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Marquette region, vicinity of Ishpeming, Michigan. No. 123 1891

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1891

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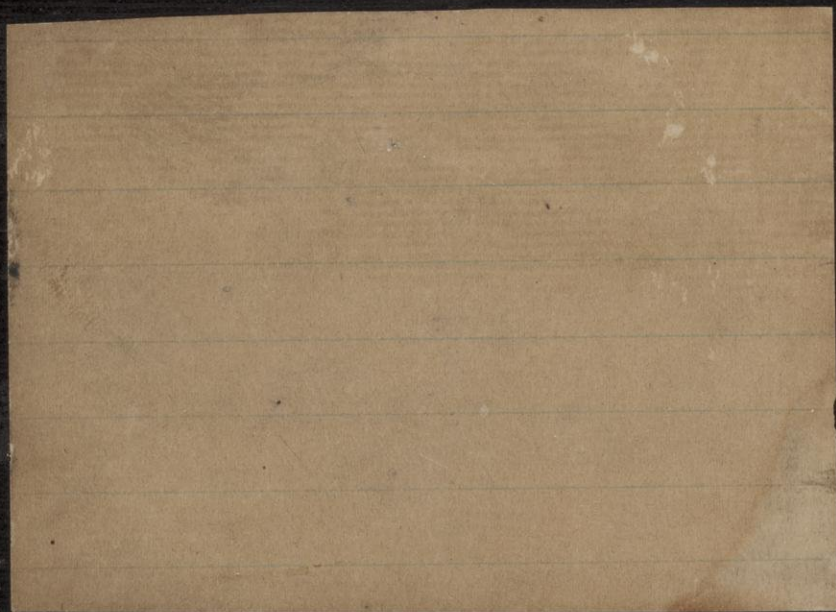
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Ishpeming
No 4
Plane Table
Notes

U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK



LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

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

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section, and the dip and strike when observable, for instance 4025, 250 N., 300 W., *Strike, N. 6° E., Dip, 50° E.* Then follow with as full a description of the ledge as possible. When topographical maps are used for locations this paragraph applies only in part.

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

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

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

19745-19810

#123

19847-19863

19865-19873

19909-19916

19945-19950

Plane Table Notes

Marquette Region

Vicinity of

Ishpeming

1891

W. S. Bayley.

19745 Light schistose rock from side
of pit between (486) and (488), where
schistosity strikes about $S 50^{\circ} E$.

Another thin pit south of
this one has on its south side
19746 one conglomerate striking
about $S 35^{\circ} E$ and dipping very
high to the N.E.

(490) D.S. & A. R. R.

(491) Top of hill, north side of R.R.

(492) 180 paces from pit from which
conglomerate has been taken
No rock in sight.

(493)

(494)

(495) Small greenstone ledge

(496) " " "

(497) " " "

(498) " " "

(499) N.E. end of large greenstone
ledge in S.E. corner of hill. Ledge
was 35 ft. S.W.

(500) Greenstone ledge

(501) " "

(502) " "

(503) " "

- (504) Greenstone ledge
 (505) Ledge coarse greenstone
 (506) " " "
 19747 Specimen from (506)? or (505)
 (507) N. end large ledge of greenstone
 many 60 ft S or 15 ft E.W.
 (508) Greenstone ledge 30x30 ft. W. side
 of dam.
 (509) Greenstone ledge 30x20 ft E. side
 of dam.
 (510) Large flat ledge of greenstone
 E. of dam.
 (511) Point in same ledge
 (512) Ledge of greenstone 15x10 ft.
 (513) " " "
 (514) " " "
 (515) Greenstone ledge in W. of hill.
 (516) N. end top of hill.
 (517) Ledge greenstone 30x30 ft.
 (518) Ledge greenstone 15 ft wide and
 many N.E. for 40 ft.
 (519) Greenstone ledge
 (520) " " Soft bed in
 direction at right angles to right.
 (521) Bare knob of greenstone
 (522) N. end of same knob.
 In the Swamp at the bottom

of this hill are test. pits?, from which my gravel has been taken.

- (523) Another knob of greenstone just into swamp.

19748 The ledges (522) and (523) are the usual greenstone. Best on the north side of bluff (522), both along its top and well down in its north face are bedded rocks that seem to be surrounded by the greenstone. They are more or less contorted, are cut by veins and faulted locally. The beds strike most generally 30° S of E and dip to the north at a varying angle. In some places the dip is southerly. The rock appears to be the actinolite? carbonate schist.

- 19750 Dark ore bands? in same.

(524) Greenstone knob

(525) Greenstone knob.

Another little knob of greenstone is at 100 paces N of (525), showing

a precipitous ledge with the north
and running E. 300 ft.

(526) Small ledge of greenstone, at
west end of hill S. of Salisbury.
mine.

(527) Little knob of greenstone on the
north side of hill South of mine.

(528)

(529) Ledge greenstone

(530) " "

(531) " " Top of hill.

