

with granulated augen quartz, and this is also the rock immediately beneath the conglomerate. The strike is from a point 30' up the river from the post, next down the river from 3020. Dip E. about 50 . Specimen 340 is rock beneath augen quartz, 341 is augen quartz, 342 & 343 specimens of the conglomerate, inclusion and matrix, 344 conglomerate from inclusion, 2 feet long. The rims of the inclusions weather a lighter color than the interiors. Strike about N. 4 W.

Specimens 345-353. Section 16, 44, 31, 100 N., 1150 W.

Slate conglomerate locality.

Specimen 345 Slate conglomerate, composite pebble.

Specimen 346 " " " "

Specimen 347 " " " "

Specimen 348 Slate conglomerate, single large felspar pebbles.

Specimen 349 Slate conglomerate, with feldspar pebbles

Specimen 350 " " " " "

Specimen 351 Slate conglomerate, showing contact with granite inclusion.

Specimen 352 Actinolite schist, from N. of camp, section 10

Specimen 353 " " " " " " " ".

352 & 353 show actinolite with pink carbonate.

Specimen 354. Section 10, 44, 31. 500 N., 200 E.

Large angular masses of rock outcrop. Cannot be sure if ledge, but if not, ledge is probably near. 354 is specimen.

Specimen 355. Section 10, 44, 31. 500 N., 1100 W.

Outcrop of squeezed greenstone. On weathered surface has appearance in places of an agglomerate. Strike of cleavage N. 10 W dip 81 E.

500 N., 1025 W.

Low knoll, 20 paces across, probably underlaid by rock, may be same as 355. Knoll so overgrown with young balsams, that did not try to determine certainly.

Specimens 356 & 357. Section 10, 44, 31. 1000 N., 1300 W.

Top of a knob about 20 feet high. It runs S. 100 paces. Rock surface volcanic, shows bedding which corresponds with cleavage in strike, possibly in dip. Strike N. 13 W., dip 30 E. Specimen 356 is fine; specimen 357 foarser grained.

Specimens 358 & 359. Section 10, 44, 31. 1000 N., 1350 W.

N. W. corner of knob. Rock like 358, a squeezed amygdaloid. Strike of cleavage is N. & S., dip about 60 E. 358 is overlaid by rock coarser than 356, not like 357. Specimen 359. Line of contact is irregular. Perhaps may strike N. 20 W.

Specimen 360. Section 10, 44, 31. 1005 N., 1570 W.
Outcrop small, rock a greenstone. Cleavage not well defined; is on E. side of low knoll, which trends about N. 30 W.

Specimen 361. Section 10, 44, 31. 1005 N., 1580 W..
Cannot be sure if from ledge. Cleavage probably strikes N. 45 W., dip vertical.

Specimen 362. Section 10, 44, 31. 1000 N., 1905 W.
Outcrop of greenstone. Outcrop is in a ridge that runs 80 paces S. of here, and is about 30 paces wide at S. end, and 25 at N. end. Cleavage strikes and ridge trends about N. 20 W.
Cleavage dips about 75 E.
Going N. on W. section line of 10, 44, 31, from W. 1/4 post.

Specimens 363 & 364. Section 10, 44, 31 1230 N., 2000 W.
Greenstone much like 362. An immense low lying exposure. Cleavage in general strikes about N. 20 W., dips 60-80 E. Specimen 363 from N. 1200, 1980 W., specimen 364 from N. 1280, 1930 W.

Specimen 365. Section 10, 44, 31. 1500 N., 1860 W.
Outcrops of squeezed greenstone. Cleavage strikes about N. & S. and dips 80 E.

Specimen 366. Section 10, 44, 31. 1440-85 N., 1600 W. Outcrop of greenstone, cleavage strikes about N. & S., and dips 80 E.

Specimens 367-369. Section 10, 44, 31. 1250 N., 1500 W. Outcrop very close to road on the E. side of it. Rock much squeezed and stratified. Is it squeezed agglomerate? Strike of bedding and of cleavage about the same, nearly N. & S., dip about 70 E. Slates, 367; pebble, 368; banding, 369.

Going N. on E. section line of section 5, 44, 31.

Specimens 370 & 371. Section 5, 44, 31. 400-550 N., 30-150 W. Large outcrop of granite about 20 feet high on N. side of a burnt cedar swamp. No other rock seen outcropping along base of granite. Specimen 370 is from 100 W., 475 N.,; 371 is from 150 W., 500 N.

Specimen 372. Section 4, 44, 31. 2000 N., 100 W. Large outcrop of squeezed greenstone. Cleavage strikes N. 40 W., dip perhaps is 85 E.

Specimen 373. Section 10, 44, 31. 1475 N., 1300 W. Outcrop of greenstone, 12 paces long, 10 wide. Cleavage strikes nearly N. & S., dips 80 E. Rock contains needle-like crystals of hornblende. Outcrop trends in direction of cleavage. Apparently interbanded or stratified with 373 is a fine-grained rock without hornblende needles. There is no sharp line between the two, but

gradation takes place within two inches. Strike of bands correspond with cleavage.

Specimens 375 & 376. Section 10, 44, 31. 1470 N., 1225 W. Outcrop of greenstone, containing hornblende. Cleavage strikes N. & S., dip 50 E. Rocks E. side of low ridge, trending N. & S. It contains patches or bands of yellow green color without hornblende, specimen 376.

Specimens 377 & 378. Section 10, 44, 31. 1490 N., 1260 W. Exposure, W. side of knoll about 30 feet long. Rock distinctly banded. Strike and dip correspond with cleavage, N. 35 W., dip 65 E. Specimens 377 & 378 show difference of bands.

Specimen 379. Section 10, 44, 31. 1470 N., 1240-50 W. W. slope of hill. Greenstone. Cleavage strikes nearly N. & S.

Specimens 380 & 381. Section 10, 44, 31. 1425 N., 1130-50 W. Outcrop of greenstone forms a knoll trending about direction of strike. Cleavage strikes N. & S. Rock is very fine-grained, and tough with no hornblende crystals. At 85 paces S. outcrop ends. Is widest at 50 S. Specimen 380 is from N. end, specimen 381 from S.

Specimens 382 & 383. Section 10, 44, 31. 1530-60 N., 1040-70 W.
Outcrop of greenstone, cleavage strikes N. & S. about, and dips about 65 E. Rock shows bands or beds, which correspond in general trend with cleavage, which corresponds with trend of outcrop, but are crumpled and not very continuous. Some bands contain hornblende, others do not. No. 382 hornblende, 383, none.

1400 N., 1500 W.

Going W. on a line starting from point, by Herald's and Lee's pacing. N. 200 & E. 550 of W. 1/4 post of section 10, 44, 31. 100 W., go N. 200 and run W. on that line. N. 1400 of S. section line.

Specimen 384. Section 10, 44, 31. 1425 N., 1640 W.
Outcrop of rock that looks like a squeezed conglomerate or agglomerate on weathered surface. Cleavage strikes nearly N. & S., perhaps N. 5 W.; dips high angle to E.

Specimens 385-387. Section 10, 44, 31. 1425 N., 1650 W.
Outcrop 15 x 8 feet. Cleavage as preceding, nearly N. & S. Rock is darker, contains actinolite, 385 is specimen. 20-25 paces N. is another outcrop about same size, of varying character as regards proportionate amount of actinolite, 386 and 387 are from it.

Specimens 388 & 389. Section 10, 44, 31. 1420 N., 1695 W.
Outcrop of actinolite schist and a much squeezed rock that looks almost like an agglomerate or conglomerate. Could see no actual

contact between the two rocks. But change from one to another took place within space of 3 inches. Specimen 388 is actinolite rock, 389 squeezed conglomerate.

Specimens 390 & 391. Section 10, 44, 31. 1400 N., 1710 W. Outcrop 10 paces square, of coarse to fine textured schist, contains epidote in W. half. Contact between that and portion without epidote is sharp. One side of outcrop is belt of epidote, relations with non-epidote, peculiar. Non-epidotic seems to send off stringers or ribbands into epidotic. Specimen 390, epidotic; specimen 391, non-epidotic.

Specimen 392. Section 10, 44, 31. 1425 N., 1735 W. Outcrop of fine-grained schist.

Specimen 393. Section 10, 44, 31. 1410 N., 1740 W. Outcrop of actinolite schist.

Specimen 394. Section 10, 44, 31. 1410 N., 1750 W. Outcrop of crystalline schist.

Specimens 395 & 396. Section 10, 44, 31. 1285 N., 1490 W. Outcrop of schist, actinolitic. Actinolite not very regular in distribution but in more or less irregular lenses. These lenses separated by darker material, in which saw no actinolite crystals of large size.

Specimen 397. Section 10, 44, 31. 1300-40 N., 1170-1230 W. Outcrop of schist, dip 65 E.

Specimens 398-400. Section 10, 44, 31. 1300 N., 1080-1190 W. Outcrop of a rock like 398 and an actinolite schist, 400. Contact is quite sharply defined, is probably parallel to cleavage and dip, dips 55 E., 399 is contact.

Specimens 401 & 402. Section 10, 44, 31. 1315 N., 1125 W. Outcrop of peculiar looking schist, small, dips 60 E. No. 401 apparently runs into outcrop above. Runs up to N. 1335. Exposure N. 35-45, then in space of about 15 feet covered. Apparently passes into 402.

Specimen 403. Section 10, 44, 31. 1300 N., 1140 W. Outcrop more massive looking, but cleavage well defined.

Specimen 404. Section 10, 44, 31. 1300 N., 1100 W. Outcrop like 404, looks on weathered surface much like conglomerate in one place. No mica, actinolite schist.

Specimen 405. Section 10, 44, 31. 1300 N., 1070 W. Outcrop, cleavage, but not apparent. Joints run in various directions, no marked parallelism.

Specimen 406. Section 10, 44, 31. 1300 N., 1030 W. Outcrop mica schist, cleavage strikes N. 15 W., and dips 65 E.

Specimen 407. Section 10, 44, 31. 1840 N., 1790 W. Rock, a graywacke on E. slope of top of hill, no well defined cleavage.

Specimens 408 & 409. Section 10, 44, 31. 1840 N., 1830 W.
Outcrop, 5 paces square. Cleavage planes strike N. 5 W., dip about 90 . Outcrop varies in character, 408 is from E. side of outcrop, 409 is from W. side of outcrop.

Specimens 410 & 411. Section 10, 44, 31. 1840 N., 1850 W.
Outcrop about 10 x 5 paces, of schist, light and dark. Darker or lighter bands are enclosed in augen shaped masses, one by the other. Strike of these augen correspond with that of cleavage, which is N. 5 W., dip 90 Dark bands contain actinolite. 410, dark; 411, light.

Specimens 412 & 413. Section 10, 44, 31. 1695 N., 1865 W.
Outcrop 10 x 5 paces. Dip 73 E. 412 is one kind of rock here; 413, contact, corresponds with cleavage.

Specimen 414. Section 10, 44, 31. 1810 N., 1880 W.
Outcrop of rock looking like squeezed conglomerate, cleavage strikes nearly N. & S. (sun low) and dips 80 E. 414 on weathered surface looks like conglomerate, may be simple schist.

Specimen 415. Section 10, 44, 31. 2000 N., 1325 W.
Outcrop much hidden, 2o paces N., 10 S. of line, rock a graywacke. Cleavage strikes N. 10 W., dip 70 E.

Specimen 416. Section 10, 44, 31. 1250 N., 980 W.
Outcrop, runs N. & S. 200 paces, probably is greenstone. At this point cleavage strikes as near as can be determined N. 10 W., dip?

Specimen 417. Section 10, 44, 31.

Outcrop on tote road. Cleavage strikes N. 20 W., dip 70 E.

Outcrop is by road, 35 E.

Specimens 418 & 419. Section 10, 44, 31.

Knoll 20 paces square. North part is composed so far as seen of rocks, 418 on W. side, 419 on E. side. Cleavage line of contact not seen. Cleavage strikes about N. 15 W.

Sandford's location of these specimens, 417-419, is utterly unintelligible.

Specimen 421. Section 4, 44, 31. 880 N., 0 W.

Outcrop of greenstone with porphyritic quartz. Outcrop is about 20 paces wide.

Specimen 422. Section 4, 44, 31. 800 N., 25 W.

Rock is fine-grained, without visible quartz.

Specimens 424 & 425. Section 4, 44, 31. 700 N., 85 W.

About S. W. corner of this mass of greenstone, although it may run S. W. 20 paces or so farther. Rock here is fine-grained, 425. Cleavage strikes N. & S., dips 75 E. Exposure makes low bluff for at least 40 paces N. E. of here. At 25 E. to 50 E., more of same rock. On all this ridge variations are irregular, may change from W. 10 -E. 10 .

Specimens 426-428. Section 22, 44, 31. 1450 N., 1035 W.
Outcrop of fine and even textured greenstone, 20 paces wide across strike of N. line and 50 long. Contains in places considerable proportion of carbonate.

Specimens 429-431. Section 28, 45, 31. 1760 N., 345 W.
Outcrop in all probability of biotite schist, is very low-lying. A knoll 2 or 3 feet high, about 20 x 15 paces. On the W. side of this knoll is exposure of 429. It strikes N. 5 E., dips about 40 E. Rock contains much quartz in lenses, corresponding with cleavage, 6-12 inches long.
At about 5 paces E. of N. end of this exposure is probably exposurr of same rock, cleavage strikes N. 5 E., dips 40 E. Exposurr may be 15 x 16 feet by angular fragments. No. 430 & 431 are from here. 431 apparently overlies 430.

Specimen 432. Section 28, 45, 31. 560 N., 515 W.
Low narrow knoll running nearly N. & S., probably formed by rock. Angular fragments on it and at S. end a probable exposure., 15 wide, 5 long. Rock is a squeezed eruptive containing hornblende and mica, also calcite and chlorite. Cleavage strikes N. 6 W., dips 45 E.

Specimen 433. Section 28, 45, 31. 1640 N., 640 W.
Outcrop of a squeezed eruptive, is farthest S. of continuous outcrops running S. from large one on Fence R. Cleavage strikes about N. 5 W/, dip 45 E. No. 433 is from here. Rock is full

of irregular lenses or augen of crushed quartz. Outcrop runs N. about, for 150 paces.

Specimen 434. Section 28, 45, 31. 1625 N., 1050 W. Marble. Strikes W. of N.

Specimens 435-436. Section 28, 45, 31. 1640 N., 1600-20 W. Island in river bed, of eruptive greenstone. Ridge is about 70 feet wide. Cleavage strikes N. 16 E., ridge trends about same, dip of cleavage is 48 E. Rock is also cut by parallel joints, which strike N. 20 W., and dip 65 W. 435 is specimen. At N. end of this outcrop, rock is more massive. Contains in places large crystals of actinolite, and much disseminated actinolite. Cleavage anf joint planes strike N. 8 & 12 W., and dip 37 E., specimen 436.

Specimen 437. Section 28, 45, 31. 1700 N., 1250 W. Ridge of limestone trending about N. & S. Cleavage which may here correspond with bedding strikes N. 4 W., dips 58 E. on W. side of ridge and 26 E. on E. side. Ridge is about 30 feet wide. At this place is cut in ridge formed by probably two parallel joints. It gives fine curves, section of ridge of about 30 feet. From this point ridge runs nearly N. 145 paces. At N. end, dip of cleavage is 35 E., strike apparently corresponds with ridge. Sun so low that cannot determine accurately. Limestone is here very sandy. In places on weathered surface it looks like eastern sandstone. Smashes up under hammer, so did

not secure specimen of most sandy type. Specimen 437 is from near cut. Is medium between most calcareous and most sandy.

Specimen 438. Section 30, 45, 31. 1900-2000 N., 1200-1300 W

Outcrop on line of granite andgneiss, no well marked foliation at this point. At 75 paces S. E., the quartz and feldspar augen strike N. 30 W., and dip E. at about 60 . Rock here does not differ much from point on line. It may run N. of section line 20 paces from where first seen.

Specimens 439 & 440. Section 19, 45, 31. 900 N., 500 W.

Low knoll evidently underlaid by granite, similar to that seen on S. section line. Rock outcrops in several places. Knoll is 60 paces across, N. & S. Rock is in general massive looking, does not look sheared. No fissures on weathered surface.

Specimens 441-444. Section 28, 45, 31. 1920 N., 1030 W.

Low small outcrop of limestone on S. bank of river. Cleavage strikes N. 7 W., and dips 26 E. In places in this outcrop are pink and green bands. Strike N. 60 E., dip 15 S., may be crumpled. No. 441 is average; 442,green;443, pink; 444, green and pink. Rock shows other joint or cleavage planes striking nearly same as cleavage, dipping 40 E.

Specimen 445. Section 28, 45, 31. 1700 N., 1240 W.

Is from N. face of cut. It shows probable bedding. This corresponds with cleavage, principal one.

Specimen 446. Section 28, 45, 31. 1700 N., 1240 W.
Also from N. face of cut. Shows much same thing. Quartz grains well rounded. Is not 6 feet from 445.

Specimens 447-449. Section 28, 45, 31. 1835 N., 1250 W.
Specimen 447 looks much like sandstone, but not as much so as other portions of the outcrop near by. Specimen 448 is much the same. Specimen 449 is most calcareous. Is slightly pinkish, like 443, 444. Chief cleavage corresponds with bands.

Specimen 450 Section 1, 45, 32. 1650 N., 10 W.
Possible outcrop, makes low mound 3 feet high. May be angular boulders. Assuming to be masses of rock are but little out of place, strike of cleavage is about N. 45 W., dip 60 E. Rock contains hornblende, feldspar, and calcite, also mica in some cleavage faces. Is similar to fragments seen on drift at 420-450. It may be a sheared eruptive. Saw no trace of banding apart from that associated with cleavage. Is no particularly tough under the hammer. Specimen 450 is fair average of the outcrop.

Specimen 451. Section 6, 45, 31. 1800 N. 2000 W.
Ridge possibly underlaid by rock. Angular faces outcrop in places. At W. 30, N. 800, face of rock, may be boulder. Cleavage which about corresponds with lance like light banding, strikes N. 70 W., dips about 65 E. Strike and dip those of chief cleavage. Rock is tough under the hammer. It contains hornblende

and feldspar. Some of lenses or bands look faintly jaspery.

Specimen 453. Section 1, 45, 32. 1420 N., 65 W.

Possible outcrop of what looks like a squeezed eruptive greenstone. A siliceous hornblende feldspar rock. Exposure 8 feet square. Strike of lamination is N. 30 W., dip 50 E.

Specimen 454. Section 1, 45, 32. 1500 N., 30-60 W.

Low ridge in which are numerous angular rock faces. From variety judge rock to be made of boulders, but at 45 W., 1490 N. on S. side of the low knoll may be an outcrop of graywacke. Exposure about 15 feet long.

Specimens 455 & 456. Section 6, 45, 31. 1575 N., 1940 W.

Test pit in trench before mentioned, 15 paces S. W. of N. end. Nothing on dump to show that trench is ledged to N. E. of here. Material thrown out of this pit was probably a greenstone schist, siliceous and banded, 455 & 456 are from here.

Specimens 457-471. Section 6, 45, 31. 1550-1610 N., 1910-75 W.

Specimens 457-459.

Dump 15 paces from N. end of trench.

Specimens 460-462.

Are from dump at S. 30. They give fair idea of gradations. 460 is biotite, 461 is perhaps nearest average of rock on dump. 462 contains more quartz. A quartz, hornblende schist.

Specimens 463-467.

At S. W. 42, rock is becoming more plainly siliceous. A banded jasper. On W. side of trench, at this point are some specimens

showing the gradations from siliceous schist to jasper. Fragments of biotite stuff like 460 are on dump, E. side, but do not feel sure they are from ledge at this point. Most of the rock is decidedly siliceous, gives signs of passing into a lean magnetite schist. No. 463 shows banding of siliceous and aluminous material and hornblende, very well. Is it a gradation of 461? 465 is from E. side of trench. It looks like a good black jasper. A siliceous magnetite schist. Reminds me of that at Spur's Mine. 466 & 467 from W. side of trench. Show farther gradations. I notice the reddish tinge of the jasper, also that rock contains hematite as well as magnetite.

Specimens 468-471.

At S. W. 48 on E. side of dump, are some selected specimens of ore, 468 is one of these. Looks like ore from Franklyn, N. J. 469, is another specimen. Specimen 470 is from W. side of trench at same point. The test pit in the trench at this point is evidently sunk in this rock. In places rock looks almost like a conglomerate, 471 is such a specimen. Probably simply due to brecciation or replacement.

Specimens 472-474. Section 1, 45, 32. 1495 N., 5 W.

Test pit, ledged in jaspery looking rock showing considerable degree of gradation in texture. Some of the specimens look as if of clastic origin, 472 is one of these. It is interbanded with the finer. Is it graywacke? Specimen 573 is finer-grained.

Evidently forms larger part of ledge. Is it a replacement product? Specimen 474 shows coarse and fine-banded. Reminds me of rock seen at Inter Range Mine.

Specimen 475. Section 1, 45, 32. 1475 N., 5 W.

Test pit. Nothing on dump to show if certainly ledged. On dump are some large sub-angular boulders of a greenstone, with large actinolite crystals, which contain cherty band. 475 shows banding, bands are not large, 2 inches wide at most.

Going N. from point 300 paces W. of probable 1/16 post on E. section line of 1,,45, 32.

Specimens 476 & 477. Section 1, 45, 32. 1540 N., 260 W.

Low ridge, probably underlaid by ledge of tough feldspar hornblende rock, that weathers reddish. Is like rock seen so much in drift and in place on N. section line. Cleavage not very well marked, but strike of lamination is about N. 30 W., and dip 30 E. Ridge is about 70 paces long, about 3 high at E. end, 15 at W. Rock is probably Sholdeiss's "quartzite." Ridge trends nearly E. & W., is not properly a ridge, no N. slope; at 270 W. the ground makes off to a little W. of N. No outcrops on it here.

Specimen 478. Section 1, 45, 32. 1925 N., 235 W.

Some large angular masses of rock here, largest 20 x 10 feet. Is a banded actinolite greenstone, bands are jaspery. Is probably not in place, but ledge cannot be far off.

Specimen 479. Section 1, 45, 32. 1925 N., 285 W.

Large mass of similar rock. It may be in place, strike of cleavage and banding is N. 50 W., dip 60 E. Rock is 6 feet high, about 10 x 15 feet square.

Specimen 480. Section 1, 45, 32. 1895-1920 N., 260-90 W.

Large outcrop, very large angular masses. Are plainly out of place. Hence difficult to say what is true strike and dip of cleavage. Rock is banded greenstone like that seen so often.

Specimen 481. Section 1, 45, 32. Sandford's location cannot be made out.

Probable outcrop is on E. side of a knoll, is about 25 x 10 feet. Rock very tough and pretty massive, cleavage not well defined. Some bands may strike N. 15 W. about, and dip 65 E.

Specimen 484. Section 6, 45, 30. 80 N., 0 W. m

Mass of rock which in preliminary survey was considered an outcrop. I doubt if it is. Around this mass are otherboulders (rounded) to 1/3 its size and looking like the same or a similar rock. The general schistosity of the mass whence the specimen was N a little W.

Specimen 485. Section 5, 45, 30. 15 N., 150 W. m

Strike N. 70 E. Dip northerly 59. This is a magnetic schist which seems to have a distinct foliation as above given. I should judge this whole hill to be of the same material.

Undoubted a loose piece. H.A.S.

Specimen 486. Section 7, 46, 30. 365 N., 1610 W.

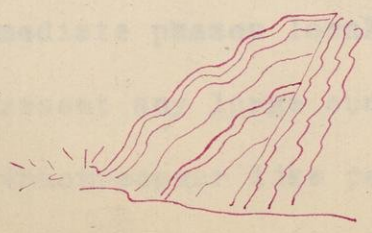
A small outcrop of actinolite schist. The strike is N. 60 W., dip 29 E.

Specimen 487. 24, 47, 31. 1000 N., 331 W. m

Greenish hornblende schist. This is the largest of the series of outcrops which show this hill to have a hornblende schist core. There are also outcrops at 331 W. 10 86 N., 320 W., 80-90 W. 325 W., 100 N., etc. to end of hill. Much more coarsely crystalline in going west.

Specimen 488. & 489 Section 24, 47, 31. 1410 N., 0 W. m

Outcrop of banded much crumpled ore formation, (?) actinolite schist. The general strike of this outcrop is N. 13 EE which is the axis of a slight fold as well as the axis of minor plications.



Looking North.

5-40 N 23 W, 24-47-31.

N.

< 20 paces —>

tion across a northerly trending

old.

34000

40 W. of range line 500 S. of N. E. corner, we crossed the crest of a fold of the ledge. Here the strike seemed to be exactly N. & S. and the rock was dipping both E. & W., very much corrugated and possessing two series of plications, both parallel, beside the main fold. No specimen was taken since it was a continuation of the other ledge and similar rock. The banding in places is more pronounced in this specimen.

Specimen 490. Section 24, 47, 31. 1500 N., 420 W.

Exposure of ledge like 490. No structure was madeout, though the general trend of the exposure is N. & S. The exposure is poor and not very large or high.

Specimen 491. Section 24, 47, 31. 1500 N., 550 W.

Low outcrop of hornblende schist, trending N. & S. Forms part of a large hill.

Specimen 492. Section 24, 47, 31. 1500 N., 600 W.

Quartzite. The rock is not shown absolutely in place but broken up by frost.

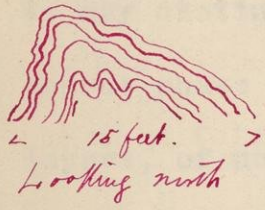
Specimens 493 & 494. Section 24, 47, 31. 1500 N., 650 W.

Quartzite. Quartzite with a serecitic ground mass. These two do not grade into each other, though there are rocks which look like intermediate phases locally developed. The quartzite does not present any large conglomeratic phases, though those specimens which appear like pebbles were found. No definite dip nor strike were determined, though it looks very probable

that the strike is N. & S. with a very high westerly dip. As shown by the general direction wavy contact below.

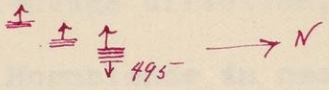
Specimens 495 & 496. Section 24, 47, 31. 1250 N., 50 W.

Actimolite schist. Strike N.



This rock as is shown by specimen 495 is much like that found at creek, continuation of the same probably. Here, however, is developed a few bands of hornblendic or perhaps rather actinolitic phase, specimen 496.

This outcrop is followed by 2 others lying approximately



Specimen 497. Section 24, 47, 31. 1250 N., 900 W.

Hornblende schist in knoll, rising out of the low bands.

Specimen 498. Section 24, 47, 31. 1250 N., 1750 W.

Large outcrop, hornblende schist.

Specimen 499. Section 24, 47, 31. 730 N., 600 W.

Outcrop of hornblende schist on W. slope of hill.

Specimen 500. Section 24, 47, 31. 1500 N., 865 W.

Outcrop of hornblende schist.

Specimens 501-503. Section 28, 45, 31. 1900 N., 775 W.
Hornblende biotite schist or gneisses with at eastern end of exposure, what appears to be an eruptive, specimens 502 & 503. We may distinguish in these hornblende schists; first, a coarse phase in which the rock is banded with coarser and finer layers, of no very great continuity, made up of hornblende biotite and quartz. Specimen 501. The lamination is often very even, but is seen to be discontinuous. From this we may trace down the rhombohedral breaking through all stages. These gneisses weather light pink with tinges of green, 2nd, medium phase, where the ~~anticline~~ aspect of rock is on the whole massive, although distinctly showing cleavages. Contains quartz eyes up to 2 or 3 inches. These have sometimes a hollow interior. Drawn out into lenses in cleavage direction, 3rd phase, fine biotite hornblende schist. Hornblende in needles for most part but not always; in cleavage planes or making small angles with them. In cleavage planes they have no regular distribution.

Specimens 504-509. Section 28, 45, 31. 1730 N., 630 W.
At 270 S., and 75 E. of line the graywacke is cut off by some hornblende schist. Uncertain whether a vein in the strike or an eruptive contact, incline to latter. Both rocks are foliated parallel to the junction and the graywacke is not seen again on the line of strike. It is succeeded at 325-400 S. by south striking and east dipping hornblende schists of the pseudo-amygdaloid phase. The inclusions are both of quartz and calcite, the weathering out of the latter leaving the surface pitted. Pink feldspar occasionally with quartz. ~~Sta~~

~~Starting at 300 S., 75 E. run east to section line.~~

Specimens 504, 505 & 509. Section 28, 45, 31. 1800-1900 N, 700 W.
The strike is N. 12 W., dip E. 45 . These specimens represent the hornblende schists which are exposed on the east bank of the river for over 125 paces.

Specimen 506. Section 28, 45, 31. 1825 N., 640 W.
This rock is a graywacke. It strikes N. 10 W., and dips 40 E. It is overlaid by

Specimens 507 & 508. Section 28, 45, 31. 1850 N., 600 W.
These are mica schists.

Specimens 510 & 511, Section 21, 45, 31. 30 N., 250 W.
Starting at blazed tree 200 paces W., of S. E. corner, 20, run N. 8 W. to locate outcrops.
At 30 paces N. S. end of outcrop 5 paces across; strike N. 8 W. dip E. 40-45 . This rock is a rather dull weathering biotite

schist, in large part very evenly laminated. With it occur bands blue gray on fresh fracture, and light weathering showing sometims also altered feldspars on weathered surface. Both varieties have zones of hornblende crystals, substantially but not always ~~or~~ exactly parallel with the lamination, and always when followed for any length, discontinuous. Augen of granulated quartz are also found. Regard the evenly laminated biotic phase as a dynamic product. Less squeezed portions show the usual rhombohedral cleavage, from these a perfect passage into the evenly laminated can be traced. Quartz veins in the cleavage showing drawing out into string--of-sausage forms.

Specimens 512 & 514. Section 21, 45, 31. 40 N., 275 W.
Rock of 512 closely packed with quartz eyes, some of which have undoubtedly a concentric structure. Rim of calcite or feldspar. 50 paces on line. Specimen 514.

Specimen 513. Section 21, 45, 31. 60 N., 280 W.
West of line the coarsely crystalline varieties with large hornblendes, predominate. Strike N. 8 W. dip 40-45 E.

Specimen 515. Section 21, 45, 31. 100 N., 240 W.
No note

Specimen 516. Section 21, 45, 31. 230 N., 290 W.
Biotite schist packed full of quartz eyes. Some are of blue quartz. All are well rounded. No composite pebbles were seen. Can this be a conglomerate? At 29 E. were arranged in layers;

not enough exposed to test continuity, but some layers with inclusions came to an end across strike very sharply against layers poor in inclusions.

At 230 on line and W. fine biotie schist with inclusions, specimen 516, below it. Similar rock showing distinct medium sized hornblende crystals in weathered surfaces. Both varieties are evenly foliated.

Specimen 517. Section 21, 45, 31. 263 N., 300 W.

At 263 on line, evenly laminated mica schist without inclusions containing large chloritized garnets,,specimen 517. Underlaid for 10 paces W. by coarser hornblendic variety.

To 300 on line, E & W. of it, 10-15 paces, same rocks hornblendic variety predominating to the west. At 19 W. rock with quartz pebbles, some unoriented, all very round and smooth, largest 1/2 inch and from that down to B. B. Shot. This rock must be either clastic or an amygdaloid. No specimen.

At 375 on line and 21 paces E. exposure on ridge comes to an end. River at 395. .

Specimen 518. Section 21, 45, 31. 400 N., 315 W.

First outcrop on Herald's line on E. side of river. Dark weathering rather massive rock. Biotite or chlorite schist with quartz eyes, has a greener tinge on fracture than rocks seen before to-day. Strike about N. & S. and dip E.

Specimen 519. Section 21, 45, 31. 350 N., 350 W.

Herald's 2nd outcrop, for the most part as far as could be seen

very schistose biotite-hornblende rock. Strikes and dips about as others.

Specimens 520-522. Section 21, 45, 31. 290 N., 500 W. Run along strike for 20 paces back from river. Herald's third outcrop on E. side. Rock on both sides parallel. Two small ledges project into the river. The down stream one is a crystalline fine-grained diorite apparently and is probably a dike. The rock 10 feet S. is a sericitic schist carrying blue quartz grains in abundance. Must be either a fine-grained conglomerate or an autoclastic acid eruptive. Specimens 521 & 522.

Specimens 523 & 524. Section 21, 45, 31. 240 N., 550 W. Herald's Falls locality, E. side river. Exposures for 50 feet across strike, N. 8 W., dip E. For upper 20 feet, rock fine-grained light weathering and although laminated yet on the whole quite massive. Specimen 523. Lower 30 feet, rock, green more schistose and consists almost entirely of hornblende and biotite. Carries calcite lenses some large and irregular, 4 or 5 inches in diameter. Weathers out and gives rock pitted appearance. Curious cross jointing dipping S. 60 , normal to strike. Some quartz inclusions similar to those seen this P. M.

Running west on the section line between 21 & 28, 45, 31.
from the west bank of the river.

Specimen 525. Section 28, 45, 31. 1978 N., 820 W.

A rather light weathering hornblende biotite schist. This rock is black and glistening and very finely crystalline on a fresh fracture. It is highly schistose but not evenly laminated. The rhomboidal cleavage systems are well shown both on large and small scales. The strike is N. 8 W., dip 45 E. The strike is the average very nearly of the two systems. The hornblende occurs probably in two ways:-- First, very intimately disseminated in very small crystals, which aid in giving the rock its foliation being arranged along the cleavage planes. Second, in aggregates of much coarser crystals which are roughly aligned with the cleavages, but are not in bands.

Specimen 526. Section 28, 45, 31. 1930 N., 808 W.

On the west slope of the hill we find the usual biotite hornblende rocks for 10 paces. Then gradually come in more sericitic with hornblende as in the specimen.

Specimen 527. Section 28, 45, 31. 1935 N., 846 W.

At the bottom of the hill, we find a very evenly laminated red weathering rock, which has the appearance of an acid eruptive.

Section 28, 45, 31. 340-80 N., 1980 W.

Going north from the S. W. corner of the section on the W. section line, we find marble from 340 to 380 paces just E. of the W. section line. Rather thinly bedded, strike N. and S. dip E. 20-30 .

Specimens 528 & 529. Section 28, 45, 31. 1940-60 N., 1700 W.

Tremolite limestone thinly bedded strikes N. 8-10 W., dip E. 35 .

Specimens 530 & 531. Section 21, 45, 31. 400 N., 526 W.

Top of little hummock is made up of sericitic rock of specimen 530. Below this comes evenly laminated hornblende schist. The strike is N., dip 20 to the E.

Specimens 532-536. Section 21, 45, 31. 375 N., 520 W.

Sericitic schists, being overlaid by biotite hornblende schists. In the sericitic schists here we have either a fragmental or an autoclastic conglomerate from an acid eruptive. Strike N. 8 W., dip 35 E.

12 paces farther south, this conglomerate is succeeded along the strike by hornblende biotite schist so that one is evidently irruptive through the other or there is a fault. At the south end of the conglomerate knob there are two or three good exposures in which can be seen that besides its fine granular structure in a small scale the conglomerate has a pseudo-conglomerate on

a large. The two customary cleavages have divided the rock into rhomboidal forms. The inclusions are the comparitively unsheared cores between bounding cleavage planes. They have by no means escaped shearing. This is shown immediately along the margins. The cores have a clearly crystalline look. This rock hasbeen a massive crystalline. 20 paces from the river, on the line, we find indisputable proof that this is so, for out conglomerate may be traced foot bv foot into a clearly acid eruptive. Specimen 532 shows quartz grains and feldspar inclusions. This is perhaps the most conglomerate phase of the rock. Specimens 534, 535 & 536 ressemble the slate conglomerate of section 16, 44, 31. Show passage into acid eruptive. 536 is entirely similar to the acid slates in the river section on line between 10 and 15, 44, 31.

Specimens 537-539. Section 21, 45, 31. 1075 N., 375 W. North exposure of grey greenish weathering banded rock. Biotite schist alternated with layers of coarse hornblende schist. Both rocks contain many garnets, both where they come together and away from the contacts, but near the contacts the garnets are most abundant. Strike N. 8-10 W., dip 35 E. The rocks are seamed with thread-like veins of pegmatite and are cut by a dike of quartz prophyry. Contact is ragged. Specimen 539 is dike rock

Specimen 540. Section 21, 45, 31. 1014 N., 375 W.

Chloritic or biotite schist, garnetiferous, with usual hornblende and much quartz in veins parallel to bedding. Strike due N., dip 35 E. The specimen shows an alteration of garnets to chlorite.

Section 21, 45, 31. 250 N., 595 W.

Falls on the Fence River.

There are large exposures both on the north and south banks of the river by these Falls. The strike is N. 8-10 W., dip 30-35 E. The rock weathers a reddish white, it is hard and brittle It is pseudo-conglomeratic; the inclusions are nearly equally divided in some parts of the rock between the very fine-grained reddish weathering felsitic and the coarsely crystalline hornblendic constituents. The two cleavages that cause the structure nearly coincide; hence the rock has a roughly banded appearance, the inclusions being very narrow in proportion to their length. I should regard the rock as originally a very fine-grained and even textured acid eruptive and the hornblende as a new crystallization of the ground up material, bounding the comparatively unsheared cores. There is a great deal of new radiating and felted hornblende actinolite even in the felsitic material. This rock strongly reminds one of the brittle slates below the camp on Section 10, 44, 31. One loose piece shows a structure that has apparently suffered plication. The rock

carries with it some calcite which has weathered out leaving the surface pitted. The rock does not disturb the needle.

Specimens 541 & 542. Section 16, 45, 31. 880 N., 470 W.

The main shaft at the Doane's exploration. No rock is exposed. there are four or five test pits, from the deepest of which material has been hoist4d. This material is in all respects similar to that at Sholdeis's . The dip here is probably low. The first material, i.e., that which forms the bottom of the dump, is a quartzitic banded rock, then comes the more ferruginous on top of the dump showing that the first was passed through to reach the second.

Specimens 543 & 544. Section 16, 45, 31. 900-970 N., 775 W.

This rock is grey to light weathering biotite schist, brittle, with and without porphyritic hornblende crystals; well developed foliation, not quite regular. There are less sheared bands in it which seem to indicate that the rock originally was a graywacke.

Section 16, 45, 31. 1440 N., 1175 W.

Angular fragments of light weathering somewhat banded hornblende schists. Very like those at the lower Falls in section 1, 45, 31. The rock is probably very nearly in place.

Specimens 545-547. Section 28, 45, 31. 1850 N., 870 W.

An outcrop on the north bank of the Fence River at the edge of the water, exposed for 36 feet across the strike of the cleavage.

The western or lower portion exposed for 10 feet from west edge of the outcrop and is a dark weathering, very tough hornblende rock. It is made up principally of hornblende which occurs in slender rods and in radiating bunches. Besides this hornblende are reddish areas of sausurized feldspars constituting the material between the hornblende crystals or the ground mass. The usual biotite is also present, bleached on weathered surface. This rock has a strong parallel or nearly parallel cleavage which shows itself even in the most massive varieties. The whole aspect of the rock is that of an eruptive. Specimen 545, above this comes in the same exposure; another variety of greenstone. The division between the two is marked by a quartz vein with pink feldspars and strikes with the cleavage N. & S., dips E. 35 . This second variety weathers a green grey and is notable for containing a great abundance of large triclinic feldspar crystals. These crystals occur up to one inch in length and are very slender. Some show distinct multiple twining. Others are entirely altered into chlorite. They are not aligned in cleavage planes. The great majority of the crystals do not depart from the cleavage direction more than 40 on either side. Crystals are bent, some of them. Rock also shows fine-grained inclusions which areusually very irregular lenses, usually cutting the foliation at right angles. The feldspar crystals are found in these inclusions also, and

sometimes a crystal is half in an inclusion and half out of it. There is a great difference in the extent of alteration of the feldspar crystals. All are probably saussurized but at the same horizon in rock, some crystals will be changed to chlorite, while adjoining ones an inch away, still show bright feldspar cleavage. 546, shows the usual aspect and altered feldspars. Specimen 547 showing the inclusion and saussuruzed feldspars.

Specimens 548-553. Section 28, 45, 31. 1775 N., 1475 W. Falls on Fence River.

At these Falls there is a band of marble about 16 to 18 feet wide, crossing the river; on the east side, the marble is in contact with greenstone and the relations are clearly irruptive; on the up stream side, it is closely succeeded by greenstone, the rela tions between them cannot be made out. Marble. The contact with the upper or eastern greenstone strikes very nearly N. & S. It is an uneven line and bends to the W. of S. in the river. Marble weathers a light yellow. On fresh fracture, white, not very crystalline, and has the fracture of some quartzites. It is soft to the knife; has a greenish tinge.