(532) Bottom of hill near center
The whole north face of the
hill is practically a ledge

19751 Many small areas of the green-
stone are separated from each
other by soil, but there is no
doubt that they are parts of an
continuous ledge

(533) Ledge of greenstone

(534) Bare knob of greenstone at N.E.
end of hill.

(535) S.E. corner same ledge, which
runs South perhaps 300 ft.

(536) 20 ft. from East end of ledge
of greenstone forming a knob
running 15 paces west.

(537) N. limit of small ledge running 25 ft E of (537) and 35 ft S.

Another small ledge of greenstone lies 30 ft north of line joining (536) and (537) and runs for 40 ft. parallel to it.

(538) Schistose greenstone, west end of small knob.

(539) N. end of same knob.

19752 The schistose greenstone dips high to the N and strikes to N of E.

Ledge greenstone 40 x 40 ft.

Aug 4/91.

(540) Ledge of greenstone

(541) East end of ledge of greenstone running 10 ft S.W. and 5 ft. wide. North of (541) a few steps is a small ledge of the same rock and 10-15 paces a large ledge.

(542) Small ledge of greenstone near East end on north side of knob.

(543) Small ledge of iron-ore on S.

19753 side of big hill S of Salisbury Mines.

A test pit in the valley back of

- (543) This hill appears like in the drift. Fragments of iron chests, have been thrown from the hole, but no evidence of rock in place can be seen in it.
- (544) 5 paces S. of ledge of greenstone 20 ft E-W x 10 ft N-S.
- (545) Ledge of greenstone on top of hill. Ledge runs 20 ft further west, 10 ft E and 50 ft S.
- (546) Center of circular ledge 35 ft in diameter.
- (547) E end of precipice of greenstone.
- (548) Another point further west in precipice. Specimens.
- 19754 (549) Another point in precipice. Westernmost end of precipice is 100 ft E of (550).
- (550) Low ledge of greenstone.
- (551) Ledge of greenstone running 40 ft. further west.
- (552) Ledge of greenstone on back side of hill. Southernmost edge of top is 10 ft further S. Ledge runs 100 ft W, 100 ft E and is 20 ft wide.
- (553) is highest point of greenstone hill

south of (552). Here is a high precipice of greenstone facing north and forming the S. side of a valley which separates (552) from (553).

(554) Further west we strike same precipice.

(555) Ledge on top of hill.

(556) " at western end top of hill.

(557) " near bottom of hill.

(558) opening of pit at bottom of hill

(559) } Two corners of the East end

(560) } of this pit.

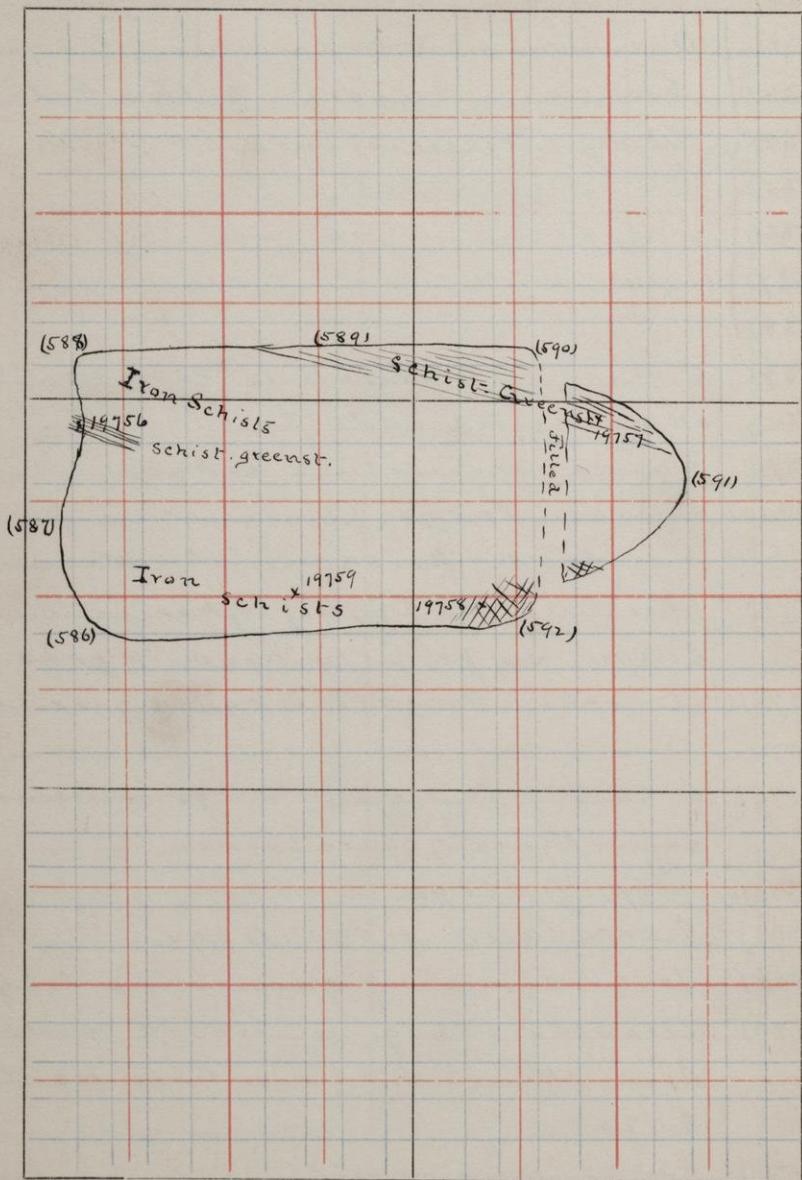
In the pit are exposed in 19754 schists - dipping quite low to the north or north-west. The strike could not be determined accurately.

Both walls of the pit are about 60 ft high and of iron-schist². Near the north wall is 19755 a ledge of schistose greenstone, which seemingly pinches out to the eastward. At the west end in the bottom of the pit ^{the ledge} is 10 ft wide, while at the extreme East end (559) it is only 2 ft. wide.

- (561) }
 (562) } All rights to greenstone ledges
 (563) } bounding valley of the Salin-
 (564) } bury mine.
 (565) }
 (566) }
 (567) }
 (568) }
- (569) E and of greenstone ledge in S.
 slope of alidade hill.
- (570) Large greenstone ledge
- (571) Small ledge of greenstone form-
 ing little knob in the plains.
- (572) Center of S. edge of greenstone
 ledge 30 ft E to W and 20 ft wide.
- (573) Another small ledge of greenstone
- (574) " " " "
- (575) S. end of Castlein ledge in west-
 ern knob of greenstone.
- (576) Top of ledge
- (577) North end of 575 ledge.
- (578) N.W. corner of greenstone ledge
- (579) Another ledge in north side of
 hill. Runs S.E. up hill about
 30 ft.
- (580) Ledge greenstone
- (581) " "

T.

R.



- (582) within 3 ft. of north side of greenstone ledge
- (583) S.E. corner of this ledge
- (584) Edge of greenstone precipice
- (585) Road, two rock.
- (586) S.W. corner open pit, Salisbury.
- (587) West side " " "
- (588) N.W. corner " " "
- (589) Center of N. side " " "
- (590) N.E. end " " "
- (591) S.E. " " " "
- (591) Eastern extremity " " "

In the pit are the usual iron chert of the older formation. They show no good strike nor dip. On the north side is a schistose greenstone and in the S.E. part a very dense fresh greenstone.

- 19756 Schistose greenstone from west end of pit.
- 19757 Schistose greenstone from north^{East} side of pit.
- 19758 Fresh dense greenstone from S.E. corner
- 19759 Iron chert from lower down upon the S. side of pit.

- (593) Near N. end of western face
of greenstone in hill.
- (594) 1/4 post(?) about 10 ft N. of S. end
of small precipice of greenstone
- (595) } Points in greenstone precipice
- (596) }
- (597) }
- (598) Greenstone ledge.
- (599) " " "
- (600) " " "

The coarse greenstone in these
ledges looks as though it were
a bedded rock, with thick beds
dipping about 25° W. There is
however, no evidence of bedding
in the rock itself, hence this
appearance may be due to joint-
ing.

- (601) Ledge of greenstone in top of hill,
extending 50 ft back in line of
dip.
- (602) Greenstone ledge 20 ft to 100 ft
wide.
- (603) Ledge greenstone.
- (604) " " about 40 ft. Square
- (605) " " " " "
- (606) " " " " "

11
(607) Point in face of greenstone precipice.

(608) Another point in same ledge.

19761 Specimen from this point.

(609)

(610) } Small ledges of greenstone in

(611) } top of hill.

(612)

(613) One of a number of greenstone ledges, that end 20 ft E of (613)

(614) Small ledge of greenstone west

19762 down in slope

(615) Small ledge greenstone

(616) } Two points in greenstone ledge.

(617)

(618) Another small exposure of greenstone.

Two other are respectively at 30 ft. N. and 50 ft. N.W. of (618)

(619) S.W. corner of precipitous ledge of greenstone.

(620) Further north in edge of same cliff.

(621) Center of ledge of greenstone

19763 running N.S. about 30 ft.

(622) Another ledge of greenstone about 20 ft. square.

- 2
- (623) Ledge of greenstone in top of hill.
Rock runs about 40 ft. back in
line of sight. It contains an
occasional Epidole^d inclusion
19764 of which specimen was taken
- (624) Face of greenstone precipice.
- (625) E. corner of same cliff.
- (626) About 40 ft. from N.E. end of
ledge with face to the S.E.
- (627) Little ledge of greenstone 20x10 ft.
Back of this point in line of
sight are several other ledges
of the same character. One is
12 paces distant from (627) and is
25 paces long in this direction,
another is distant 52 paces
and is 35 paces long; at 75
paces distant ^{in line of sight to (628)} is still another.
19765. This weathers black unlike
the others mentioned. Found
work specimen.
- (628) Center of ledge of greenstone 35 ft.
19766 wide. It resembles very strongly
a dyke in the greenstone, run-
ning along the line of sight.
- (629) } other points in this same dyke
(630) } as descend hill.