Near both greenstones it is very tremolitic. The marble has about, two equally developed, rather coarse cleavages. They strike N. 2 W. and N. 22 W. Both dip E. 60 . Divide rock into very perfect rhombs, 1 or 2 inches long by 1/2 inch across. This development of two cleavages is the best yet seen. Probably neither represents bedding. The marble has faint indications of a third structure; this structure is finely plicated and on the whole has a very gentle easterly dip. I regard this as probably bedding. Why is the cleavage so steep in this band? I think the cleavage probably has its dip determined by the dip of the plane of contact with the upper greenstone.

This is the plane dividing the marble from massive and unyielding material. It makes manifold copies of itself in distributing thrust over thinly bedded rocks. Specimen 548, shows the limestone with tremolite. Specimen 549, shows what is regarded as plicated bedding in the limestone.

Upper greenstone. This is a rock looking very massive in the ledge. The most massive portions, however, show foliation and schistosity. 8 feet above the contact, it includes a thin band of limestone which may be seen for 8 feet under water to the south and is abruptly cut off at the north end, where it is

also penetrated for two or three feet by a stringer from the greenstone. The greenstone is very sharply squeezed for two or three feet from the dike. Specimen 550 is from the interior, the greenstone, 551 is from the wall two feet from the limestone, 552 is from included band of limestone.

The western or lower greenstone. This rock is foliated , the cleavage dipping E. from 30 -35 , and also near the limestone it dips W. about 20 . Large fragments are scattered about, not in place, showing a structure that has undergone great plications. On the whole, am not prepared to say that this limestone is not a pinched-in synclinal fold, the greenstones being an interbedded intrusive previous to folding, hence showing irruptive contacts, and that all have been folded together subsequently. 553, specimen of lower greenstone.

Specimens 553 A.-557. Section 4, 44, 31 and 33, 45, 31.

1950-2000 N., 100-150 W.

This is a very large outcrop of greenstone. On the eastern side the rock is very massive, fine-grained, dense and rings under the hammer. It has little biotite and some radiating hornblende crystals, very small. No very well pronounced structure. Faint appearance of banding is shown in 553 A. The strike of this banding is to the N. W. The rock weathers a dul greenish grey. At 1990 N., 114 W. comes in a rock which is very similar in appearance except that it carries feldspars.

Specimen 554. There is a sharp line of demarcation between the two rocks which strikes N. 43 W. This rock carries yellowish fine-grained inclusions of felsite? Specimen 555. The feldspars occur both in aggregates and in single crystals of triclinic feldspar. The largest crystals are half an inch in length. On the western side of the exposure, we have a contact between the rock of 554 and an evenly laminated biotite schist.

Specimen 558. Section 10, 44, 31.
From a boulder in the drift, shows a faulted pegmatite vein.

Specimen 559. Section 28, 45, 31. 1750 N., 1500 W.
An altered basic intrusive, pitted, carries fragments of limestone.

Specimen 560. Section 28, 45, 31. 1715 N., 1550 W.
A band 2 feet wide, quartzitic looking.

Specimens 561-564. Section 28, 45, 31. 1710 N., 1700 W.
Represent marble and greenstone, for 150 paces below the dam on Fence River.

Specimen 565. Section 28, 45, 31. 1700 N., 1680 W.
Marble, white, ful of calcite crystals, arranged in parallel planes. These planes I take to represent bedding. They strike about N. 10 W., dip E. 28. The individual crystals are arranged across these planes. They often surround cavities. Between this bend and the dam, the marble is continuously exposed on the north side of the river, and nearly so on the south side of the river.

Nearly all on the north bank, shows the curiously arranged areas of the calcite crystals. Near the dam, down the stream, we get alternating thin layers of pink, blue and white marble. It unquestionably represents bedding. Strike N. 8 W., dip 28 E.

Specimen 566. Section 28, 45, 31. 1750 N., 1725 W.

A little stringer from a dike is intruded into the limestone at this point, which is on the north bank of the river at the water; and has developed in it long slender crystals.

Are they tremolite?

Specimen 567. Section 28, 45, 31. 1730 N., 1745 W.

Just below the dam, the marble has been blasted out and fresh surfaces are exposed showing alternating blue and pearly white layers. The strike is N. 20 W ., dip 28 E. The real dip is flatter, showing that it is the dip of the shank of a fold.

Specimen 568. Section 28, 45, 31.

At the dam, on the south side of the river, a dike cuts the strike of the marble in a slightly diagonal direction. Dike is imperfectly foliated, parallel to bedding of limestone and same vertical joints run through both rocks. Strike about N. 20 W. dip 25-30 E. The strike of the south west contact is

approximately N. 40 W.

Specimens 569-583. Section 21, 45, 31. 1008-1100 N., 250-275 W. These specimens are all from the test pits and outcrop at Sholdeis's exploration. The material thrown out at the main pit consists of a quartzitic looking rock, both banded and massive and of a very lean siliceous iron ore, full of particles of quartz. The rock has a very fragmental aspect, it carries little particles of quartz, some of which can be distinguished as blue in color. It also has a great deal of specular oxide of iron mixed with it, and probably much magnetite. Particles are all small and appear to have no definite arrangement. The rock while banded, does not show in the different bands much difference in texture. Some bands are more schistose than others and are darker colored, containing more iron. Specimens 569, 570 show two phases of the "rock". Specimens 571, 572 are of the "ore". There is no essential difference between them. Near the north end of the rock exposed east of Sholdeis's pits a line of test pits comes up to the ledge from the west. The outcrop on the east has veins of pegmatite which have been pulled out into augen, sometimes and usually lobed, 3 or 4 inches through and running with the bedding.

Near the base of the rock at the nearest test pit we find a thickness of 3 or 4 feet in which the silica is cherty and banded with magnetite. The latter is een tolerably pure and very finely granular in one seam one and a half inches thick in part of its length. Specimen 573 is of the cherty silica. It may be traced 8-10 feet before it disappears. On top of the outcrop we get a wel exposed section across. The line of division between the thinly banded rock below and the garnetiferous above is about the axial line of the hill. Strike N. 15 W. The rock consists maibly of quartz; lighter bands are coarser in texture. At the south end we see nothing that is distinctly fragmental. The structure of this rock seems to be bedding. The bands do thin out , however, and widen and thicken. At 1121 N. 225 W., the above rock is joined on the east by a garnetiferous biotite schist, dark weathering and banded like the rock below it. To the east it passes rather abruptly in about 9 feet into actinolite schist , which is 2 feet through. East of this actinolite schist comes a very quartzitic variety of actinolite schist. The quartz is in layers parallel to the strike. It is very much sugared. The actinolite schist also has traces of garnet, but in the rock below they are very closely packed. The quartz continues to the east for about 13 paces. At 1051 paces N., the dip is from 55-80 to the E. The structure in the thin bedded rock is crenulated. The pitch of the little folds is to the south.

Near the contact, between the quartz and garnet schists, garnet bands and light bedded bands occur in both rocks. And both rocks also carry some actinolite. Seven or eight feet thickness of schist. This is simply a mass of olive green actinolite.

Section 6, 45, 31.

Hill north of Sholdeis's trench. Near the top of the hill at the N. W. side, hornblende schists, rather finely and evenly lamin ated. Dip 40-45 N., This rock consists of a dark weathering coarsely crystalline hornblendic element and a light reddish white weathering element in nearly equal proportions. The light colored mineral occurs in excessively irregularly outlined lenses in the dark. Neither occur in masses more than 2 inches wide, and those from 1/2 inch down are much more numerous.

Specimens 584-588. Section 7, 45, 30.

These specimens represent the archaean granite gneisses and mica schists in the area west of Trout lake.

Specimens 589-594. Section 18, 46, 30. 866 N., 1100 W.

These specimens represent all the varieties of rock thrown out at the main shaft at the Ayre Estate exploration. The pyritiferous varieties are apparently the last thrown out, in other words, the bottome rock. Specimen 590 is interesting as showing quartz eyes, mainly in the bands of magnetite. This should be sliced. A determination of the origin of the quartz will have a bearing on the origin of the schists.

Specimen 595. Section 18, 46, 30. 745 N., 1300 W.

This specimen is from the test pit west of the main shaft. It is probably from ledge. It is a quartzite with layers of fine conglomerate.

Specimen 596. Section 30, 47, 31. 600 N., 1900-1925 W.

We find on the south side of the bare hill north-west of the ridge, 3 small exposures of a probably basic intrusive. The rock is massive and coarse. It contains hornblende with a little feldspar, which is nearly all altered to saussurite. The other exposures show a distinct but not very pronounced lamination. Strike N. and S., dip to the W. 70 .

Specimen 597. Section 25, 47, 31. 1475 N., 900 W.

Very coarse diorite.

Specimen 598. Section 24, 47, 31. 1750 N., 760 W.

Coarse cherty specimen.

34000

Specimens 598 A. & 599. Section 24, 47, 31. 1530 N., 850 W.

Quartzite exposures 10 paces diameter. There are faint indications of sedimentary bands. Strike N. 35 W., and dip E., very high. The quartzite weathers a very light color, the greenstone outcrops continuously to 1666 paces N., and 820 W. The outcrop varies in width from 10-25 paces.

Specimen 601. Section 24, 47, 31. 1400 N., 0 W.

Specimen to show crumpled character of the rocks at this point.

Specimens 602 & 603. Section 30, 47, 30. 1950 N., 850 W.

N. edge of rounded knoll of rock, tough. Made up of hornblende and feldspar. Shows squeezing, no well marked strike or dip. Outcrop is 20 paces across N. & S. Joint or cleavage planes strike N. 2 E., N. 30 E; N. 15 W. N & S most prominent dip about 75 W., specimen 602 shows large hornblende crystals. 603 large feldspar. Two knobs grade into each other irregularly.

Specimens 604-606. Section 30, 47, 30. 1900 N., 725-750 W.

Outcrop 10 feet wide, runs 25 paces S.. Rock tough, mostly hornblende. Crystals of that material 1/2 in diameter and over. No strike or dip, specimen 604 from here. Another outcrop, runs N. E., about 10 feet across, crosses line farther on. Outcrop is distinctly banded. Some bands are of magnetite hematite, some of green hornblende and chlorite. Rock a magnetite actinolite schist. This exposure about 6 x 15 feet. Bands strike N. 30 E. dip 45 W., specimen 605 from here, This is immediately overlaid by soft green actinolite rock, specimen 606.

Specimen 607 & 608. Section 30, 47, 30. 1900 N., 720 W.

It is underlaid, space blank of 6 feet, by rock of varying character as to grain, but of hornblende and feldspar. Rock is tough,

contains actinolite. No strike or dip observed.

Specimen 609. Section 30, 47, 30. 1975 N., 710 W.

Small outcrop, 6 feet squuare, of coarse grained rock, like 604, that contains a narrow band of finer-grained. Strike is N. 30 E., dip 65 W.

Coarse grained rock makes outcrop about 20 feet across, which crosses line at 1290. Runs about 20 paces N., makes a bluff facing N. E.

Specimen 610. Section 30, 47, 30. 1940 N., 565 W.

W. end of cut exposing cross section of magnetite actinolite schist, 12 feet S. side of cut on line at 1415. Rock is actinolite magnetite schist, like 605. Strike N. 35 E., dip about 90. Cut is 45 paces long, runs S. 40 E. at S. E. end. Strike is N. 15 E., dip runs from 60-75 W., specimen 610 is from here.

Specimen 611. Section 20, 47, 30. 750 N., 1900 W.

Outcrop of granite forming brow of hill, runs about N. E. and S. W., 20 S. W. and at least 80 N. E. Outcrop of varying width, at least 20 paces near this point.

Specimen 612. Section 20, 47, 30. 1000 N., 1910 W.

Outcrop of quartzite, 15 paces long, E. & W., 10 N. & S.

Quartzite is very vitreous, no distinct bedding nor well marked cleavage. Principal joints strike N. 20 E., dip 75 E.

Specimen 613. Section 20, 47, 30. 1000 N., 1940 W.

Outcrop 2 paces wide, 10 long, of a banded schist. It looks like some of the lower series schists of the Republic trough. Strike is N. 65 E., dip about 42 W.

Specimen 614. Section 20, 47, 30. 1045 N., 1850 W.

Middle of another outcrop of same rock. Contains some bands very siliceous bands. In places the rock is fairly rich in iron. Strikes and dips vary from N. 35 E. to 70 N.; N. 35 E.-40 N.

Specimen 614.-616. Section 20, 47, 30. 1045 N., 1850 W.

Top of W. side of a rock cut, old mine, cut is about 20 feet wide and 35 paces long. Point located is 20 paces from N. W. end. Cut runs S. 30 E. Small pit full of water, just below point located. Rock exposed by cut is magnetite actinolite schist, with bands of biotite and hornblende schist. Some narrow seams of pyrite. At S. E. end of cut the underlying quartzite is exposed. It is seen in contact with the schist,,specimen 614. At point located the finely banded magnetite actinolite schist is overlaid by heavy band. Rest of outcrop, in width about 20 paces, of much sheared green schist, which contains hornblende biotite and pyrite. At contact with magnetite actinolite schist on E. end of cut is seam of pyrite about 1 foot across. At N. W. end of cut, rock is much less sheared. Here it contains large

crystals of hornblende, specimen 616. The vertical thickness of the magnetite actinolite schist on E. side of cut is about 20 feet. On the W. side of cut there is apparently 4 or 5 feet of rock like 615.

Specimens 618 & 619. Section 20, 47, 30. 990 N., 1930 W. Outcrop on hill side about 15 feet square, of magnetite actinolite schist. It strikes N. 50 E., and dips 60 N. It is almost in contact with a hornblende rock, having no very well marked strike or dip. Specimen 618 is magnetite actinolite; 619 is hornblende rock.

Specimen 620. Section 20, 47, 30. 1000 N., 1975 W. Test pit, from amount of angular rock fragments on dump, think it is in all probability ledged in 620. This looks like the "black ore jasper" of the Republic trough, cannot tell strike and dip.

Specimen 621. Section 20, 47, 30. 1850 N., 1950 W. Outcrop of a hornblende feldspar rock, slightly schistose. Strike and dip as whole not well marked. At one place on S. side of outcrop, about 50 W. of line, strike is N. 90 E., dip 45 N. 621 is specimen of average. Rock is acid eruptive, does not weather as red as some.

Specimen 622. Section 19, 47, 30. 1970 N., 390 W. Large outcrop, rock is very uniform in grain and composition. Is not banded.

Specimens 623 & 624. Section 19, 47, 30. 1115 N., 0 W. Outcrop on hill side, 10 paces wide, E & W.

Rock is a schist, no well marked strike or dip. It is fine-grained crystalline. Contains sub-angular pieces of black chert. The rock also has some crystalline concretions which give it a warty look on weathered surface. Rock contains chlorite and feldspar

Specimen 625. Section 20, 47, 30. 1985 N., 1920 W.

Outcrop 15 paces wide. Rock much similar to preceding but still more distinctly banded. Strike of bands at 40 W., N. 55 E., dip 45 45 N. Ridge bends E. & W.

Specimens 628 & 629. Section 19, 47, 30. 1980 N., 460 W.

Outcrop on W. bank of creek, 10 paces across N. & S. , 5 wide. 2 kinds of rock exposed, cannot say whether strike is E. & W. or N. & S. Small fold. Rock in creek bed is very hornblendic. That overlying it is harder and distinctly banded. Is it an upper series actinolite schist. On looking close, I doubt if two rocks are distinct beds. One may grade into other irregularly. 628, hornblendic; 629 banded.

Specimens 630 & 631. Section 19, 47 30. 1940 N., 85 W.

Shaft, rock first struck was quartzite. Can be seen at bottom of shaft. Strike and dip hard to determine. Shaft was evidently sunk through this perhaps 20 feet, and struck magnetite actinolite schist, much better looking rock as regards content of iron than most of that seen.

630 is quartzite; 631 schist, a trifle more iron than average.

Specimens 632 & 633. Section 19, 47, 30. 895 N., 130 W.

Deep shaft, should say was sunk 75 feet at least in rock. Rock thrown up is magnetite actinolite schist, most of it about like 631, but much leaner with white siliceous bands, specimen 633. Also some fragments of green hornblende rock containing garnets, 632.

Specimen 634. Section 24, 47, 31. 1285 N., 0 W.

Outcrop of banded rock, about 8 feet square. Much crumpled. General strike of crumplings is N. about 30 E., cannot tell strike as whole, outcrop too small. 634, garnets.

Specimens 635 & 638. Section 24, 47, 31. 1430 N., 0 W.

Outcrop 10 paces wide N.& S. Strike at N. 100 E., dip cannot be told, trend of strike as whole is N. Rock is a garnetiferous mica schist. Specimens 635 & 638.

Specimen 636. Section 19, 47, 30. 1450 N., 1550 W.

Large outcrop, about 10 paces across, E. & W., 45 N. & S. Rock same aspreceding, many parallel joints, strike N. 30 E. Strike of longer axis of crystals may be N. 5W.

Specimen 637. Section 24, 47, 31. 1495 N., 30 W,
Outcrop of 10 feet square of same much crumpled schist. Strike as whole nearly N. & S. Runs to 265 N. about 3 wide. Contains hematite bands. None of actinolite. Is magnetic.

Specimen 639. Section 20, 47, 30. 1025 N., 1780 W.
Exposure about 15 x 10 feet, may be a larger boulder of foliated rock. Foliation much contorted. As a whole think it strikes N. 35 E. and dips 40 N. Rock is very tough. A much sheared acid eruptive, very hard to get a good specimen.

Specimen 640. Section 20, 47, 30. 800 N., 1750 W.
Another outcrop, large, is continuation of this one, runs E. & W. is fully 50 paces long and 15 wide. Granite at 250 E. 150 S. is not foliated and no well marked parallelism of joints. Granite is very pretty, would make good ornamental stone, were it not so split up with joints.

Specimen 641. Section 20, 47, 30. 700 N., 1800 W.
Other outcrop runs from its E. end about 100 paces, S. 35 W. is at least 20 paces wide, makes a bluff 20-30 feet high. At 100 W. bends off more to the S., about S/ over 50 paces, in places is 50 paces wide.

Specimen 642. Section 20, 47, 30. 880 N., 1750 W.
Outcrop of granite, 20 feet long E. & W. ,10 wide N. & S.
Rock is banded or foliated. Strike is N. 65 W., dip 40, NN
Rock has on weathered surface, large radiating crystals, did not

get specimen.

Specimen 643 Section 20, 47, 30. 1150 N., 1585 W.

Large outcrop of magnetite actinolite schist. Strike N. 70-75 E. dip 40-45 N. Ridge at this point 10 paces wide. Runs N. 75 to a point at 40 paces. Runs 100 paces farther W.

Is crumpled in places, but practically a continuous outcrop strike corresponds with trend of hill. 85 S. W. is small pit on ledge. Nothing but magnetite actinolite schist thrown out.

Specimens 644. & 645. Section 20, 47, 30. 1147 N., 1550 W.

Large outcrop of magnetite actinolite schist and greenstone. At 460 E., 175 N. is a contact about 86 feet long. It strikes N. 58 E., dip 42 N. This corresponds with banding of schist. Schist does not differ from previous outcrop, blank space of about 5 paces between the two outcrops at this point. May be occupied by greenstone. The greenstone hornblende rock is much sheared and foliation corresponds with strike of beds.

The magnetite schist is on whole richer in iron than former outcrop, 645 is specimen. The ridge of schist is at point located E. 440, N. 175. About 15-20 paces, runs in direction of strike N. 75 E., 60 steps, and S. 75 W., 105 steps, is 5-20 paces wide, 5 at S. W. end. Dip is 50 .

Specimen 646. Section 20, 47, 30. 1175 N., 1575 W.

Drift, into ledge. Ledge is about 25 feet high on N. side,

Drift is at right angles to strike of rock, drift is 50 feet long. Rock is all magnetite actinolite schist, except a narrow band of garnetiferous hornblende rock, like 644 about 3 feet thick, 20 feet from N. end of drift.