- (631) Small ledge at bottom of large ridge of greenstone
- (632) Ledge greenstone 30x20 ft.
- (633) W. end of another ledge of greenstone 20 ft. wide. Extending all the way to right (634). At its eastern end the ledge is some 50 ft. wide.
- (634) Ledge greenstone 40x20 ft.
- (635) } Other greenstone ledges on top
- (636) } of hill.
- (637) Top of large hill of greenstone back of other hills.
- (638) East side of top of hill. Greenstone
- (639) Three easting end of same hill. Greenstone.
- (640) West end of bare face of greenstone cliff.
- (641) Lower down in same face.
- (642) Further East in same precipice
- 19768 Greenstone
- (643) East end of bluff.
- 19767 40 ft S. of top of knob.
- (644) East end at bottom of little knob near road.

- 14
- (645) W. end same knob, which is
19769 of greenstone
- (646) Near north easterly edge of same
knob.
- (647) Greenstone on slope of hill. The
rock here is cut by gashes of
epidote and by a small dyke.
19770 Specimen from dyke.
- 19771 is from a greenstone ledge fur-
ther up the hill and about 50
ft. to N.W. of (647)
- (648) Small ledge greenstone further
up hill.
- (649) Middle of small ledge 30 ft E.W.
10 ft N.E.
- (650) Small ledge of greenstone
- (651) Bottom of large greenstone ledge
- (652) Ledge of greenstone on top of hill
- (653) " " " " " "
- Further East.
- 19772 is from sight (652)
- 19773 " " 4 ft below 19772.
- (654) East face of precipitous ledge of
greenstone.
- (655) Top of hill. A solid greenstone
ledge runs along the line connect.

ing the various heights.

(656) Ledge further East

(657)

(658)

(659)

(660)

(661)

(662)

(663)

(664)

(665)

(666)

(667)

(668)

(669)

(670)

(671) Foot of bluff of greenstone at west end of Sally Lake.

(672) SW end of precipitous face on top.

(673) In center on top

(674) E. end of top of cliff.

The entire face of this cliff is of uniform moderately coarse.

grained greenstone.

(675) Edge of water.

(676) Small point of greenstone extending into Lake.

(677) Top of this ledge

(678) E. end of ledge of greenstone.

19774 Specimen from (678),

(679) N. Shore of Bay

(680) Center of large ledge, some distance from water's edge. The ledge, which is of greenstone, extends about 200 ft west of this point and is broken at two places, so that it forms three minor ledges. The ledge at (680) is about 50 ft long, and is precipitous to the South.

(681) Western exposure of iron cherts in small ledge near water's edge.

(682) Lake Shore

13 paces further in line of sight is a large cut in the rising ground. The excavation is in the iron cherts, and was evidently

19775 once a ruined pit. The rocks are so controlled that could not get

strike nor dip.

- (683) Mouth of large pit some 20 ft back of (683) and running 40 ft. W. The rocks exposed in this pit are the usual iron cherts, except in the north wall, where is a

19776 Schistose greenstone

Another large pit some 40 ft back of (683), shows the same rocks.

Aug 6/91.

- (684) To ledge of greenstone in garden.
 (685) Small ledge of greenstone.
 (686) E. end ledge of greenstone on S.E. slope of hill.
 (687) N.E. end large ledge of greenstone.
 (688) W. end ledge of greenstone whose E end is (686)
 (689) Flag
 (690) Small ledge greenstone.
 (691) Center of ledge of greenstone 20 ft long
 (692) Small ledge greenstone.
 (693) Shaft of Lake Angeline Mine. The ore from this mine is a soft hematitic and a soft black one.

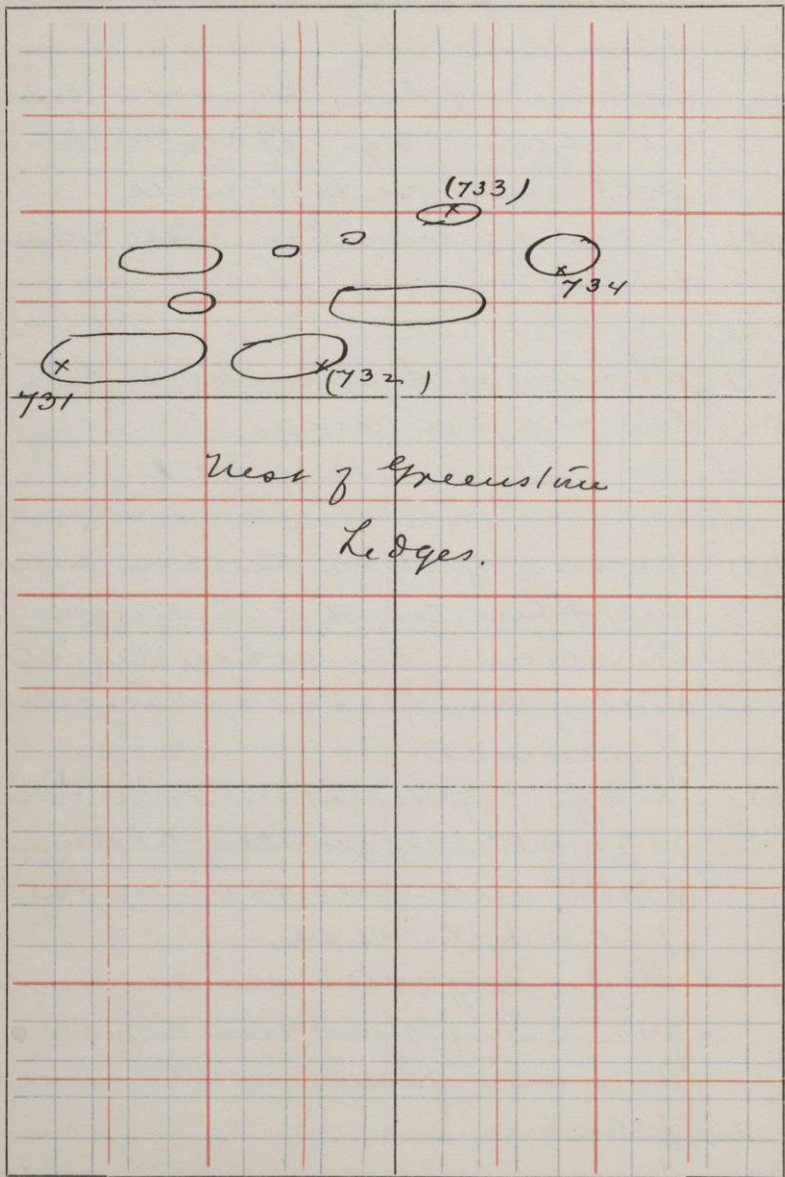
- 19777 Black ore from Shaft " " of Lake Angelina Mine.
- 694 Shaft of Angelina Mine. Near
across the ore is brown hematite?
which is now being produced, and
in addition there is much slag-
specular. An old dump heap
- 19778 Near this shaft shows Jasper
conglomerates in large blocks.
Probable that conglomerate
was first penetrated, then hard
ore and finally the soft ore
was reached.
- (695)
- (696)
- (697) Burt Shaft of Lake Superior
Co., The ore is the hematite so
- 19779 far as seen.
- (698) In road
- (699) Little hill of greenstone at
west end of Lake Angelina.
- 19780
- 19781
- (700) East end foot of hill NW of Lake
- 19782 Small ledge of greenstone
- (701) N.W. cor. same ledge.
- (702) East end of top of hill where is

- 19783 a large ledge of greenstone
 (703) Another ledge of greenstone, practically an extension of (702)
 (704) Ledge of greenstone
 (705) Ledge of greenstone, further west in top of hill
 (706) Ledge of greenstone on top of hill.
 (707) Middle of ledge of greenstone, mining 50 ft E.W. and 30 ft N.W.
 (708) Top of another greenstone ledge
 (709) Large flat ledge in top of hill.
 (710) Middle of greenstone ledge 80 ft long.
 (711) Greenstone ledge, top of hill.
 19784 Specimen
 (712) Small ledge greenstone
 (713) Greenstone Exposure
 (714) S.W. end ledge (707)
 (715) W. end of greenstone ledge on top of hill.
 (716) Bottom of hill, west end.
 (717) Small greenstone ledge in S.W. slope of hill.
 (718) Small ledge of greenstone
 (719) Point in ledge of greenstone on north side of hill.
 (720)

- (721) West end steep greenstone ledge
19785 Specimen
- (722) Sw. end of long smooth ledge
at water's edge. Ledge runs 35
ft. N.E. and is 20 ft. wide.
- (723) Ledge of greenstone, well down on
hill.
- (724) " " "
- (725) Thompson's Station No. 4. L.S. Min.
Co's Surface Map.
- (726) " " No 1.
- (727) W. end of little knob on west
end of hill north of L. Angeline.
Practically the whole north
side of this hill is a solid ledge
of greenstone.
- (728) Ledge of greenstone 20 ft E.W.
50 ft N.W. in saddle between
(727) knob and main portion
of hill to the east.
- 30 ft N of (728) is a small ledge
of the same rock running 50 ft
N.E. and forming the west side
of the hill.
- (729) Small ledge greenstone on south
slope of hill.

T.

R.