Specimen647. Section 20, 47, 30. 1245 N., 1500 W.
Small outcrop of magnetite actinolite schist, 15 feet long. Strike 65 E., dip 40 N. Probable contact of greenstone schist. N. 248, 505 E. Test pit, sunk in magnetite actinolite schist and greenstone. Greenstone overlies schist. 647 is contact specimen from dump. The hornblende is probably at least 10 feet thick. 647 is sheared greenstone. Specimen

Specimen 648. Section 20, 47, 30. 1280 N., 1520 W.
Outcrop of fine grained hornblende rock. Terminates abruptly in bluff at W. end, bluff is 15 feet high. Outcrop is at W. end fully 45 paces wide, makes a ridge of 30 feet. Strike of lamination is here N. 87 E., dip about 50 W.

Specimen 649. Section 20, 47, 30. 1250 N., 1745 W.
W. end of outcrop of hornblende rock, continuation of outcrop before seen. Is not as much sheared just at this point.

Specimen 650. Section 20, 47, 30. 1175 N., 1750 W.
Test pit, not ledged, outcrop 10 feet across, of sheared hornblende rock. Strike of foliation which is twisted is mostly S. 70 E., dips low may be flat.

Specimens 651 & 652. Section 20, 47, 30. 1040 N., 1750 W.
Outcrops of sheared rock, a mica quartz schist. Foliation of southerly outcrop strikes N. 60 E., dip hard to determine, 652. Strike of northerly outcrop N. 65 E., dip about 40 W., 651. Correlated. Running E. on 1/4 line outcrop 652.

Specimen 653. Section 20, 47, 30. 1080 N., 1000-1063 W.
Outcrop of granite on N. slope of hill. Is foliated apparently in 2 directions, one more prominent. This one is about parallel to trend of ridge, which is nearly E. & W., dip about 60 N. Sun too low to determine strike.

Specimens 654 & 655. Section 20, 47, 30. 1100 N., 1000-1025 W.
Outcrop of much sheared rock, 15 feet wide. Foliation strikes N. 70 E. and dips 40 N. Rock is of 2 kinds, coarse and fine. Fine is apparently included in coarse in irregular patches. 654 is coarse; 655 is fine.

Specimen 656. Section 20, 47, 30. 1310 N., 1750-1760 W.
Outcrop of hornblende rock, 8 paces wide. Rock is fine grained not schistose.

Specimen 657. Section 13, 47, 31. 45 N/, 815 W.
Outcrop of graywacke quartzite, this outcrop is about 10 paces square, saw nothing should call real bedding. On weathered surface paralel fissures strike just about N. & S., dip about vertically.

Specimen 658. Section 13, 47, 31. 28 N., 825 W.

Another outcrop, 15 x 3 feet, E. & W. long axis. Rock has here contains flakes of a black mineral. Long axes of these strike about N. & S. and dip about vertically.

Specimens 659 A., 659-664 Section 13, 47, 31. 15-27 N., 260 W.

Outcrop about 5 paces across, of basic hornblende feldspar eruptive and quartzite. Contact between the 2 is irregular. It strikes roughly, N. 60 W., dips I think high to W., hard to tell. Have little doubt but contact is sedimentary and quartzite overlies greenstone. It is near the ontact a conglomerate, contains large fragments, 1 foot across of greenstone. Also pebbles of quartzite and granite. Still greenstone may be eruptive through the conglomerate or part of conglomeratic appearance may be due to brecciation. Greenstone may be large boulder. From irregular line of contact, and from general appearance of quartz there has evidently been much crumpling.

659 A. and 659, quartzite above contact; 660 granite pebbles; 661 A., 661 greenstone pebbles; 662 quartz pebbles; 663 greenstone near contact.

664 another piece of granite.

661 is pebble 1 foot across, at 6 feet above contact.

Specimen 665. Section 24, 47, 31. 1750 N., 820 W.

Outcrop probably. Rock is greenstone, hornblende and red feld spar, a basic eruptive.

Specimen 666-669. Section 19, 47, 30. 895 N., 130 W.

Is either a very siliceous band of magnetite actinolite schist, or else a piece of the upper quartzite. It is from the dump of the shaft at 105 S., 130 W. of E. 1/4 post of section 19, 47, 30. 667 is another piece. 668 is specimen of about the best ore from this pit. It shows replacement of old by new magnetite. This ore is said to be unprofitable for mining simply because it contains too much sulphur.. 669 is another piece of siliceous rock from same pit.

Specimen 670. Section 20, 47, 30. 1035 N., 1950 W.

Is a chunk of upperquartzite. Recomposed material from dump of pit which is N. 35, E. 50 of W. 1/4 stake of section 20, 47, 30 Chunk shows ore pebbles.

Specimen 671. Section 20, 47, 30. Not located.

Sheared greenstone containing garnets, from E. side of large cut at N. E. of W. 1/4 post. Rock grades upward into unsheared greenstone. This specimen is from near contact of greenstone and actinolite magnetite schist underlying it. At the contact is a vein of iron pyrite about 1 foot thick. Thickness of this sheared greenstone is about 20 feet.

Specimen 672. Section 19, 47, 30. Not located.

Is greenstone from an outcrop about 10 x 20 feet, 80 paces W. and 40 N. of shaft .

Specimens 673 & 674. Section 19, 47, 30.

Are from a boulder of Michigamme schist, which lies near the

road, leading S. from the magnetic mine, 673 is a piece of matrix with 2 nodules, 674 pieces of nodules.

Specimen 675. Section 2, 41, 30. 1965 N., 930 W.

Outcrop of granite, sheared. Foliation strikes about N. 45 E. and dips? A red granite. Hydro mica plates developed

Specimen 676. Section 2, 41, 30. 1960 N/, 1000 W.

Outcrop of greenstone sheared. Continuation of those seen to E. Strike N. 75 W., dip 80 N.

Specimen 677. Section 2, 41, 30. 1935 N., 1040 W.

Top of large knob of granite, like 675. Strike of foliation more pronounced. It is N. 80 E., dip 40 N.

Specimen 678. Section 35, 42, 30. 35 N., 775 W.

Outcrop of quartzite, peculiar looking. Inclusions of greenstone, not much foliated. Also at E. 60, N. 55.

Specimens 679 & 680 Section 35, 42, 30. 30 N., 890 W.

Contact of quartzite and greenstone, but a few feet long. Is crumpled or irregular. Not sure of strike and dip. Contact looks eruptive. Greenstone looks chilled, 679; quartzite may be hardened, 680.

Specimens 681 & 682. Section 35, 42, 30. 1100 N., 1075 W. 1100 W.

Top of knob of limestone. The rock is full of crystals of a bladed mineral. A parallel cleavage or jointing dips 60 N., and strikes N. 75 E. at W. end of outcrop.

Specimen 683. Section 35, 42, 30. 25 N., 1165 W.

Outcrops of quartzite. On E. about one foot across, other very small.

Specimen 684. Section 34, 42, 30. 720 N., 537 W.

Outcrop of limestone. Cleavage or parallel jointing strikes N. 80 E., dips 65-80 N.

Specimens 685-687. Section 31, 42, 29. 850 N., 990 W.

Ledge in side of hill, trends N. 92 W., is exposed for about 50 paces west and about 10 east. Rock is massive looking, very siliceous, a quartzite bedding not very apparent. Some fine bands near line at 1030 strike N. 5 E., and dip 73 N.

Specimen 688. Section 34, 42, 29. 930 N., 1000 W.

Good example of rock, in places it is softer, but softness appears to be due to weathering along shearing planes.

Specimen 689. Section 34, 42, 29. 960 N., 1000 W.

On line, same rock exposed. This rock outcrops in several places on hill top.

Specimen 690. Section 34, 42, 29. 1755 N., 1015 W.

Test pit, is ledged in ~~Cambrian~~ sandstone

Specimen 691. Section 34, 42, 29. 1825 N., 925 W.

Test pit, ledged in Cambrian sandstone.

Specimen 692. Section 34, 42, 29. 1800 N., 975 W.
Test pit, probably ledged in Cambrian sandstone.

Specimen 693 Section 34, 42, 29. 1760 N., 1000 W.
Rocks like 693 on dump, may be fragments of boulders, are mostly sub-angular, but ledge must be near as dump is all same rock.

Specimen 693 A Section 34, 42, 29. 1825 N., 925 W.
Is from near 691 Is q ite possibly boulder fragment. Taken because it shows the sandstone containing ore pebbles. These ore pebbles are very common in the drift. Hence suppose ledge from which they came, is nearby. Large boulder or outcrop at N 1850 W. 30 of 1/4 line contains them.

Specimen 694. Section 34, 42, 29. 1550 N., 1250 W.
Outcrop of Cambrian sandstone, bedding horizontal, rock yellow in color, friable, not conglomeratic.

Specimens 697, 685 A.698, 685 B. Section 31, 42, 29. 775 N., 1225W Test pit. This pit is sunk in very ferruginous drift material. The miners call it ore, and are looking for a hanging wall to the formation. The drift is underlaid by soft red and grey schists, micaceous. These are said to be dipping S. at an angle of 60 and strike S. W. 785 N., 25 E. test pit bottomed in these schists/ 697. (685 A. 697), show close plications, hence dip and strike given by miners probably refer simply to ledge as a whole, 698. (685 B. 698)

Specimen 699. Section 31, 42, 29. 1570 N., 1300 W.

Test pit on hill-side, exposing a coarse gritty, reddish schist The aparent bedding, which may be simply cleavage, strikes about N. 85 E., dips 47 N.

Specimen 700. Section 35, 42, 30. 0 N., 1585 W.

Top of hill, quartzite outcrop on top and face in bluff 30 feet high, obscurely banded, strikes E. & W.

Specimens 701 & 702. Section 30, 47, 30. 1000-1012N, 1150-1200 W.
Outcrop of crystalline schist some 30 paces long. Massive.
What appears to be a conglomerate structure in the centre, but
no sharp contact with the finer grained rock. Needle crystals
of hornblende more developed at W. end of outcrop. Main joining
about N. 10 E. of 70 W. Another jointing, less developed,
at right angles to this. Outcrop trends E. & W. dip 45 .
At 700 paces one part of the same rock shows on side of hill
to 730 paces. Here trends N. E. Chloritic blotches in the rock,
not parallel.

Specimens 703-705. Section 30, 47, 30. 1250 N., 1000-1200 W.
At 826 paces, outcrop of schist, about 60 feet high, cliff
face, stretches 30 paces S. and 45 paces N. Jointing N. E.
Dip 28 S. W. This rock strikes about N. 10 E. with steep dip
of 60 to the W. Ridge runs E. as far as 990 paces.

Specimen 706. Section 30, 47, 30. 1475 N., 1760 W.
Outcrop of greenstone.

Specimen 707. Section 30, 47, 30? 1700 N., 775 W.
Outcrop of the green schist, with large hornblende crystals
At 1196 outcrop of magnetite actinolite dike schist. Magnetite
bands are here locally disturbed.
Strike of magnetite bands N. 29 E., dip of magnetite bands 60 .

Specimen 708. Section 30, 47, 30. 1700 N., 775 W.
Just W. of this is a green schist, without the magnetite bands.

Specimen 709. Section 30, 47, 30. 1700 N., 775 W.
W. of this, 3 yards, is a more coarsely crystaline rock.

The magnetite rock has had a hole dug in it.

Specimen 710. Section 30, 47, 30. 1700 N., 700 W.

At 1275 paces, outcrop of the magnetite banded schist, strike of bands about N. 30 E. The bands here arenot perfectly straight but appear somewhat distorted. Dip 59 westerly. The rock here has the whitish appearance in places, it has 1/4 mile south where the line A. crosses it.

Specimen 711. Section 30, 47, 30. 1700 N., 250 W. Outcrop of granite, main jointing N. 42 E. with a of about 80 westerly, minor joints E. & W. and N. 37 W., but not all just parallel.

Specimen 712. Section 19, 47, 30. 100 N., 725 W.

At 1300 an outcrop 85 paces S., and 30 paces W.

Specimens 713-716. Section 19, 47, 30. 10-50 N., 450-500 W.

At 1500 paces, 107 paces S. and 18 W. Outcrop of magnetite actinolite schist. A shaft sunk in the outcrop and filled with water. Dip of bands 64 W., strike about 22 E. of N. Joints cross the strike, specimen 713 was from bottome of pit. E. of this for 8 feet is a green schist, coarsely crystalline, 714. E. for 3 feet 715. Then the banded magnetite schist again, after 2 feet. 716.

Specimen 717. Section 19, 47, 30. 40 N., 300 W.

At 1700 paces was at foot of granite ridge which trends about N. 20 E., cliff exposures on both sides of us N. & S.

Joints N. 20 E., with about 72, minor joints running N. 45 W.

Specimens 718 & 719. Section 30, 47, 30. 1250 N., 725-800 W. Banded rock with whiter matrix. Strike N. 24 E., dip 64 N. and W. Reaches to 292, where is another rock like non-banded at 1262 p paces. Reaches to 1300 paces, ditch runs off E. and a little S.

Specimen 720. Section 30, 47, 30. 1825 N., 1680 W, An outcrop of green schist, with many large hornblende crystals. 20 paces E. & W., 18 paces N. & S., massive, joints N. 20 E. and N. 75 W.

Specimens 721-723. Section 24, 47, 31. 1400 N., 0 W. Also outcrop of banded schist. Strike N. 4 E., dip about 81. E. but bands are wavy.

Specimen 724. Section 19, 47, 30. 1775 N., 1700 W. Outcrop, massive structure.

Specimen 725. Section 19, 47, 30. 1715 N., 1600 W. Massive rock, no structure. Ridge runs S. W. 17 paces, 10 paces wide.

Specimen 726. Section 19, 47, 30. 1775 N., 1040 W. Outcrop of 15 x 12 paces, massive.

Specimens 727 & 728. Section 19, 47, 30. 1730 N., 1000 W.

Specimen 729. Section 19, 47, 30. 1760 N., 990 W. Small outcrop, 25 paces S.

Specimen 729. Section 19, 47, 30. 1760 N., 990 W.
Massive outcrop. By typography and small outcrops, suspect it runs W. S. W. amd joins outcrop at 925.

Specimen 730. Section 19, 47, 30. 1785 N., 825 W.
Outcrop of massive greenstone, runs W. 10 N., 50 paces.

Specimens 731 & 732. Section 19, 47, 30. 1800 N., 510-590 W.
An outcrop of greenstone, 20 paces N., stretches 20 paces W. and 40 paces E. from 1-15 paces wide, massive. Specimen 731 at W. end, 732 at E. end of outcrop, trends E. 10 S.

Specimen 733. Section 19, 47, 30. 1710-50 N., 410 W.
Outcrop, 10 paces S., stretchs 8 paces S. , massive, makes a big bluff on shore of river.

Specimen 734. Section 19, 47, 30. 1790 N., 350 W.
Outcrop of greenstone, 5 paces N., trends E. N. E. and W. S. W. for 50 paces both ways. Massive rock. All these rocks are considerably jointed.

Specimen 735. Section 19, 47, 30. 1800 N., 200 W.
Large massive outcrop, trending E. N. E. about 95 paces, and W. S. W. about 30 paces.

Specimen 736. Section 19, 47, 30. 1785 N., 50 W.
Outcrop 7 paces N., runs N. E. about 30 paces, massive greenstone.

Specimens 736 A. & 737. Section 19, 47, 30. 1960-75 N., 500 W.
Outcrop 19 paces S. Trend about E. & W. or E. 20 N. 10 paces E.,

and 45 paces W. Joints most developed N. 45 E.

Specimen 738. Section 18, 47, 30. 5 N., 1250 W.

Outcrop 10 paces N., cleavage N. 19 E. and N. & S. Outcrop trends N. 5 W., outcrop 15 paces long.

Specimen 739. Section 19, 47, 30. 1995 N., 1300 W.

Outcrop, massive greenstone 25 paces every way. High at S. side and dissapears on a level with the soil on N. side at 810 paces. Outcrop 15 paces N., 20 paces wide and stretches N. 30 paces. Same rock as 739.

Specimen 740. Section 19, 47 30. 1910-75, N1,301450 W.

Outcrop of massive greenstone, stretches 85 paces to the S. W. 15 to 20 paces wide on the average. At 985 paces small outcrop of same rock.

Specimen 741. Section 19, 47, 30. 1950 N., 1600 W.

Outcrop 22 paces S., runs S. W., 40 paces long. Massive greenstone.

Specimen 742. Section 30, 47, 30. 580 N., 1890 W.

An outcrop of greenstone, massive. Outcrop is 70 pa ces N. of S. 1/16 stake on W. section line. Small outcrop.

Specimen 743. Section 30, 47, 30. 1700 N., 1860 W.

Outcrop of massive greenstone, 310 paces S., and 115 paces E. of corner. Outcrop trends about N. 43 E. is about 53 paces long and at most, 25 paces wide. Stands high with steepest side at W. Contains the large hornblende crystals.

Specimen 744. Section 35, 42, 30. 1996 N., 390 W.

Outcrop 40 paces long, quartzite, massive, vitreous, no structure visible.

Specimen 745. Section 35, 42, 30. 0 N., 980 W.

Outcrop W. of 1/4 stake.

Specimens 746 & 747. Section 35, 42, 30. 400 N., 425 W.

Outcrop around 480. Bands and cleavage strike about N. 85 W., and dip about 70 N. Specimens 746 & 747 are a crystalline limestone.

Specimens 748 & 749. Section 35, 42, 30. 1400-25 N., 260-325 W.

Outcrop N. 75 E., dips about at 65 N. In bed of river., specimen 748. 6 paces S. and 2 W. in bank is outcrop, dips 75 N., same strike.

Specimens 750-752. Section 35, 42, 30. 375 N., 740 W.

R. R. cut through limestone, strike N. 80 E., dip 64 N.

Specimen 753. Section 34, 42, 30. 885 N., 85 W.

Test pit ledged in marble, banded.

Specimen 754. Section 34, 42, 30. 1263 N., 2540 W.

Test pit probably ledged in specimen 754.

Specimen 755. Section 34, 42, 30. 1492 N., 10 W.

Outcrop of limestone, 5 paces long, 1 or 2 wide. Strike about

E. & W. If any dip, by the tremolite bands, is 10 to the S.

Specimen 756. Section 34, 42, 30. 945 N., 263 W.

Limestone , strike seems to be about N. 75 E., no dip is determinable. Small outcrop about 5 paces long and 3 across.

Specimen 757. Section 34, 42, 30. 775 N., 250 W.

Outcrop of limestone, 63 paces long, makes a cliff at S. end and is largely covered on top. Much tremolite developed in the rock. What evidence there is of a structure makes the strike N. 80 E. and the dip 76 N.

Specimen 758. Section 36, 42, 30. 200 N., 1275 W.

Is test pit ledged in quartzite. At 215 N., 1230 E. another test pit.

Specimen 759. Section 36, 42, 30. 200 N., 1230 W.

Test pit possibly ledged in 759.

Specimens 760-762. Section 36, 42, 30. 825 N., 1300 W.

Test pit, ledged specimen 760. At 826 N., 1325 W. is test pit ledged in same rock. The ledge is exposed at bottom of pit, which strikes N. 65 W. dips 63 N. At 850 N., 1250 W. is very deep shaft ledged in same material.

Specimen 763. Section 36, 42, 30. 1537 N., 1250 W.

Outcrop of 763. Strikes N. 85 W., dips 15 N.

Specimens 764 & 765. Section 36, 42, 30. 1750 N., 1275 W.

Limestone. Strikes N. 75 E., dip seems to be to the N. at different angles.

Specimens 766. Section 36, 42, 30. 910 N., 990 W.

Test pit ledged in specimen 766. There are a number of test pits round here which are ledged in same material.

Specimen 767. Section 36, 42, 30. 925 N., 730 W.

Test pit ledged in specimen 767.

Specimen 768. Section 36, 42, 30. 1020 N., 762 W.

Test pit bottomed in specimen 768.

Specimens 769 & 770 Section 31, 42, 29. 875 N., 1400 W.

Test pit bottomed in sandstone and ore, 769 sandstone; 770 ore.

Specimen 771. Section 31, 42, 29. 968 N., 1610 W.

Test pit, bottomedin ore.

Specimen 772. Section 31, 42, 29. 1058 N., 1480 W.

Test pit bottomed in ore.

Specimen 773. Section 31, 42, 29. 1120 N., 1445 W.

Three test pits, ore, all ore alike.

Specimens 774 & 775 Section 31, 42, 29. 990 N., 1485 W.

Test pit, Cambrian red sandstone and silicious ore. 774 sandstone; 775 ore.