- (730) Another small ledge
- (731) West end west of small greenstone ledges.
- (732) About middle of south side of west
- (733) N. side of west.
A few isolated ledges are even north of (733).
- (734) E. end west of ledges.
- (735) Center of Sec. 10.
U.B. True center of section is 100 ft N. of (735) Authority: Engineer Cummings, who reset the post.
- (736) Middle of long narrow ledge of greenstone 50 ft long in N.E. direction.
- (737) Front side of what is practically one ledge with (736) Runs 40 ft S.E.
- (738) East end of another ledge of greenstone on south side of hill.
30 ft N.E. of (738) another small ledge.
- (739) Small greenstone ledge 10 x 10 ft.
Another 20 ft N.

- (740) W. end of greenstone ledge on
(741) E / S. slope of hill.

Another small one 30 ft N of
W. of (741)

- (742) Middle of greenstone ledge, some
200 ft long E-W.

- (743) Test pit on S. side of hill in
old iron chert. Am not sure
that rock is in place in pit.

- (744) Large pit, from which prin-
cipal rock taken was schistose
greenstone

- (745) Pit. No rock seen in place.

- (746) Pit. No rock seen in this pit.
But the large amount of chert
lying around indicates that
rock must have been struck
19788 in the Excavation. Specimens

- (747) Pit. No rock seen in place

- (748) Pit. " " " "

From amount of chert on
surface around pit entrance
No doubt that the rocks exist at
a short depth below.

- 19789 From pit (747).

(749) In plain

(750) " "

(751) Waller's Edge

(752) Shaft house

Open pit extends from this
shaft house at its south west
side to

(753) on its north side

(754) " " South "

The pit is a large open one
partially filled with dump
material. On its south side
is exposed schistose greenstone,
back of which is the massive
greenstone of the great greenstone
hill. Under the schistose green
stone, at the bottom of the pit is
some of the iron chert.

On the north side the rocks
are soft crumbly material
showing but little trace of strike
or dip.

The western portion of the pit, that
just outlined is separated from
an eastern portion by a timber
bridge whose south abutment

(755) is located by (755)

(756) W. end precipitous ledge of greenstone above the pit on the North side of the hill.

(757) Greenstone ledge on top of hill, about 20 ft. S of edge of pit.

(758) East end of this ledge

(759) Greenstone ledge on top of hill. The East half of the pit, like the western portion has walls of schistose greenstone on the South. In the S.W. corner the schistose rock has been stripped off showing the massive greenstone beneath.

Along its North side are the iron bearing cherts

19790 Iron chert from N.W. corner of pit.

(760) Ledge greenstone on top of hill.

(761) " " further East.

(762) West end of large ledge on top of hill.

(763) Easterly portion of same ledge.

at the Eastern end of the Eastern pit it was thought that a northern dip at a high angle could be detected, but this is not

certainly the case.

19791 In w Eastern end of Eastern pit.

Aug 7/91.

(764)

(765) North abutment of bridge separating two portions of pit.

(766) Shaft House

(767) East end, north side of pit

(768) Eastern end of pit, north side

(769) Eastern end of pit.

(770) East end on south side.

East of this pit is still another and smaller one, on whose north side is the quartzite formation and whose south side is in drift.

(771) is the west end of this pit

(772) North side, near opening

(773) Eastern end.

(774) South side.

(775) " " "

Under the drift on the south side, and next to the greenstone, is an exposure of Jasper conglomerate, containing the usual

jasper and ore fragments. This rock is plainly perceivable at the western end of the pit, but is more obscure at the eastern end. On the north side of the pit is rotten red quartzite sometimes passing into the mottled quartzite.

19792 Jasper conglomerate from S.E. end of pit

19793 Quartzite from north side.

The dip and strike of these rocks could not be taken, but there are indications of a high northern dip.

(776) 1/4 bush

(777) Drill Hole, with iron ores and chert surrounding it, but so finely broken that its true nature is not discernible.

(778) East end of knob of greenstone, with ledge running about 40 ft. N.E.

(779) East end of west knob East.

(780) Island of greenstone in Lake Angeline.

(781) Pit at base of hill on north side of lake. The rocks in the dump.

19794 heap are ochreous greenstone
19795 and iron cherts

(782)

(783) } Since test pits from which
(784) } so far as known only gravel
(785) } has been taken.

(786) Top of greenstone ledge, which
on the South side is stripped
bare, and dug against which
is the Cleveland Lake Shaft.

19796 Specimen of the greenstone
19797 one from stock pile of mine.

(787) Greenstone on top of hill.

(788) West end of stripped portion of
ledge, on top.

(789) West end of stripped ledge at
bottom.

(790) Another point low on stripped
ledge

(791) To center of 6 ft wide dyke of
greenstone cutting the great
massive greenstone back of shaft
house.

19798 The dyke runs about N.E. and
has a hade of about 20° to S.E.

(792) Cleveland Lake Shaft. This shaft
house is built upon the greenstone

- which extends beyond to the East with nearly the same characteristics as it possesses to the west except that it becomes slightly schistose, with its schistosity striking a little S of E.
- 19799 (793) is junction point of greenstone ledge above the shaft house.
- (794) Eastern end of stripped ledge. Here the great line of greenstone breaks down sufficiently to allow of a road's construction over it. To the East of the road another line of greenstone begins, from which a point juts out into the lake.
- 19801 (795) Point on this ledge near water's edge.
- (796) To top of ledge where it has been stripped. The rock is a fresh gray greenstone, coarse grained, and with large grains of hypersthene or hornblende.
19802. (797) Top of ledge of greenstone further East
- (798) Water's edge.
- 100 ft west of (798) is a high cliff

of greenstone, rising abruptly
from the water and running
back and N.E. as a high
greenstone ridge

- (799) Large ledge of greenstone 50 x 30
ft. near top of hill
- (800) Large greenstone ledge, top of
this hill
- (801) Top of hill further East.
- (802) Midway of long ledge of green-
stone running N.E. to S.W. about
100 ft.
- (803) East end of greenstone ledges
running all around crown of hill.
- (804) Small ledge greenstone 20 ft
north of (804).
- (805) W. ends of large ledge of green-
(806) E. / stone near top of next hill East.
100 ft further South is another
greenstone ridge.
- (807) Further East on this southerly
ridge.
- (808) Small ledge greenstone
- (809) Greenstone on top of small rise
separated from (807) by a little val-
ley.

(810) Front side of narrow ridge of
greenstone forming a narrow
hill running along line of sight.

19803 Specimen.

(811) Water's edge

On the south side of this arm
of Lake Angeline is also a pre-
cipitous bluff with very steep
sides to the north. Rock, howev-
er shows only on top where it

19804 is a schistose greenstone

(812) Near W. end of ledge described

(813) Corner.

(814) Bottom of ledge near R.R. track.

Here the side of the ridge has
been stripped showing ledge
as far down as this point. Bey-
ond this point the ground slopes
rapidly to the lake but shows no
rock.

(815) Greenstone ledge

19805 Greenstone from greenstone is-
land in Lake Angeline used as
station.

Aug 9/91

- (816) North side of greenstone ledge
in little hill.
- (817) N.E. corner of the same ledge.
- (818) Small greenstone ledge.
South of the hill in which alidade
stands is another rise that
appears to be drift. In it are
several pits from which grav-
el has been taken. From one
some iron chest has been ta-
ken. Though no rocks were
here seen in place the pit was
located by (819)
- (820) Shaft. The one taken from
this shaft is soft hematite?
- 19806 and the associated rocks are
19807 schistose greenstone and
19808 iron chert
- (821) Lake shore
- (822) " "
- (823) Shaft of E. Cleveland Mine
- 19809 one from one pit of E. Cleveland.
- (824) Pit on South side near top of
hill, that is evidently in the
old chert formation although my
schistose greenstone has been

taken from it.

- (825) West end large ledge greenstone
running about 50 ft E.
- (826) Cliff of greenstone, running per-
pendicular to right for 100 ft.
- (827) Greenstone ledge on top of hill.
- (828) Large greenstone ledge on top
of hill.
- (829) Large ledge of greenstone
- (830) Bare ledge of greenstone. Top-
line's triangulation station.
- (831) Pit from which large quan-
tities of iron chert have been ta-
ken.
- 19810 Slate ore with martite-crystals
from western shaft of L'Angelina
mine.
- (832) Large ledge of greenstone, form-
ing long ridge running at
right angles to line of sight.

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- (833) Point in Sally Lake. No rock
- (834) Near Sand beach, Sally Lake. No
rock.
- (835) North End Sand beach
- (836) Point. No rock.

- (837) S. end another sand beach
- (838) Near north end sand beach
no rock.
- (839) Rock point composed of green-
stone. Ledge runs along south
side of bay all the way to the
bottom.
- (840) Bottom of bay.
- (841) Greenstone point north of bay.
The point consists of a little
knob of greenstone, whose south
side forms north shore of bay.
- 19848 Specimen from north shore of bay.
- (842) Point of greenstone. Ledge ex-
tended East 80 ft. and forms the
shore of bay.
- (843) Sand beach in this bay.
- (844) Greenstone point from which
18849 took specimen
- (845) Middle sand beach in bay.
- (846) Ledge of greenstone on rise of ground
sloping to lake and distant from
water's edge about 20 ft.
- 19850
- (847) Small jutting ledge of iron schist
dipping toward alidade at an-
gular 30°
- 19851
- (848) In bay

- (849) Small ledge of cherts at water's edge. They strike pretty nearly in line of sight, with a dip to the N.W.

About 40 ft. further west is another ledge of same kind.