Specimen 776. Section 31, 42, 29. 1135 N., 1510 W.

Small shaft 48 paces W. ledged in red sandstone and ore and light green light schist, probably top rock.

On logging road, test pit not ledged at 1625 paces, 60 paces E. shaft ledged in red sandstone and ore and conglomerate. At 1625 test pit ledged in sandstone. At 1640-87 shaft.

Specimens 777-779. Section 31, 42, 29. 1600 N., 1400 W.
On logging road, test pit not ledged at 1625 paces, 60 paces E. shaft ledged in red sandstone and ore and conglomerate. At 1625 test pit ledged in sandstone. At 1640-87 shaft. Went through at least 15 feet of red sandstone and struck the conglomerate. Specimen 777 sandstone; 778 conglomerate; 779 ore from shaft 1625-60 E. The sandstone appears to lie mainly horizontal.

Specimen 780. Section 31, 42, 29. 1555 N., 1505 W.
Test pit ledged in a ferruginous sandstone, the cleavage of which dips S. at a high angle, and strikes E& W.

Specimens 781 & 782.S Section 36, 42, 30. 950 N., 275 W.
Outcrop on N. side of R. R. track, 24 paces W. The red Cambrian sandstone seems to have been deposited unconformably on the limestone.

Specimens 783 & 784.Section 31, 42, 29. 690 N., 520 W.
Test pit ledged in Cambrian sandstone, which is very rotten. Seems to strike N. 80 E. and dip 17 N. Some ore pebbles in it, but pure sandstone under that layer.

Specimen 785. Section 31, 42, 29. 715 N., 520 W.
Test pit ledged in ore.

Specimens 786-788. Section 31, 42, 29. 737 N., 530 W.
Test pit ledged in limestone.

Specimen 789. Section 31, 42, 29. 765 N., 500 W.

Test pit, 30 feet deep. Drift about 11 feet deep. Dug into ore.

Specimen 790. Section 31, 42, 29. 1410 N., 495 W.

Trench 10 paces long, limestone possibly in place.

Specimen 791. Section 31, 42, 29. 110 N., 760 W.

Outcrop of quartzite, 6 paces W., 3 paces long by 1 pace wide, cleavage strikes N. 85 W. and dips 72 N.

Specimens 792 & 793. Section 31, 42, 29. 775 N., 720 W.

Outcrop of limestone. Tremolite bands strike N. 80 W, and dip 85 N. 27 paces E. and 1-20 across.

Specimens 794-796. Section 31, 42, 29. 820 W., 760 W.

Test pit ledged in red decomposed rock and ore. Red 794. Ore, 795 & 796.

Specimen 797. Section 31, 42, 29. 1737 N., 625 W.

Test pit ledged in sandstone

Specimen 798. Section 31, 42, 29. 1750 N., 615 W.

Test pit ledged in sandstone and quartzite slate. specimen 798 slate.

Specimen 799. Section 31, 42, 29. 1747 N., 250 W.

Outcrop

Specimen 800. Section 31, 42, 29. 1735 N., 289 W.

Outcrop 3 paces long, quartz pebbles in it. All sandstone. It shows in loose boulders in many places, lays about horizontal.

Specimen 801. Section 24, 47, 31. 1650 N., 825 W.

Greenstone.

Specimens 802-805. Section 24, 47, 31. 1500 N., 650 W.

Quartzite conglomerate. The strike is about N. 10 W., dip is very nearly vertical, inclined somewhat to the E., probably. The rock has both massive and pudding stone varieties. There are no pebbles more than half an inch in length. In some layers they are very closely packed. Blue a nd white quartz and feldspars. There are some pebbles of dark chert. Specimen 805 shows what is perhaps a jasper pebble.

Specimen 806. Section 24, 47, 31. 1560 N., 650 W.

The strike is N. 70-80 W., dip 70 E. Very good observation. This band is apparently nearer the crest of a northward plunging anticline. Abundant pebbles, dark chert. Some 2 or 3 inches across. Specimen shows one such.

Section 24, 47, 31. 1775 N., 750 W.

Quartzite very massive, smallexposure. Greenstone exposed just north of it. Relations not determinable. The greenstone outcrops at 1810 N., 750 W.

3408 Section 13, 47, 31. 10-15 N., 250 W.

This is a conglomerate variety described in Sandford's Notes. It is a true conglomerate with greenstone chert and feldspar pebbles. The contact with the greenstone on the N. side is exposed, cannot surely say what the nature of the contact is.

Strike of the pebble alignment is N. 18 W., but we may have here a north and slightly southerly pitching fold.

Specimen 809.. Section 36, 42, 30. 50-60 N., 1975 W. At corner 35, 36, 1 & 2, section 36, 25 paces E., 55-60 N. of south west corner. Massive vitreous quartzite eight paces E. & W. In section 2, south of the town line and W. 150 paces from corner, large outcrops of quartzite very similar to 809. These outcrops seem to mark a fold, presumably an anticline. There are indistinct traces of little easterly pitching folds in the quartzite as shown by bands of different color and particularly by diverging lines of breaking. Through the rocks run corrugated surfaces on which mica has grown.

Specimen 810. Section 36, 42, 30. 325 N., 1965 W. Numerous outcrops of marble on top of this hill., on both sides of the line. White crystalline marble ca rrying large bladed crystals of a mineral that seems to be tremolite, which has a rather definite arrangement in parallel bands. Strike nearly E. & W. Dip to the N., at varying angles. A good observation on N. side of hill top is 70 to N.

Specimens 811-814. Section 35, 42, 30. 1032 N., 0- W.

At 1032 on the line between 35 and 36, a shaft has been sunk in garnetiferous schist, and in an irony siliceous rock which may be quartzite. The latter is cut by smal greenstone dikes. Strike is E. & W., nearly. Dip N. Specimens show all varieties.

Specimen 815.

Specimens 816 & 817. Section 35, 42, 29. 752 N., 1765 W.

Lower quartzite, very coarse and vitreous. This rock makes up the whole of this E. & W. ridge, and is very well exposed. Is very massive. One system of parallel planes dips S.; otherwise no structure. At 720 N., 1750 W., a small dike of coarse granite cuts the quartzite. Trends N. and S.

Specimens 818-821. } Section 35, 42, 29. 1888 N., 1350 W.
829-34. } All from the W. side of the River, at the dam.

Specimen 829. This specimen is from the S. W. side of the dam, section 35, 42, 29 and represents the coarse pegmatite granite that adjoins the muscovite biotite schists on the south. The gneises strike N. 85 E. and dip S. 66 . Exposed six to ten feet across strike, 30-40 along it. Very schistose and easily weathering. Regularly banded, bands up to one or two inches across. Granite is exposed S. of the schists. No gradual passage into them. Pegmatitic granite: schrift granit:--quartzes have that peculiar arrangement.

Specimens 822 & 823. Section 35, 42, 29. 1900 N., 1310 W.

These specimens are from the E. side of the river, just below the dam and are entirely similar to specimens that will be described farther on

Specimen 824. Section 35, 42, 29. 837 N., 1250 W.

Is from the lower quartzite. It strikes N. 50 E., and dips 20° to the S. It is exposed along the river for a distance of 25 paces to the east and to the W. for 150 paces , at intervals.

Specimen 825. Section 35, 42, 29. 12 N., 1200 W.

Is red gneiss, rather evenly foliated. The strike of the lamination is E. & W., the dip is vertical.

Specimen 826. Section 35, 42, 29. 240 N., 1250 W.

Gneiss.

Specimen 827. Section 36, 42, 29. 120 N., 1875 W.

Is from a rather massive greenstone dike, which cuts granite.

Specimen 828. Section 36, 42, 29. 300 N., 1850 W.

Granite, which occasionally shows movement. It varies in color from pink to grey; is rather fine-grained.

Near granite schists have irregular and apparently broken lenses of pegmatite. Specimen 830, shows schist at contact with granite. Specimen 831, shows a finer-grained variety of the schists. Specimen 832, shows a variety that is so thoroughly disintegrated that fresh specimens cannot be had. Specimen 833, comes immediately above the granite on the edge of the hill. It is a hornblende rock, very tough, probably a basic eruption originally; it shows the same pegmatite veins.

Specimen 834. The hill on the W. side of the river, 40 paces below the dam is made up on the E. face of a dark colored hornblende rock similar to 833. The mass of it consists, however, of rather fine-grained evenly laminated gneiss, red to grey in color. Strikes N. 85 W., dips 60-80 S.

Specimen 835. Section 35, 42, 29. 1925 N., 1515 W.

~~Oct. 5th, 1892.~~

Tremolite limestone; for the most part a massive tremolite rock with but little carbonate.

Specimen 836. Section 35, 42, 29. 1910 N., 1560 W.

Mica schist, similar to schists at dam. Here also overlies marble.

Specimen 837. Section 26, 42, 29. 30 N., 1487 W.

North of the N. line of 35 between the river and the north-west corner. We have N. of the line from 30 paces N. to the river many loose angular fragments and occasional outcrops of quartzite. Quartzite for the most part extremely coarse

and vitreous. Occasionally what appear to be very minute included kaolinized feldspars. Otherwise not distinguishable from the southern quartzite.

At 30 N. and 1820 W., S. E. corner 27, outcrop of lower quartz~~,~~ite striking E. and W. and dipping S. very high.

Specimen 839. Section 26-27, 42, 29. 30 N. of S. corner. The quartzite is found in angular fragments along the N. edge and along the N. slope of the hill some 30 paces N. of the corner. Ledge is evidently beneath.

Specimen 838. Section 26 & 27, 42, 29. 20 N. of S. corner. 20 paces N. of corner in a test pit is found a soft ferruginous rock. What the original material was cannot now say. Has a banded character, and in some specimens is a rather soft white mineral which looks like saussurized feldspar. The rock suggests somewhat the more disintegrated variety of the ~~gneisses~~ schists at S. end of dam in section 35. On the N. slope of this hill are many test pits all ledged in quartzites or quartz schists. In one, about 60 N. and 30 W. of corner, the material thrown out is a very iron stained mica schist, carrying the large muscovite plates seen at the quarry at the dam. It is difficult to see any difference between the two rocks except that of color.

Specimens . 840 & 841. Section 27, 42, 29. 150 N., 220 W. The same material is found in an old trench running S. in the N. slope of the hill. The dump overgrown with moss. The specimens show a progressive increase in the amount of infiltrated iron in a rock which in its freshest phase cannot be separated from the dam ~~gneisses~~ schists.

Specimens 842-844. Section 26, 42, 29. 40 N., 1720 W. About 280 E. of corner and 40 N. is a trench cutting through 10 feet of quartzite, etc. Strike N. 85 E., dip N. very high, nearly vertical. Aparently conformably interbanded with the quartzite, specimen 842, is the rock represented by specimens 843 and 844. It consists of quartz surrounding both irregular and rounded masses of a very soft white earthy substance. This substance hardens on exposed surfaces. When rock is freshly broken it falls apart into dust. I imagine that this white earthy material is the kaolinized remnant of old feldspar grains in the quartz, or it may be the remnant of granulated feldspars in a crushed granite. If the former it is the first time I have seen original feldspars or original material rolled of any kind in this quartzite. I finally regard them as pebbles; the quartzite has them in very small sizes and quantities:--see specimen 842, and from this they finally predominate over the quartz. Specimen show sequence. Can they have been originally partly kaolinized before inclusion in the quartzite? seems likely.

Specimens 845-861. Section 35, 42, 29. Dam.

Strike of the marble on E. side of the dam is N. 52 E. about. The strike is not constant and within the limit of the exposure changes to about N. 20 E. The mass of the rock strikes as above. Dip S. 38° to 40°.

The marble has very distinctly bedded layers of carbonate up to two feet or more in thickness and interbedded with these, layers of a green, easily disintegrating silicate. These layers are only roughly parallel, they thicken and thin and pinch out. They sometimes represent a lateral change in the marble. They are a serpentine-looking rock. Specimen 846 represents the coarsely crystalline marble. Specimens 846 and 847 represent the green silicate. At the S. end the marble is apparently cut by a dike the trend of which is S. 85 E. and the dip, as exposed in a pit for the dam, about 60 to the north. The contact of the dike with the marble has also been a surface of faulting which has taken place after the intrusion of the former. Edges of the limestone are bent up, and both rocks, the dike particularly, are thoroughly shattered at the contact; the dike sends stringers into the marble. This fault zone is one of some mineralization:-- pyrites, red oxide of iron and silicates, with occasional large muscovite plates. Specimen 848, limestone from contact. Specimen 849 is the dike rock about one foot from the contact. Specimen 850 is the dike rock about four feet from the contact.

The division surfaces of the marble are corrugated and striated.

On the E. side of the river, about 20 feet below the dam next south of the dike, similar material, specimen 851 outcrops on path

20 feet farther south or just east of the cribbing of the discharge of the dam, the schist of specimen 852.

10-12 feet farther south the thoroughly crystalised mica schist of 853, which is succeeded by eight feet thickness of banded schists represented by specimen 854. The strike of all the above is N. 88 E. Dip S. 60-65 .

From this point south as far as exposures extend, on east bank we find mica schists very quartzose occupying the bank. They strike N. 88 E. and dip 60°, S. Interbanded with them are thin (nine or ten feet) of a dark mottled red and green soft schist which is perhaps a basic eruptive; its relations as to penetration, etc. cannot be determined as contacts are eminently zones of alteration. Specimen 855 represents about the most massive phase of this rock. As for the mica schists they are lower members of the same formation, the upper portion of which is in contact with granite, on the west side of the river. (See dam ~~gneisses~~ Schists on pages preceding).

The rock consists very largely of quartz with both muscovite and biotite and occasionally feldspar. In degree of shearing and fineness of fissile character it varies; but there is a tendency to more complete shearing and larger development of the micas as we go south and up. As to the original character of this sheared rock, specimen 856 which is from well up the river, will settle this point. It is the most massive variety found and unquestionably is the form from which the schists have been autoclasticaly developed. It looks like a granite, not more so, however, than much of the upper quartzite in the Republic trough. 857, 858 & 859 represent the more quartzitic phases and are from up the river.

Specimens 860 & 861. represent the more schistose phases, and are from down the river, or higher up in the formation. These schists are crenulated and pitch E. 15-20 . There is a well marked change in the dip in going up the hill. What is perhaps the beginning of a fold may be seen.

Specimens 862 & 863. Section 35, 42, 29.

Bridge over river on new road to Metropolitan.

25 paces N. of bridge, E. side river, quartzite, white, coarsely crystalline. The strike is N. 72 E., dip is uncertain. The only structural surfaces pitch E. and are wavy, but it is very doubtful if they represent bedding. Outcrop is small, not more than 20-30 feet across strike and is

below high water.

From this outcrop ran N. 70 E.; 75 paces; offset at right angles 20 paces to edge of swamp. At 86 paces N. 70 E., 20 S. Quartzite, massive; has striation lines on wall of exposure pitching E. about 20 . To about 120 N. 70 E., 20 S. continues, showing same easterly pitch. Evidently on or near a fold but rock has no bedding planes.

Specimen 864-867. Section 35, 42, 29.

At 125, N. 70 E., 60 S.

Is W. end of exposure of gneiss. Runs E. for 30 paces. The interior of the mass, 20 feet wide, appears to be very fine-grained granite, which may be a later dike. Specimen 864. Both N. and S. of the granite we have what appear to be but partly indurated quartzites, specimen 865 on the south, and 866 on the north. Striated surfaces seen in specimens on the north side pitch E. , south side pitch W. On north side the dip is N. 60 , and strike about N. 85 E. Specimen 867 shows contact from loose piece, unable to find it in ledge.

Specimen 868. (See 871, below.)

Specimens 869 & 870. Section 35, 42, 29.

Going W. 15 paces, another outcrop. Specimen 870 from this point shows a more vitreous character than the above and than specimen 869, which comes from a point a few paces farther north. At 870 the striations pitch west.

Specimens 871 & 868. Section 35, 42, 29.

Green schist and granite, entirely similar to rocks at S. end of dam.

Specimens 872-878. Section 35, 42, 29. 1200 N., 1250 W.

At bridge over Sturgeon River.

On W. shore under bridge and from 12-15 S., we get a calcareous rock striking N. 75 E. and dipping S. at a low angle. Specimens 872 & 873. Immediately above it comes a green schist which is barely exposed. Specimen 875.

Farther down stream the limestone is succeeded and underlaid by an extremely soft disintegrated rock consisting aparently of a green silicate which is soft and greasy under the fingers and is probably serpentine crystals and carbonate crystals. Carbonate layers and seams are parallel to the structure , also hard bands of tremolite rock. Specimen 874. Altogether analogous to the marble formation at the dam.

On the east side of the river, we have quartzite again, extending from about 30 paces south of bridge to 68 paces south. It forms a low outcrop along the water, running inland 10 or 15 paces at the N. end. On the water it is joined by the marble but what the dip is or nature of the contact is, we cannot say, except, that both walls, the quartzite particularly are much shattered. Specimen 876.

On W. side at 76 paces S, is a bluff from 22-30 feet high. At the bottom are rocks of marble series, mostly calcareous, greenish rocks containing an abundant and often predominating silicate with occasional layers of purer carbonate. Capped by Cambrian, horizontal. Specimen 877. Marble series here appears to be strongly plicated and on the whole to be nearly flat. This is more a general impression than an accurate observation. Now and then a layer can be followed for a few inches, showing the above state of things. The mass of the rock is pretty thoroughly broken up and disintegrated. Where strike of quartzite brings it across river, no outcrop. At first bend is a green schist. Specimen 878.

North of this--i.e. up river about 30 paces, are two patches of soft hematite, probably disintegrated schist:-- soft red mud. Up the river from the bridge I found the calcareous rock in the water almost to the east shore and striking directly for the quartzite. A probable cross fault.

Specimen 879. Section 35, 42, 29.

Is from the drift at the bridge. What is the nature of the jasper spots?

Specimens 880-882. Section 32, 42, 29.

East Groveland Mine.

The dump shows material which seems to be a ferruginous quartzite. Some of it is quite rich in iron. A very small stock pile shows

a very coarse ore, consisting of magnetite altered to martite. The shaft goes down vertically for 10 feet, then underlays to N. In all the so calles ores here, occurs a great deal of clear secondary quartz as well as cherty looking silica.

Specimens 883-886. Section 31, 42, 29.

These specimens represent the Groveland formation. They are essentially like the material at Michigamme mountain, only they are often richer in iron.

Specimen 887. Section 35, 42, 30.

Marble with tremolite from the river locality.

Specimens 888-895. Section 34, 42, 30.

200 paces N. of the fork in the roads is a group of nine test pits, which are all bottomed in the olive slates, except the northern one which is bottomed either in quartzite or in granite. From the bottoms of two or three of these pits, the ground has been explored with a diamond drill. Specimens 888-890 are from pit B. Specimens 891-894 are from pit A. Specimen 895 is from pit C. and is either quartzite or granite.

See sketch below.

Specimen 896. Section 33, 42, 28. 0 N., 1990 W.

Starting at the south corner between sections 32 and 33, 42, 28, and running N. on the section line. From zero paces along the line, both east and west, granite and gneiss with irregularly developed foliation. The structure indicates a pitch to the east of about 30. The dips observed are both north and south, and the dip planes are very wavy and irregular.

Specimens 897-899. Section 32, 42, 28. 730-735 N., 0-25 W.

Strike N. 30 W., dip N. E. very high.

Section 33, 42, 28. 740 N., 1970 W.

A trench exposes a very coarse Cambrian conglomerate; the pebbles consist of iron ore, limestones, mica schist and quartzite.

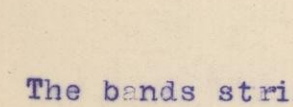
Specimen 900. Section 33, 42, 28. 1610 N., 1990 W.

A schistose greenstone.

34000

Specimens 901-905. Section 32, 42, 30. 890 N., 455 W.

On S. W. corner of a large outcrop of banded schist. Dark bands are biotite and silica, like rock near S. 1/4 post of 35. White bands are feldspathic and contain silica and muscovite. The bands are interlaminated very sharply. The white bands in places show large augen which pass out longitudinally into the black by interlamination, thus;



The bands strike N. 79 E., and dip 80-85 N. The dark bands seem to cut across the lamination of the white , axes in place, but this may be due to augen str cture in the white bands.

Outcrop is 63 N. & S. by 76 W. & E.

Specimens 906-908. Section 29, 42, 300n the M. & N. R. R.

Specimen 906, 1500 N. of S. line.

A large outcrop 50 paces wide.

Specimens 907 & 908. 900 N. on S. line.

Large outcrop of granite through which, R. R. cuts. Is 100 paces wide. Outside not sheared, parallel to several dikes, longest strikes N. 50 E., dips 75 S.

Specimen 908 A. 2, 41, 30. 1775 N., 800 W.

Outcrop of gneiss, cleavage planes strike N. 85 E. and dip about 70 N.

Specimens 909 & 910. Section 2, 41, 30. 1765 N., 850 W.

At S. W. corner of same ledge, 300 W., 210 S., same rock.

Cleavage planes may be somewhat crumpled. Strike N. 85 W., dip.

82 N. Some joint planes strike N. 10 W., dip 25 W.

Specimen 911. Section 2, 41, 30. 1815 N., 925 W.

Outcrop of schist. Strike is about N. 78 E., and dip 40 N. Between the well marked division planes of the cleavage, a finer crumpling is in some places visible. This fine crumpling is parallel to the cleavage, in cross section looks like this.

The pitch of the little crumples is about 15 W. Outcrop is about 20 feet long.

Specimens 912 & 913. Section 31, 42, 29. 730 N., 1100 W.

Test pit bottomed in limestone. Limestone is apparently banded, and contains tremolite.

Specimens 914 & 915. Section 32, 42, 29. 400 N., 300 W.

Ledge of granite, which probably underlies a knoll, here makes an exposure about 20 feet long and 5 feet wide. Rock is a gneiss rather than a granite. Strike of banding N. 76 W., dip 85 S. No. 914. This strike and dip probably not constant, few paces farther W., no well marked uniform strike or dip, No. 915.

Specimen 916. Section 32, 42, 29. 337 N., 275 W.

Outcrop of granite, 20 feet square. Is very low lying, but forms top of hill.

Specimens 917-920. Section 33, 42, 29. 1360 N., 30 W.

Test pit, ledged in ferruginous material. Rock is ferruginous

schist, limonitic rather than hematitic or magnetitic.

Specimen 921. Section 33, 42, 29. 380 N., 0 W.

Under upturned tree. Probable outcrop exposed in places, 10 feet by 20 feet. Rock is hornblende, feldspar. Eruptive looking. Longest axis of crystal strike about N. 80 W., dip nearly vertical

Specimen 922. Section 33, 42, 29. 365 N., 20 W.

Outcrop of much similar rock. It is banded coarse and fine. Coarse is like 921, fine like 922. Strike of long axis of crystals is parallel to contact, which strikes N. 72 W., dips 75 S.

Specimens 923 & 924. Section 33, 42, 29. 75 N., 20 W.

Top of hill, hill is formed by ledge of granite, which outcrops for 75 paces to W. of line. Rock is in places massive, in other places indistinctly banded or gneissoid, gneisseid type predominating.

Specimen 925. Section 33, 42, 29. 0 N., 125 W.

Outcrop of granite, continuation of ledge seen to E. Rock here as there is massive in places, in places gneissoid. Strike of banding or large axis of crystals as a whole is about E. & W.

Specimen 926. Section 33, 42, 29. 10 N., 290 W.

Low lying outcrop of hornblende rock, sticks out in some places in low knoll. Largest exposure on S. side of knoll near logging road. Longest axis of crystals strikes about E. & W.

Specimen 928. Section 34, 42, 29. 125 N., 250 W.

200 N. top of ridge formed of granite, rock outcrops in places.

30 paces E. of line, large outcrop and ground falls off. 35 paces W. same rock, granite is very massive.

Specimen 929. Section 34, 42 29. 325 N., 280 W.

Granite outcrop, forms bluff 10 feet high, about same as 928, 450 N., bluff runs E. over 75 paces, granite, specimen 929.

Specimen 930. Section 34, 42, 29. 675 N., 200 W.

Outcrop on N. side of valley, to near top of it, of quartzite, the lower quartzite. Is banded, bands strike about N. 60 W.

Specimen 931. Section 34, 42, 29. 750 N., 250 W.

Outcrop of quartzite, forms bluff 20 feet high and 70 feet long, on N. side of knoll. Outcrop not as distinctly banded as one on S. side.

Specimen 932. Section 34, 42, 29. 1150 N., 250 W.

At foot of a low sharp rise in the ground. Outcrop of Cambrian sandstone. Exposure but about 15 feet long, but in all probability in place. Rock is very friable, breaking up between th the fingers. More of same rock exposed about 40 paces W. on S. slope of rise of ground.

Specimen 933. Section 34, 42, 29. 1375 N., 200 W.

Many angular fragments of sandstone on the ground. Irregularity of ground also indicates that ledge is just below surface. At 90 E. ground breaks off suddenly, little sharp,fal of 5 or 6 feet. Possible exposureof rock in place.

Test pit ledged in ferruginous schist of Groveland type. E. a lean iron ore.

Specimen 934. Section 34, 42, 29. 700 N., 300 W.

Rounded faces of granite. Ledge probably, or else ledge just below surface.

Specimen 935. Section 33, 42, 29. 1370 N., 32 W.

Test pit ledged in ferruginous schist.

Specimen 936. Section 33, 42 29. 936 N., 25 W.

Tes pit ledged in limenitic material like deep shaft.

Specimen 937. Section 33, 42, 29. 1315 N., 58 W.

Test pit ledged in schist, coarse grained like some seen at E E. Groveland mine.

Specimen 938. Section 33, 42, 29. 1430 N., 30 W.

Test pit. Ledged probably in Cambrian sandstone.

Specimen 939. Section 33, 42, 29. 1450 N., 75 W.

Test pit ledged in the ore conglokerate at base of Cambrian sandstone.

Specimen 940. Section 33, 42, 29. 1390 N., 88 W.

Test pit ledged in limenitic jaspery rock like 936.

Specimen 941. Section 33, 42, 29. Test pit, ledged in the Groveland ferruginous schist. Some of the bands are finely laminated.

Specimen 942. Section 33, 42, 29. 1388 N., 100 W.

Pit ledged in same material but darker and more ferruginous.

Specimen 943. Section 33, 42, 29. 1400 N., 240 W.

Test pit ledged in ferruginous schist of Groveland type. E. a lean iron ore.

Specimen 944. Section 33, 42, 29. 1408 N., 240 W.

Test pit, ledged proabably in a micaceous ferruginous schist.

Specimen 945. Section 33, 42, 29. 1380 N., 80 W.

Test pit bottomed in same jaspery limenitic schist. Rock can be seen in place on side of pit. Strike is N. 87 W., dip 80 S.

Specimen 946. Section 33, 42, 29. 1345 N., 80 W.

Test pit, deep, ledged in rock like former, but more limenitic.

Specimen 947. Section 34, 42, 29. 1375 N ., 1980 W.

Test pit ledged in ferruginous micaceous schist, 947 like 944.

Specimen 948. Section 34, 42, 29. 1388 N., 1980 W.

Test pit ledged in Cambrian sandstone.

Specimen 950. Section 35, 42, 29. 325 N., 450 W.

Ledge of granite forms little bluff on S. side of river valley. Outcrop is over 50 paces long, and 15 feetshigh at W. end.

Specimen 951. Section 35, 42, 29. 50 N., 410 W.

Outcrop of gneiss, strikes almost E. & W., dips at high angle, 80 S.

Specimen 952. Section 35, 42, 29. 125 N., 75 W.

W. end of a ridge of gneiss, runs in direction parallel to general strike of banding which is N. 88 E. Ridge is 60 paces long, 15 wide, about 10 high. Dip of banding about vertical.

Specimen 953. Section 36, 42, 29. 13354N,,2250 W.

Outcrop on S. side of river valley of gneiss. Lamination of gneiss strikes about E. & W., dip is nearly vertical.

Specimen 954. Section 35, 42, 29. 475 N., 300 W.

Outcrop of granite in river bed.

Specimen 955. Section 36, 42, 29. 1337 N., 250 W.

N. side of a low ridge underlaid by a quartzose limestone; the calciferous. Rock is not in place, but numerous angular fragments indicate ledge is probably very near.

Specimen 956. Section 36, 42, 28. 675 N., 250 W.

Top of cliff, N. side of river valley. Rock outcropping along top of cliff and forming a bluff 10-30 feet high is calciferous limestone, like 955. Cliff runs almost due E. & W. Saw not trace of bedding. Runs W. over 200, E. over 100.

Specimen 957. Section 36, 42, 28. 560 N., 250 W.

Cliff breaks off more suddenly at 1460-10 E. Probable outcrop of Cambrian sandstone. Break in slope probably due to difference in weathering of sandstone and limestone.

Specimen 958. Section 36, 42, 29. 260 N., 250 W.

Another outcrop of gneiss, 20 feet square.

Specimen 959. Section 31, 42, 28. 185 N., 1975 W.

Outcrop of hornblende feldspar rock. Lost.

Specimen 960. Section 31, 42, 28. 660 N., 1990 W.

Foot of bluff 15 feet high. Is formed of horizontal bedded calciferous limestone, makes brow of valley.

Specimen 961. Section 31, 42, 28. 1150 N., 1775 W.

Outcrop of the calciferous limestone, horizontally bedded. Outcrop is about 30 paces long. Runs to 50 W. of our line.

Specimen 962. Section 31, 42, 28. 675 N., 1750 W.
Test pit ledged, also trench. On dump of trench are angular fragments of a ferruginous schist. The trench may or may not be ledged in it. Trench is about 15 paces long.

Specimen 963. Section 31, 42, 28. 600 N., 1765 W.
Test pit, ledged in Cambrian sandstone.

Specimen 964. Section 31, 42, 28. 320 N., 1750 W.
Top of knob of granite, runs down to edge of river.

Specimen 965. Section 31, 42, 28. 175 N., 1725 W.
Outcrop of gneiss. Lamination strikes about E. & W.

Specimen 966. Section 31, 42, 28. 300 N., 1825 W.
Outcrop of gneiss, forms knob on bank of river, is 65 x 40 paces, trends E. & W.1740 in valley.

Specimen 967. Section 31, 42, 28. 100 N., 1750 W.
Top of a ledge of granite, makes brow of a valley to S. Ledge outcrops in places for over 100 paces E. of our line.

Specimens 968 & 969 Section 31, 42, 28. 100 N., 0 W.
Outcrop of red granite and grayish gneiss or granite, cannot say which cuts which, contact irregular. Red 968; gray 969.

Specimen 970. Section 32, 42, 28. 450 N., 1950 W.
Granite outcrop, 20 to 30 paces wide.

Specimen 971. Section 31, 42, 28. 725 N., 37 W.
Ledge of granite, fine-grained makes a long outcrop on N. side of little valley.

Specimen 972. Section 31, 42, 28. 740 N., 62 W.

Ledge of hornblende rock, a basic eruptive cutting the granite in an irregular N. W. and S. E. direction.

Specimen 973. Section 31 ,42, 28. 1825 N., 215 W.

Angular pieces of sandstone, some very large. In drift on the slope at this place. Some of them may be in place. At 40 E., 180 S. The sandstone possibly dips 10 N., strikes N. W.

Sped men 974. Section 31, 42, 28. 1825 N., 215 W.

Rock contains apparently conglomerate bands; bands may not be of same ledge however, as cannot be sure the rock is in place. These bands with ore pebbles are evidently what lead to test pitting.

Specimen 975. Section 31, 42, 28. 890 N., 240 W.

Foot of hill S. of R. R. Ledge of granite makes outcrop here. Runs over 50 paces to W. of our line. 50 W. at foot of hill rock is fine grained, reddish.

Specimen 976. Section 31, 42, 28. 800 N., 225 W.

Outcropping at intervals to E. & W. of here is hornblendic rock, a thick fold. Dike, probably about 50 feet across.

Specimen 977. Section 31, 42, 28. 745 N., 270 W.

About highest part of hill. Rock forming greater part of it is a fine-grained greyish granite in places a gneiss. This rock is cut by intrusions like 976, all strike nearly E. & W.

Specimen 978. & 979. Section 31, 42, 28. 680 N., 280 W.

Large outcrop of granite and an intrusion. outcrop fully 40 paces

wide, 100 long. Intrusion is fresh, not a schist. At 1230 contact of intrusion and granite can be seen. Specimen 978. Strike of contact is almost E. & W. Middle of intrusion is like 979.

Specimen 980. Section 31, 42, 28. 500 N., 275 W. Outcrop, of an intrusion, contact. Strikes nearly E. & W.

Specimen 981. Section 31, 42, 28. 350 N., 260 W. Outcrop of granite, a rounded knob. Rock most of it like that seen before farther N., but a portion of outcrop on N. side is coarsely grained, contact not well defined.

Specimens 982-984. Section 32, 42, 28. 15 N., 1475 W. Outcrop of medium grained, pinkish gneiss, cut by some old much altered eruptives. Eruptives probably strike about E. & W. Are not over a few feet thick. Exposure not large. Gneiss is like 982, eruptive is like 983. Along the contact the gneiss has been corrugated and penetrated by stringers of the eruptive. Farther to N. E. at N. 50, E. 50 outcrop forms a bluff 10 feet high; corrugations at contact pitch nearly vertically.

Specimen 985. Section 32, 42, 28. 50 N., 1500 W. Outcrop of gneiss, well marked foliations, is cut by E. & W. striking intrusion much altered. Gneiss and intrusion both foliated, about parallel, foliation is not parallel to contact, in places as contact is not straight but jagged.

Specimen 986. Section 32, 42, 28. 175 N., 1500 W.
The creek here flows over an outcrop of intrusive rock similar to 983. To W. of line this intrusive can be seen cutting the gneiss over a large area. The gneiss is frequently included in the intrusive in irregular patches or thin strings; some of the patches are 3 feet across, 40 feet long or so. At 200 paces, an intrusive outcrops to W. of line, is at least 25 paces thick. A specimen of it is 986.

Specimen 987. Section 32, 42, 28. 375 N., 1510 W.
On top of outcrop of intrusive. Much like 986 but not so strongly foliated. It is at least 15 paces wide. To W. can be seen cutting gneiss.

Specimens 988-990. Section 32, 42, 28. 1420 N., 1465 W.
Top of ridge. Outcrop of limestone runs paces E. of line and W. of it. Strike of it or strike of tremolitic bands and seams filled with new quartz is N. 85 E., dip about 75 N. Limestone has a very striking appearance on weathered surface from amount of siliceous material in it. It is in places a siliceous rather than a lime rock.

Specimens 991 & 992. Section 32, 42, 28. 1410 N., 1575 W.
At W. end of ridge 2 pits. Limestone contains less quartz and much more friable grains. Specimen 992 looks almost as if it might be a lime and sand rock of Cambrian age. But too, little of it is exposed to be sure. It probably is not Cambrian.

Specimens 993-995. Section 32, 42, 28. 1587 N., 1495 W.

A deep shaft ledged in Cambrian ore conglomerate. specimens 993, 994 & 995.

Specimen 996. Section 32, 42, 28. 1620 N., 1487 W.

Possible outcrop of ferruginous ore, sand and pebbles fill crevices in it. It may be simply a very large boulder., on edge in the Cambrian conglomerate. Strikes about E. & W., dips 60 N.

Specimens 997 & 998. Section 32, 42, 28. 1590 N., 1560 W.

Test pit ledged in ore conglomerate or possibly in ferruginous schist. Material on dump is conglomerate and much broken up fragments of schist. Is schist of Cambrian age?

Specimen 999. Section 32, 42, 28. 1560 N., 1550 W.

Outcrop 20 feet square of ore conglomerate, is so well recemented as to give the appearance of a Huronian rock, contains patches and stringers of friable sandstone. An apparent bedding of jaspery rock strikes about E. & W., dips 50 S. S. W. corner of outcrop is plain Cambrian conglomerate. Think the apparent bedding may be a cross bedding, as the jaspery bands do not have a vertical extent of over 3 feet, then become flat and die out. Bands are about 3 inches thick, several of them. specimen of bands 999. The bands are capped by a nearly horizontal layer containing thin seams of friable sandstone. Am not sure but jaspery bands may be in a large boulder. Rock is well cemented.

Specimen 35000. Section 32, 42, 28. 925 N., 1750 W.

Old much altered dike, like 977, about 10 feet thick, here is farthest N. of the granitegneiss area. It strikes and foliation planes strike about E. & W.

36000

Specimen 1. Section 31, 42, 29. 625 N., 50 W.

Test pit ledged in sandstone.

Specimens 2-5. Section 32, 42, 29. 405 N., 1855 W.

An old mine. Shaft almost full of water. Over 10 feet of quartzite exposed in shaft. Quartzite and ore which is largely composed of hematite are on the dump.

Specimen 6. Section 32, 42, 29. 0 N., 1535 W.

Outcrop of granite.

Specimens 7-9. Section 32, 42, 29. 445 N., 1500 W.

Test pit ledged in quartzite, 7; a much altered schist, 8; and in places it looks as if ore was concentrating, 9.

Specimens 10 & 11. Section 32, 42, 29. 1540 N., 1200 W.

Old test pit, with nothing on dump but sandstone, 10, and one piece of a crystalline rock, 11.

Specimen 12. Section 32, 42, 29. 1500 N., 945 W.

Old test pit ledged.

Specimen 13. Section 33, 42, 29. 310 N., 1810 W.

Outcrop of gneiss. Strike of long axis of minerals is N. 84 W. Outcrop 10 paces long by 8 wide.

Specimen 14. Section 33, 42, 29. 200 N., 1500 W.

Outcrop of gneiss.

Specimen 15. Section 33, 42, 29. 540 N., 1265 W.

Outcrop of gneiss, 8 by 6 paces , large. Crystals strike N. 85 W.

Specimen 16. Section 33, 42, 29. 480 N., 940 W.

Outcrop of gneiss, 15 paces long.

Specimen 17. Section 3, 41, 29. 1950 N., 1810 W.

Massive outcrop of an eruptive rock, makes a little knob, about 25 paces E. & W. and 18 N. & S.

Specimen 18. Section 34, 42, 29. 425 N., 1635 W.

Massive outcrops of granite.

Specimen 19. Section 34, 42, 29. 425 N., 1475 W.

Outcrop of gneiss.

Specimens 20 & 21. Section 34, 42, 29. 280 N., 1500 W.

Outcrops of an eruptive rock and granite. The granite, 21, lies apparently on top. The contact is not exposed. Specimen 20 , eruptive rock.

Specimen 22. Section 34, 42, 29. 40 N., 1015 W.

Outcrop of gneiss, stretching 15 paces W.

Specimen 23. Section 34, 42, 29. 405 N., 1000 W.

More outcrop of gneiss and granite, stretching W. 30 paces .

Specimen 24. Section 34, 42, 29. 405 N., 1000 W.

Outcrops of hornblende eruptive . Massive, cleavage strikes about N. 87 W. and dips about vertically.

Specimen 25. Section 34, 42, 29. 430 N., 1225 W.

Ledge of granite, 20 paces long.

Specimen 26. Section 34, 42, 29. 60 N., 1175 W.

Outcrop of gneiss.

Specimens 27 & 28. Section 34, 42, 29. 50 N., 785 W.

Outcrops of granite, 27, and a hornblende eruptive, 28, which is apparently a dike.

Specimen 29. Section 34, 42, 29. 360 N., 750 W.

Outcrop of gneiss.

Specimen 30. Section 34, 42, 29. 740 N., 750 W.

Outcrop of quartzite. No structure visible.

Specimens 31 & 32. Section 34, 42, 29. 690 N. , 550 W.

Large outcrop of quartzite, stretching about 81 paces W. It is banded and the bands dip S. E. at 35 . The strike of the bands is about N. 60 E. But the bands are not constant, either in direction or dip.

Specimens 33,& 34. Section 34, 42, 29. 290 N., 525 W.

Outcrop of gneiss, 33, and granite, 34, grade into each other. Large exposure.

Specimen 35. Section 34, 42, 29. 190 N., 500 W.

Exposure of the hornblende rock.

Specimen 36. Section 34, 42, 29. 75 N., 500 W.

Outcrops of gneiss and granite.

Specimen 37. Section 35, 42, 29. 200 N., 1025 W.

Outcrop of Massive. Exposure 10 x 15 paces.

Specimen 38. Section 35, 42, 29. 315 N., 960 W.

Outcrop of granite.

Specimen 39. Section 35, 42, 29. 1335 N., 955 W.

Outcrop of quartzite. Small test pit just below it. Nothing

Specimen 40. Section 35, 42, 29. 100 N., 735 W.

Outcrop stretching 15 paces E. Granite.

Specimen 41. Section 35, 42, 29. 260 N., 775 W.

Outcrop of the hornblende rock and granite. The granite seems to be intrusive.

Specimen 42. Section 35, 42, 29. 1460 N., 725 W.

Test pit about 30 feet deep, could not get down it. Bottomed in sandstone.

Specimen 43. Section 36, 42, 29. 425 N., 1525 W.

Outcrop of rock, somewhat sheared. Crystalline. Planes seem to strike from N. 10 E. and N. 50 E. and dip S. 35 .

Specimen 44. Section 36, 42, 29. 375 N., 1500 W.

Outcrop of same gneissic looking rock, but not so much broken up. Here the planes strike about E. & W. and dip to the S.

Specimen 45. Section 36, 42, 29. 300 N., 1500 W.

Outcrop of granite. Massive. Stretches E.25Wpaces.

Specimen 46. Section 36, 42, 29. 185 N., 1500 W.

Outcrop with hornblende rock.

Specimens 47-50. Section 36, 42, 29. 175 N., 1050 W.

Large cliff of granite and gneis. Stretches 10 paces E. and 52 pas paces W. A dike runs through the outcrop at N. 85 E. Specimen 47 is of the granite. Specimen 48 is of the gneiss near the dike. Specimen 49 is of the dike at contact with granite.

Specimen 50 is of the centre of the dike.

The dike is 26 paces across and at S. contact dips N. at an angle of 77 . The bands in the gneiss are like the strike and dip of the dike.

Specimen 51. Section 36, 42, 29. 275 N., 1000 W.

Outcrop of the wavy gneiss, very micaceous.

Specimen 52. Section 36, 42, 29. 400 N., 1000 W.

Large gneiss bluff, 50 feet high. The crystals do not lie in planes which are parallel, but in planes which are wavy in places and parallel in other places, where they strike N. 85 E. In places there are little streaks of granite, which sometimes are lense shaped in the wavy portions. The bluff is 65 paces wide and 115 paces long.

Specimens 53, 53 A. & 54. Section 36, 42, 29. 400 N., 1000 W.

Along the S. shore of the river, running W. some 25 paces is quartzite, well banded. Strikes N. 86 E. and dips 84 N. It is possible that it is a phase of the much altered gneiss that is on the S. of it. Specimen 53 is the altered gneiss. Specimen 54 is the quartzite. South of this is gneiss, which seems to grade into 53 and 53 A.

Specimen 55. Section 36, 42, 29. 475 N., 1000 W.

On the N. shore of the river is the sandstone. It shows cross bedding. At the W. end it appears to dip N. at a high angle, while at the centre it appears to be nearly flat. There

are some conglomeratic layers that are made up out of granite and green material and some are large lumps of rock. Seems to strike N. 85 E.

Specimen 56. Section 36, 42, 29. 425 N., 1250 W.

Outcrop of gneiss, sttrikes N. 86 E., and dips from vertical to 20 N.

Specimens 57 & 58. Section 36, 42, 29. 325 N., 1225 W.

Outcrop of two eruptive rocks, where the light granite, 57, is the youngest. Parallel planes strike N. 90 E.

Specimen 59. Section 36, 42, 29. 315 N., 1285 W.

Outcrop of hornblende rock.

Specimen 60. Section 36, 42, 29. 315 N., 1775 W.

Specimen 61. Section 36, 42, 29. 437 N., 800 W.

On the S. shore of the river, quartzite is exposed in many planes.

Specimen 62. Section 36, 42, 29. 475 N., 800 W.

On the N. shore of the river nothing but sandstone outcrops. This lies either flat or dips slightly to the N.

Specimen 63. Section 36, 42, 29. 675 N., 700 W.

Outcrop lies flat. Is limestone.

Specimen 64. Section 36, 42, 29. 35 N., 520 W.

Outcrop of hornblende rock, massive.

Specimens 65 & 66. Section 36, 42, 29. 75 N., 460 W.

Granite and dike.

Specimen 67. Section 36, 42, 29. 200 N., 435 W.

Granite.

Specimen 68. Section 36, 42, 29. 275 N., 475 W.

Outcrop of the hornblende rock.

Specimen 69. Section 36, 42, 29. 650 N., 450 W.

Ledge outcrops for 60 paces E. It is probably silurian limestone and it lies flat. Some fossils in it.

Specimen 70. Section 36, 42, 29. 1725 N., 515 W.

A few small outcrops of the silurian. Lies flat.

Specimen 71. Section 31, 42, 28. 800 N., 1515 W.

Test pit ledged in specimen 71.

Specimen 72. Section 31, 42, 28. 715 N., 1500 W.

Test pit ledged in such ore as specimen 72. Seems to dip at a very high angle to the N.

Specimen 73. Section 31, 42, 28. 625 N., 1520 W.

Test pit ledged in ore, 73.

Specimen 74. Section 31, 42, 28. 600 N., 1350 W.

The sandstone, lying flat.

Specimen 75. Section 31, 42, 28. 500 N., 1375 W.

Small island, made of hornblende rock.

Specimen 76. Section 31, 42, 28. 460 N., 1515 W.

On small island, granite.

Specimen 77. Section 31, 42, 28. 350 N., 300 W.

On S. shore of river, hornblende rock, 77. Gneiss and a dike of the hornblende rock come in by section line.

Specimens 78 & 79. Section 31, 42, 28. 15 N., 1575 W.

No note.

Specimen 81. Section 31, 42, 28. 15 N., 1025 W.

No note.

Specimen 80 Section 31, 42, 28. 15 N., 1025 W.

Around the S. section line there is much gneiss. The lines in it are wavy and trend in the general direction from E. to N. 75 E. and dip about 90

Specimen 82. Section 31, 42, 28. 290 N., 975 W.

Granite with a dike of the hornblende rock, running through it about E. & W. Outcrop 15 paces N. & S. dike 8 paces across.

Specimen 83. Section 31, 42, 28. 400 N., 990 W.

Here and on slope S. of it is granite, a little outcrop of hornblende rock at the S. end of hill. No contact. On the top a little hornblende rock, dike runs about N. 88 E. Granite, 83.

Specimen 84. Section 31, 42, 28. 475 N., 1035 W.

Dike of hornblende rock runs E. & W. through the granite.

Specimen 85. Section 31, 42, 28. 1980 N., 1040 W.

Test pit ledged in the calciferous .

Specimens 86 & 87. Section 31, 42, 28. 400 N., 1275 W.

Granite, 87, with a hornblende eruptive, 86, that is like the dikes but the contacts are covered.

Specimen 88. Section 31, 42, 28. 250 N., 1300 W.

High ridge made by the eruptive hornblende rock.

Specimen 90. Section 31, 42, 28. 15 N., 835 W.

Outcrop of gneiss, wavy structure.

Specimen 91 & 92.

Specimen 91 & 92. Section 31, 42, 28. 60 N., 725 W,

Outcrop of gneiss, stretching E. Little dikes 20 paces wide running through it at N. 80 E. direction. The strike of the gneiss is in about the same direction. Specimen 91 is the dike. Specimen 92 is the gneiss.

Specimen 93. Section 31, 42, 28. 350 N., 750 W.

High knob of granite.

Specimen 94.& 95. Section 31, 42, 28. 575 N., 750 W.

Granite, 94. Just N. the hornblende eruptive strikes N. 85 E. ; 95.

Specimen 96. Section 31, 42, 28. 3000 N., 775 W.

Quartzite appears, Many loose fragments of it lying around. Can make out no structure.

Specimen 97. Section 31, 42, 28. 1815 N., 500 W.

Test pit, ledged in sandstone.

Specimen 98. Section 31, 42, 28. 1705 N., 475 W.

Test pit ledged in ore.

Specimen 99. Section 31, 42, 28. 837 N., 500 W.

No note.

Specimen 101. Section 32, 42, 28.

This specimen fairly represents the mixed iron formation which forms the top of the hill at Felch Mountain.

Specimen 102. Section 33, 42, 28. 1610 N., 1990 W.

From the same locality as specimen 900, above.

Section 33, 42, 28. 1800 N., 1750 W.

Are two test pits bottomedin material altogether similar to that which is seen north of or underneath the ore in the trench at the Metropolitan Mine.

Section 33, 42, 28. 785 N., 1463 W.

A trench running north and south for 17 paces. In the S. end is exposed Cambrian sandstone. It is a barely consolidated conglomerate containing many ore pebbles, and fragments of ferruginous slates. The fragments are all angular. The slate fragments often have polished surfaces showing rubbing. A test pit 785 N., 1420 W.; they have gone through the Cambrian sandstone into the marble. In another test pit, 785 N., 1420 W. have evidently not gone farther than the ferruginous conglomerate at the base of the Cambrian.

Specimen 103. Section 33, 42, 28. 1320 N., 1500 W.

An outcrop of schistose greenstone.

Specimen 104. Section 33, 42, 28. 925 N., 1240 W.
Is a test pit, near the forks of the road, probably bottomed in a ferruginous schist, soft and disintegrated. Don't know what it is.

Specimens 105, 106, 107 & 109. Section 33, 42, 28. 710 N., 1250 W
Is a bluff of marble on the east side of the road to the Calumet and Hecla Mine. The marble is white and very coarsely crystalline. The bedding is very indefinite; the parallel seams marked by tremolite, have a general northerly dip and E. and W. strike.

Specimens 105 & 106. On the south side of the marble at the foot of the bluff is quartzite in contact with it. The contact is undoubtedly foliated. Specimen of quartzite 109. Going north the marble becomes cherty. The cherty marble is exposed from 627 N. to 712 N. where it is overlaid by mica schist which dips N. at a low angle, and strikes E. & W. Specimen 107 represents the schists.

Specimen 108. Section 33, 42, 28. 637 N., 1070 W.
The specimen represents a hornblende schist which forms a knob at the foot of the steep granite bluff. This schist is undoubtedly an intrusive.

Specimen 110. Section 33, 42, 28. 62 N., 1000 W.
Is a bluff of white gneiss. The strike of the foliation is N. 75 W., the dip N. 40 .

Section 33, 42, 28. 146 N., 1000 W.

White gneiss strike N. & W. , dip N. 35-40 .

Specimens 111-2. Section 33, 42, 28. 600 N., 1000 W.

Beautifully plicated hornblende schist with pematite veins in the granite. The veins of pegmatite are beautifully folded, and the schist itself is probably an altered intrusive. A good locality to photograph. Specimen 111 is from the interior of the hornblende schists, 112 is from the contact with the granite.

Section 33, 42, 28. 1440 N., 1085 W.

Are three test pits ledged in the Groveland formation. At 1500 N. 1035 W. is a deep pit which passed into the ferruginous conglomerate at the base of the Cambrian.

At 1700 N., 1000 W. and beyond are to the north line of the section are very large granite boulders which have not travelled far.

Specimens 113 & 114. Section 33, 42, 28. 835 N., 750 W.

These specimens represent reddish ferruginous schists which are entirely similar to those overlying the limestone at the fault locality above. Here they are either in place or nearly so; in fact they make up the whole of this east and west ridge. These specimens represent a phase of them which closely ressembles feldspathic ferruginous quartzite.

Specimen 115. Section 33, 42, 28. 0 N., 750 W.

A coarse white granite gneiss.

Specimen 116. Section 32, 42, 28. 500 N., 500 W.

Biotite chlorite schist strikes N. 68 W. and dips 50 to the N. E. Rhomboidal cleavagesintersecting at a small angle.

Specimen 117. Section 32, 42, 28. 500 N., 552 W.

Coarse pegmatite granite, chloritic schists lie in contact with it to the north.

Specimens 118 & 119. Section 32, 42, 28. 485 N., 522 W.

A deep test pit from which flag ore has come.

Section 32, 42, 28. 500 N., 537 W.

Smalloutcrop of iron formation similar to the flat ores of the preceding specimens. It measures six feet along the strike and two or three across.

At 505 N., 537 W. chloritic schist, 8 feet along strike, 4 feet ac acros.

At 508 N., 537 W., granite, very coarse.

At 517 N., 537 W. garnetiferous schist.

Specimens 120-3. Section 32, 42, 28. 513 N., 540 W.

Granite measuring 12 paces E. & W., 5 N. & S.

Southbof the granite and in contact is biotite chlorite schists. On the N. side the granite cuts across the foliation of the garnetiferous mica schists of specimen 121. The granite itself is a coarse pegmatitic mass with enormous feldspar individuals.

On the weathered surface, areas of a square foot or more give a simultaneous flash. Specimens 122 & 123. The peculiar fissuring and recementing by quartz seen in specimen 122 is very characteristic of the whole exposure.

500-512 N., 554 W.

A small exposure of iron formation. The strike is N. 67 W., the dip is 60 to the N.

518 N., 554 W.

Garnet schist.

522 N., 600 W.

Garnetiferous schist, the strike is N. 75 W., the dip about 70-80 N. The rock is actinolitic and has one or two leaves or lenses of cherty material at this locality.

Specimen 125.

Just east is granite which runs to the south east for 40 paces and evidently cuts across the garnet schist.

555 N., 605 W,

Is a medium grained basic eruptive.

587 N., 600 W. the

The basic intrusive occupies all the north western side.

Specimen 127. Section 32, 42, 28. 607 N., 560 W.

Is banded garnetiferous, actinolitic schist. It is very strongly

plicated. The plications being frequently overturned to the south. The cleavage strikes N. 69 W.

Specimen 128. Section 32, 42, 28. 667 N., 600 W.

Is a knob of greenstone.

Specimen 129. Section 32, 42, 28. 530 N., 500 W.

We find garnetiferous schists very much crenulated.

Specimen 130. Section 32, 42, 28. 530 N., 437 W.

We find a banded rock going round the garnet schist on the east end of outcrop. Same cleavage goes through both.

Specimen 131. Section 32, 42, 28. 530 N., 400 W.

Pit in which the material thrown up is similar to 130, only with much more chlorite. On the north side of the pit, the iron formation forms the hanging wall. Dips N. 50-60 .

550 N., 400-410 W.

Iron formation essentially flat, pitches to the east, probably, though you can get it both ways.

556 N., 400 W.

Is a large outcrop with easterly pitch, dip on thewhole is to the south about 20 .

530 N., 300 W.

Is iron formation in test pit.

600 N., 500 W.

An outcrop of iron formation, strike N. 85 W. Dip is apparently south, but the rock is, without question, greatly plicated.

Specimen 132. Section 32, 42, 28. 618 N., 500 W.

The iron formation becomes very quartzitic and contains possible ore pebbles.

Specimen 133. Section 32, 42, 28. 645 N., 545 W.

Is garnetiferous schist, esposures 5 or 6 feet across and 18 feet along the strike. Immediately north is a knob of massive greenstone similar to 128. Specimen 133 is from a boulder. Is it conglomerate?

1725 N., 500 W.

Is a test pit ledged in mica schist similar to dam schists in section 32, 45, 29.

The red mica schists which are found overlying the limestone at the fault locality in section 32, 42, 28, striking N. 80 W. and dipping N. at a low angle, make up the whole of the ridge on which the Doctor's house is situated. They outcrop on the road on the slope of the hill east of the cemetery, on the raod farther west on the north slope of the hill between the two right angles, and in numerous test pits.

In one test pit beside the road on the Doctor's hill the schists by replacement become a mixed ore and the whole formation strongly disturbs the magnetic needle. In the railroad cut west of the railroad station at the E. village, the schists are well exposed and their occasional ferruginous quality well shown. At the west end of this cut on the E. 1/16 line of section 32, 42, 28, there is a distinctly marked turn of the formation to the north, showing a minor easterly pitching trough. Pitch is shown by corrugations at the east end and is about 10 . This turn in the strike is probably sufficient to carry them north of the granite gneiss exposed north of the railroad in section 32.

Granite dike on Felch Mountain. 10-12 feetwide. The sides of the contact do not show chilling. Magnetite in masses of crystals altered to martite has grown along the walls of the contact.

Specimen 135.

Shows the iron formation about 20 feet west of the contact and shows jasper eyes.

Specimen 136.

Shows superficial replacement of limestone by iron oxide under Cambrian in the large open cut described by Sandford in section 32, 42, 28.

The lower quartzite outcrops in section 29, 42, 28, on the

Floodwood road, just 900 paces N. of the quarter post, between 29 & 32.

The uper quartzite near the dam on Sturgeon River. Prof. Pumpelly's locality. Strike about N. 80-85 E., dip S. 70 .

The pebbles are of feldspar, granite, quartzite. The latter in certain bands are the most numerous. All types of the lower quartzite are represented.

Specimen 137.

Is from a quartzite pebble.

Specimens 138-140

Show other phases of the rock. There cannot be less than 500 feet thickness exposed.

Specimens 141 & 142. Section 34, 43, 31. 170 N., 900 W.

Outcrop of greenstone, which extends from 1170-1300 N., and 16 paces E. & W. It consists mainly of a massive aphanitic greenstone similar to specimen 141. About through the middle of the exposure runs a band of greenstone conglomerate, 20-30 feet wide. Strikes N. 35 W., and dips W. about 60 .,specimen 142.

Specimen 301. Section 32, 42, 28. 900 N., 750 W.
Just back of it is outcrop over 100 paces long of gneiss or gneissic granite. Grayish like that seen before.

Specimen 302. Section 32, 42, 28. 875 N., 1725 W.
Another intrusion, not so foliated as 35000.

Specimen 303. Section 32, 42, 28. 750 N:., 1750 W.
A very thick dike. Fresh not foliated. Strikes E. & W.
Makes bluff of about 30 feet on S. side, specimen lost.

Specimen 304. Section 32, 42, 28. 400 N., 1750 W.
Numerous exposures of gneiss and old intrusions, on either side of line. The gneiss is more foliated than farther N. and coarser textured. An intrusive striking E. & W. , rough on weathered surface.

Specimen 305. Section 32, 42, 28. 475 N., 1750 W.
Gneiss.

Specimen 306. Section 32, 42, 28. 300 N., 1725 W.
Large exposure of the gneiss, forms brow of valley.

Specimen 307. Section 32, 42, 28. 110 N., 1225 W.
From ledge at 115 paces, specimen 307. It will serve as type of much foliated gneisses here.

Specimen 308. Section 32, 42, 28. 340 N., 1215 W.
A bluff of gneiss, finer grained and less foliated than that to S.

Specimens 309 & 310. Section 32, 42, 28. 860 N., 1250 W.
Ledge of gneiss makes a low outcrop along foot of hill, gneiss is

grey. Is cut by a narrow dike, one of the old much altered ones. It cuts across the foliation of the gneiss. Foliation of dike is parallel to a coarse foliation or jointing in the gneiss, rather than to the fine, that of the alignment of the large axes of the crystals. Strike of gneiss, coarse foliation N.70 E. fine foliation N. 65 E. Strike of dike, fine foliation N. 45 E. Dike strikes perhaps E. & W.

Specimen 311. Section 32, 42, 28. 1085 N., 1190 W.

Outcrop of gneiss, forms here bluff, about 70 paces long. At this point 30 paces from W. cut, it is highest, about 20 feet high. Rock is well foliated, foliation wavy but striking in a general way N. 80 E.

Specimen 312. Section 32, 42, 28. 1125 N., 1125 W.

Outcrop of very siliceous gneiss, foliation irregular. In places rock looks almost as if it might be an altered feldspathic quartzite, but think is probably an igneous rock. Specimen 312 is more siliceous than most of it. Several small exposures one at point located, 20 feet square. Another about same size 20 paces W.

Specimen 313. Section 32, 42, 28. 1125 N., 1100 W.

Outcrop of a much altered eruptive. Outcrops in patches over an area 20 paces x 15 paces. Foliation strikes about N. 50 E. In places a few little crumples in the foliation. These I think plunge E. at a low angle.

Specimens

Specimens 314 & 315. Section 32, 42, 28. 1225 N., 1250 W. Outcrop on S. side of tram way cut at mine. Rock is very curious looking on weathered surface, evidently contains both quartz and calcite. Either a very siliceous limestone or a calcareous quartzite. Think it is much indurated base of Cambrian Outcrop is about 60 paces long. Saw nothing to show bedding. No well marked cleavage, 10 feet high just W. of where cross it.

Specimens 316-318. Section 32, 42, 28. 1250 N., 1300 W. Is an open with 2 test pits or shafts in it. On N. side of pit is exposure of rock limestone, banded. Strike of bands which are fine and may be due to infiltration along cleavage planes, is N. 80 E., dip 50 W. In immediate contact with limestone is material which was mined as ore. It is fine-grained conglomerate. Shows signs of bedding. Limestone with limonite adhering, 316. Conglomerate limonite material, 317. A more siliceous band about 6 inches thick, in the limonitic material, 318.

Specimens 319-326. Section 32, 42, 28. 1350 N., 1250 W.

Are from pits in this neighborhood.

Near E. end of large cut, in middle. Material taken out of cut is limonite. Bottom of cut is in general limestone. Surface of limestone is ~~very~~ smoothly rounded. Where limonite has been taken away, limestone makes knobs, 5-20 feet high. Almost look like roches Saw no glacial structure. Cut is about 100 paces long. Limonitic material is in general horizontal, but small crumples. These crumples are due to slipping of material to fill hollows in limestone floor more completely. The sides of the limestone knobs show slickensides, with vertical dip. Layers may also be cross bedded. 319 is coarse sandy limonite. 320 is finer, more compact, and conglomeratic. 322 is fine with conglomerate. Limestone is white, glistening, contains comparitively little tremolite, in general, is like 316. 323, curious looking material in thin angular lenses. Near large cut are 2 test pits, one ledged in limonite like 323, and the other in 322. E. of E. end of big cut are 3 pits, one ledged in conglomerate material like 321, the others ledged in limestone. A little W. are 2 pits, one deep, ledged in 320 & 322 and at bottom probably in limestone, the other ledged in 324. E. end of ridge covered with angular pieces of ferruginous schist. Rock breaks up under weathering freely. Saw but one small rock face that might be an outcrop, bands strike about N. 85 E., dip near 90. Test pit ledged in Cambrian conglomerate schist, 325.

rounded

326, limestone pebbles from material in deep cut.

Specimen 327. Section 33, 42, 28. 105 N., 10-40 W.

Ledge of gneiss makes an outcrop about 20 paces square on N. slope of hill. Rock is coarsely crystalline, well foliated. Foliation planes strike N. 71 W., dip about 40 N.

Top of bluff of same rock, which is exposed here in large outcrop and in patches to where just seen. Is exposed along top of bluff for nearly 100 paces W. of our line.

Specimen 328. Section 28, 43, 31. 2000 N., 850 W.

Outcrop of same coarsely crystalline strongly foliated gneiss, seen on run S. At this place, foliation strikes about N. 85 W. dips about 40 N.

Specimen 329. Section 28, 43, 31. 2000. N., 850 W.

Test pit ledged probably in a soft reddish green schist. Looks like an altered crystalline basic rock.

Specimens 330 & 33 Section 28, 43, 31. 2000 N., 860 W.

Test pit shallow, on dump fragments of rock like 329, also of soft entirely red schist, 320, and a harder more siliceous schist 331.

Specimen 332. Section 28, 43, 31. 1995 N., 900 W.

Test pit ledged in a soft red slate or schist.

Specimen 333. Section 28, 43, 31. 2000 N., 17776 W.

E/ foot of a rounded hill of greenstone. Rock is crystalline.

No cleavage nor well defined parallelism to longer axes of crystals

Specimen 334. Section 28, 43, 31. 2000 N., 2000 W.

E. foot of hill or rounded knob of greenstone, much like 333.

Specimen 335. Section 28, 43, 31. 1475 N., 500 W.

Top of a small ridge, runs from 0-50 S. of line, is underlaid by greenstone, like 333 but finer textured.

Specimen 336. Section 28, 43, 31. 1280 N., 325 W.

N. side of a ridge of greenstone over 150 paces long in N. W. and S. E. direction. Rock is finer grained than 334.

Specimens337. Section 28, 43, 31. 900 N., 1960 W.

Outcrop of greenstone on W. side of logging road, outcrops in places some distance S., at this point about 20 paces long. Rock is much like 331. An incipient cleavage, which may be a parallel jointing, strikes N. 10 W., dips about 75 N. Probable glacial structure, strike N. 70 E.

Specimen 338. Section 28, 43, 31. 1000 N., 2000 W.

On logging road, in narrow strip of dead cedar swamp, road is one seen at 1920. All along S. & W. sideof road from that point to here are exposures of greenstone. A big exposure forms bluff 25 feet high, 40 paces long. 15 paces S. at 2000, another froms forms large knob about 35 paces N. to S. foot of it. Outcrop to S. is fine-grained, like 338. Outcrop to N. is coarse like 333, 334, & 337.

Specimen 338 A. Section 28, 43, 31. 600 N., 1700 W.

Outcrop of greenstone, about 20 paces long, 10 wide, trends N. E. and S. W., is a pseudo conglomerate. Pseudo boulders are about a foot in diameter. 338 A. is sample of a boulder.

Specimen 339. Section 28, 43, 31. 600 N., 660 W.

S. end of a low knoll, here about 25 paces wide, wider and higher to N., on which greenstone outcrops. Rock so far as seen is fine textured, but crystalline, but no cleavage like 336.

Specimen 340. & 341 Section 33, 43, 31. 1995 N., 1935 W/

Small exposure Rock is either an agglomerate or pseudo conglomeratic phase of vesicular part of a lava flow. The pebbles are of a finely vesicular amygdaloid. The matrix is fine, without texture.

Specimen 342. Section 21, 43, 31. 475 N., 1500 W.

Top of low knoll, 35 paces, about, long, trending about N. E. & S. W. Rock underlaying it is probably a greenstone, at first sight rather fine-textured, but showing flashing crystal faces of drillage, occasionally nearly 1/2 inch long. Is not magnetic Don't think any well marked cleavage is developed, saw none.

Specimen 343. Section21, 43, 31. 500 N., 1900-2000 W.

Low bluff, 10 feet high, on which greenstone outcrops in places. In part rock may be like 342, but at W. cut, coarser grained, without large crystals of drillage, not magnetic. Saw no

cleavage, nothing to show structure. Rock outcrops on W. section line from 5-12.5 N. of where we came out, in places. Varies slightly in fineness of grain.

Specimen 344. Section 21, 43, 31. 1990 N., 1910 W.

Knoll, underlaid by greenstone. It runs about 10 paces S., 80 N. of line. Rock is coarser than 343, otherwise much the same.

Specimen 345. Section 16, 43, 31. 10 N., 1060 W.

Knob of greenstone.

Specimen 346. Section 16, 43 31. 1000 N., 1750 W.

Probable outcrop of greenstone. Rock differs slightly in appearance from outcrops seen before to-day. Is hardly as light looking on fresh surface. Seems to show an incipient cleavage, which strikes very nearly E. & W., and dips vertically.

Specimen 347. Section 16, 43, 31. 975 N., 1630 W.

Knob of greenstone. It extends from 350-750. Rock is coarser than 342. Not so even in texture as majority of outcrops seen to-day.

Specimens 348 & 349. Section 9, 43, 31. 1525 N., 825 W.

Top of a small knoll of greenstone. About 25 paces long E. & W. and 15 wide, N. & S. Rock is rather close textured. Has a soft look on fresh surface. Is fairly tough under hammer. Contains distinct cryst als of medium size of hornblende. Shows no well marked cleavage. 348.

At W. end rock seems to be fine-grained, harder looking. 349.

Specimen 350. Section 9, 43, 31. 1530 N., 740 W.

Outcrop about 30 x 10 paces of greenstone, varies in texturr. Finer about like 349, coarsest 350.

Specimens 351 & 352. Section 9, 43, 31. 1050 N., 1425 W.

Top of a knob of greenstone, 40 paces, about, long, E. & W., about 20 wide. Rock varies in texture. Is crystalline, but coarser and finer. N. end seems to be coarsest.

Specimen 353. Section 9, 43, 31. 1075 N., 1575 W.

Small outcrop of greenstone, 10 paces E. & W. by 5 N. & S. Rock is fine-grained aphanitic, cleavage strikes N. 45 W., dips about 50 S. Cleavage is irregularly developed. Is not regularly crumpled but is more strongly marked in some places than in others

Specimens 354 & 355 Section 9, 43, 31. 1025 N., 1725 W.

N. E. corner of a large outcrop of greenstone, much like outcrop just seen. 2 sets of joints or cleavage, apparently, by intersection having rock a conglomerate appearance. Strongercleavage strikes N. 35 W. Other, which is a rough jointing, strikes N. 75 E. Think rock is a true agglomerate. One sort of pebbles like 354, another, much less frequent, like 355. Outcrops runs about 35 S. at 1620, 255, and is about 10 S. & 10 E. of 1700.

Specimen 356. Section 26, 43, 31. 1000 N., 1980 W.

N. slope of a greenstone knob, medium texture, crystalline, no well marked cleavage or parallel jointing.

Specimen 357. Section 26, 43, 31. 1000 N., 1980 W.

Knob of greenstone, about 15 paces wide, and 20 long, N. & S. Rock varies, some parts almost as coarse as preceding, 356, finest is like 357. Joints strike N. & S. and N. 65 W.

Specimens 358 & 359. Section 31, 43, 30. 330 N., 1970 W.

Middle of a trench on S. slope of a rise in the ground. Trench has on dump fragments of red slate or schist. May or may not be ledged. Think ledge is very near surface at about middle of trench. Trench is about 25 paces long, runs up slope irregularly.

Specimen 360. Not located.

A specimen of the schist seen in drift.

Specimens 361 & 362. Section 3, 43, 30. 335 N., 1970 W.

This schist with blue quartz eyes was seen on dump of test pits on E. side of the section, 361 & 362. Test pit at N. end of trench is ledged in the schist in all probability.

Specimen 363. Section 31, 43, 30. 425 N., 1950 W.

Test pit probably ledged in Cambrian sandstone, indurated.

Specimen 364. Section 31, 43, 30. 405 N., 1970 W.

Test pit probably ledged in the schist.

Specimen 365. Section 16, 43, 31. 1570 N., 1575 W.

On low ridge, is swampy, much timber. Is underlaid by rock. Exposure about 10 x 5 paces, trending N. W. and S. E. , as does ridge. Rock is a greenstone, crystalline with very well developed and prominent crystals of the bisilicate.

Specimen 366. Section 16, 43, 31. 1600 N., 400 W.

Rounded knoll underlaid by greenstone. Rock rather fine-textured. crystalline.

Specimens 367 & 368. Section 9, 43, 31. 500 N., 1300 W.

A knob of greenstone. It trends N. & S. or perhaps N. W. and S. E. Is irregular in outline. About 100 x 75 paces. Rock at S. end is fine textured, much split, not exactly into parallel surfaces but Strike of cleavage is about N. 75 W. 20 paces N. rock is coarse textured , with no well marked cleavage. Fine 367, coarse 368.

Specimen 369. Section 9, 43, 31. 500 N., 1150 W.

Rock is coarse, crystalline, with possibly an incipient cleavage.

Specimen 401. Section 32, 42, 28. 100 N., 475 W.

Here wavy schist appears and trends about E. & W.

Specimen 402. Section 32, 42, 28. 60 N., 925 W.

Gneiss, has the wavy structure, strikes about N. 80 W. It plunges E. at about 30 .

Specimen 403. Section 32, 42, 28. 20 N., 950 W.

Just S. of this on the S. slope of the cliff, a dike of a hornblende eruptive occurs, strikes N. 81 W. Appears to dip about 90 but the contact exposure is poor. The schistose structure of this is N. 81 W. It also shows the same plunge, less plainly.

Specimen 404. Section 32, 42, 28. 475 N., 1000 W.

Specimen 405. Section 32, 42, 28. 750 N., 925 W.

Gneiss, so covered, cannot make out any plunge.

Specimen 406. Section 32, 42, 28. 1150 N., 900 W.

Outcrop of gneiss, hands strike about E. & W. and dip N. 88 .

Specimen 407. Section 32, 42, 28. 1140 N., 1000 W.

Greenstone, a schistose structure developed which strikes about E. & W. The rock seems to plunge E. at about 30 .

Specimens 408 & 409. Section 32, 42, 28. 1420 N., 1050 W.

Test pit, probably ledged in quartzite, 408, and ore, 409.

Specimen 410. Section 32, 42, 28. 1420 N., 1050 W.

Outcrop of limestone, appears to strike by cleavage, N. 80 E. and to dip about 40 N.

Specimen 411. Section 32, 42, 28. 1550 N., 925 W.

Outcrop of an eruptive rock. No structure visible.

Specimen 412. Section 32, 42, 28. 1700 N., 840 W.

Ore outcrop, seems to be largely hematite, strike about N. 88 E. and dips 75 N.

Specimen 413. Section 32, 42, 28. 1720 N., 975 W.

Open pit. Ore dips 70 S. and strikes about N. 75 W.

Specimen 414. Section 32, 42, 28. 1725 N., 750 W.

Test pit, ledged in "ore" or quartzite.

Specimen 415. Section 32, 42, 28. 1350 N., 755 W.

Test pit, ledged in decomposed rock.

Specimen 416. Section 32, 42, 28. 710 N., 725 W.

Outcrop of granite.

Specimen 417. Section 32, 42, 28. 220 N., 750 W.

Gneiss, strikes N. 82 W.

Specimen 418. Section 32, 42, 28. 150 N., 450 W.

The gneiss strikes N. 85 W.

Specimen 419. Section 32, 42, 28. 240 N., 385 W.

The hornblende eruptive occurs at 200.

Specimen 420. Section 32, 42, 28. 1025 N., 450 W.

R. R. cuts through some red micaceous schist. At W. end of cut the schist strikes N. 45 W. and dips about 35 N. E.

At other end of cut the strike is more E. & W. and the dip changes every few feet. The outcrop is about 90 paces long.and

is very much weathered and apparently loose at E. end. Specimen 420 seems to pitch S. at10

Specimen 421. Section 32, 42, 28. 1585 N., 425 W.

Greenstone, massive.

Specimen 422. Section 32, 42, 28. 1650 N., 425 W.

Ore.

Specimens 423-425. Section 32, 42, 28. 1725 N., 375 W.

Two test pits or small shafts. Show on dump 2 ores and a marble.

Specimens 426-428. Section 32, 42, 28. 1750 N., 150 W.

Open pit. The rock appears to dip S. 55 , and to strike about E & W. The pit is full of water.

Specimen 429. Section 32, 42, 28. 1650 N., 250 W.

Outcrop of the "ore" or quartzite. Strikes N. 85 E., and dips about 90 .

Specimen 430. Section 32, 42, 28. 1650 N., 275 W.

A dike of granite. The dike runs N. 40 W. and is 12 feet wide.

Specimen 431. Section 32, 42, 28. 880 N., 250 W.

Test pit ledged in a ferruginous quartzite.

Specimen 432. Section 32, 42, 28. 500 N., 250 W.

Outcrop of fine-grained gneiss.

Specimen 433. Section 32, 42, 28. 1025 N., 450 W.

From a quartzitic layer in the R. R cut.

Specimens 434, & 435. Section 32, 42, 28. 1750 N., 540 W.

From a test pit , N. of the hill of "ore" or quartzite

Specimen 436. Section 32, 42, 28. 1600 N., 475 W.

From the greenstone just S. of the same hill

Specimen 437. Section 27, 43, 31. 1925 N., 325 W.

Outcrop of greenstone, runs N. of W. and S. of E. 30 paces long, by 20 Wide. Very fine-grained and tough under the hammer.

Specimen 438. Section 27, 43, 31. 1950 N., 500 W.

Outcrop of same greenstone. Outcrop runs N. 85 W., 30 paces wide and 100 paces long in a ridge, rock outcropping here and there, more coarsely crystalline than greenstone E.

Specimen 439. Section 27, 43, 31. 1525 N., 300 W.

Outcrop of greenstone. The knob is 70 paces long by paces wide, with rock outcropping in several places. Fine-grained.

Specimen 440. Section 27, 43, 31. 1500 N., 150 W.

Outcrop of gneiss and ore about 30 paces E. & W. and about 40 N. & S. Fine-grained. ?!

Specimen 441. Section 27, 43, 31. 1125 N., 0 W.

Outcrop of greenstone stretches S. 40 paces and 40 paces E.

H. N.- 4

Specimen 442. Section 27, 43, 31. 1000 N., 250 W.

Outcrop of greenstone. H. N.- 4 E., D. - 21 .

Specimen 443. Section 27, 43, 31. 1000 N., 250 W.

Outcrop of greenstone, 25 paces E. & W. and 40 N. & S. It is similar to the other greenstone outcrops.

Specimen 444. Section 27, 44, 31. 500 N., 1750 W.

Outcrop of greenstone. Tough under the hammmer, medium grained.

Three or four other small outcrops of same rock, within a hundred paces, this is farthest W. D.-21 H. N. 2 E.

Specimen 445. Section 27, 44, 31. 400 N., 825 W.

Outcrop of greenstone, extends in several outcrops 65 paces S. H. N.-3 E. D.- 21 . Medium grained.

Specimen 446. Section 27, 44, 31. 500 N., 800 W.

Outcrop of fine-grained greenstone. Outcrop 10 x 10 paces. 20 paces S. of the larger outcrop of same rock.

Specimen 447, Section 27, 43, 31. 550 N., 325 W.

~~Some outcrops of the same fine-grained greenstone.~~

Outcrop of the medium grained greenstone.

Specimen 448. Section 27, 43, 31. 150 N., 700 W.

Several out crops of greenstone, stretching E. & W. not over 150 paces and N. about 100 paces. Fine-grained.

Specimen 449. Section 22, 43, 31. 1420 N., 1450 W.

Small low outcrop of fine grained greenstone witha very irregular cleavage, developed, which strikes a little E. of N.

E. of this is some fine-grained greenstone, massive. D. -21 H. N. 4 E.

Specimen 451. Section 22, 43, 31. 1450 N., 1325 W.

Outcrop of greenstone, about 15 paces each way. Massive. H. N. 4 E., D. 21 . Very tough, large crystals of actinolite in it.

Several other outcrops of greenstone between and S. of those mentioned.

Specimen 452. Section 22, 43, 31. 1525 N., 325 W.

An outcrop of greenstone rises out of the swamp.

Specimen 453. Section ~~22~~ 15, 43, 31. ~~1600~~ 50 N., 430 W.

Massive greenstone outcrop. Fine-grained. 25 paces across knoll.

Specimen 454. Section 22, 43, 31. 2000 N., 930 W.

Outcrop of massive greenstone, 40 paces long.

Specimen 455. Section 22, 43, 31. 2000 N., 950 W.

Outcrop of greenstone in the swamp, 30 paces long.

Specimen 456. Section 15, 43, 31. 1500 N., 1200 W.

Outcrop of greenstone, massive and fine-grained, 25 paces E. & W.

30 paces N. & 40 paces S. D. 24 . H. N. 6 E.

Outcrop not continually exposed.

Specimens 34677 Granite
34826 Gneiss
34872 Gneiss
36407 Hornblende-schist.

Analysis No. 1721

From Felch Mt. Iron

H. N. Stokes, Dec. 9, 1897

	34677	34826	34872	36407
SiO_2	76.10	74.37	64.71	50.36
TiO_2	.07	.07	.72	1.77
CO_2	none	none	none	none
P_2O_5	.02	.01	.02	.20
Al_2O_3	12.95	13.34	16.43	13.26
Cr_2O_3 Fe_2O_3	.65	.92	1.83	6.30
FeO	.09	.21	3.84	9.34
MnO	trace	trace	trace	trace
NiO CaO	.12	.50	.08	7.85
MgO	.14	.27	2.97	5.55
K_2O	6.50	6.70	5.63	1.14
Na_2O	2.36	2.50	.11	2.11
H_2O at 110°	.17	.12	.31	.16
above 110°	.48	.44	2.79	1.55
	99.65	99.45	99.44	99.59

Ba Sr Li Cl S SO_3 ~

Specimens 34878 Granite
36081 Granite
36058 Gneiss
36080 Gneiss
} Analysis No. 1711

Telluride Mt. tongue F. W. Stokes, Aug. 14, 1897

	34878	36058	36080	36081
SiO_2	72.17	71.79	74.63	69.69
TiO_2	.27	.35	.09	.29
Al_2O_3*	14.44	14.79	13.95	15.64
Fe_2O_3	1.02	1.10	.35	.90
FeO	.99	1.09	.32	1.62
CaO	.69	1.11	1.08	1.72
MgO	.70	.71	.12	.66
K_2O	4.84	3.79	6.73	5.30
Na_2O	3.65	4.29	2.55	3.34

* Includes P_2O_5