- (850) East end of Exposure forming a very high ledge, running back into the woods in line of sight.
19853
(851) West end of same Exposure.
(852)
(853)

Aug 13/91

- (854) Corner
(855) E. end little knob of greenstone
(856) W. end in front of same knob
(857) W. end back.
(858) E. end next knob of greenstone
(859) Small ledge greenstone, top of hill.
(860) Top of cliff, further west
(861) Top of greenstone ledge further west.
(862) Little round knob of greenstone on
19854 S. side of hill near its top.
(863) Below this is a little terrace where
(864) top is (863) and bottom (864)
(865) Small ledge of greenstone in plain.
(866) Greenstone ledge 20 x 10 ft.

- (867) Greenstone ledge
another, a small one 20 ft. west.
- (868) West end of a ledge of greenstone
30 x 15 ft.
Another, small one, 30 ft. S.
- (869) W } End ledge greenstone
(870) E }
- Another ledge measuring 10 x 10 ft
is 30 ft North and another is
50 ft. in same direction.
- (871) E end line cliff of greenstone.
(872) W end same ledge.
The rock weathers red, in this
19855 respect differing from the pre-
vailing rock of the region.
- (873) E. end of large ledge 10 ft wide
near top of hill. Its west end is
65 paces N. 20° E of (874).
- (874) Precipitous ledge of greenstone.
(875) Near East end of long ledge of
greenstone on top of hill. Practi-
cally continuous west for 100 ft.
with a width of 10 ft. and East for
40 ft.
- (876) West end of ledge continuous
with (874)
- (877) For Station.

- (878) Small ledge greenstone
 (879) " " "
 (880) W. end large ledge of greenstone
 (Same as (876))
 (881) Small ledge greenstone
 (882)
 (883) Station
 (884) Edge of swamp.
 (885) Culvert on R. R.
 (886) } Ends of greenstone ledge.
 (887) }
 (888) }
 (889) } Small greenstone ledges
 (890) }

On the north side of the hill
 are many exposures of green-
 stone, several shaft houses at
 its bottom and a ledge or two
 of Jasper.

The dump heaps of the western-
 most shaft show different rocks.
 The old dump heap has frag-
 ments of quartzite and Jasper
 conglomerate.

- 19856 Quartzite
 19857 Conglomerate

The one heap contains specular

- 19858 and slate ore
 in the newer dumps the heaps
 19859 contain banded ore and jasper
 In both dumps schistose green-
 stone is abundant.

(891)

(892)

(893)

(894)

(895)

(896)

(897)

(898)

(899)

(900)

(901)

(902)

(903)

(904)

(905)

(906)

(907)

(908)

19860

(909)

Small ledges of greenstone on
 North side of hill.

Small ledge (20 x 20 ft) of banded
 and jasper and ore at base of
 hill. Bands strike $7^{\circ}-8^{\circ}$ N of E
 and dip 60° to N.

Shaft house

- (910) Station in bridge
 (911) Center of greenstone ledge on S. side of hill.
 (912) Top of greenstone ledge
 (913) Highest point in top of same ledge.
 (914) E end of same ledge
 (915) W. end bottom of ledge
 (916) W. end of pit under western Lake Superior shaft. The west side of the pit is about 20 ft long and the pit is equally as wide. The rocks are quite well banded with a dip to the north of 45° and a strike about 10° N of E.

- On north side the overhanging
 19861 rock is a schistose greenstone.
 Under this and conformable with
 19862 it is what looks like a quartz-
 ite, and below this, at south
 19863 side of pit is specular ore

- (917) }
 (918) } Small greenstone ledges on
 (919) } north side of hill.
 (920) }
 (921) }

- (922) Small greenstone ledge
 (923) " " "
 (924) } Sides of open oval pit.
 (925) } There is little to be seen in
 (926) } this pit. The rocks are com-
 (927) } formable with schistose green-
 stone to the north and are to the
 south. Dip to the N at 30° .
 (928) Point on Large open pit of Lake
 Superior Co.

Aug 15th

- (929) } Sights to objects in City.
 (930) }
 (931) N. side open pit East of Lake
 Superior Mine. The East and
 the West sides of the pit are
 in drift. On the north side, at
 least 15 ft South of (931) is ledge
 of well banded gneiss, striking
 $12^\circ S$ of E , and specular ore.
 (932) On the south side of the pit the
 same rocks are exposed in
 a perpendicular face some 50
 ft. long and 15 high, topped
 by 20 ft. of drift.
 19865 Banded gneiss.

- 19866 Specular one.
- The layers of jasper are more or less curved, but the general dip is to the south at an angle of about 45° .
- (933) To middle of flat ledge of jasper about 30 ft long from E to W. and 10 ft wide in center. Rock strikes 80° S of E. Dip not determinable.
- (934) Center of ledge on west slope of hill. Curved jasper, with many bands of chert. Strike about E to W. Dip about 70° S.
- (935) } with (934) outline an old pit
(936) } whose north side toward the
(937) } East end is composed of banded
19867 jasper and ore, and on whose south side are little patches
19868 of ochreous chert forming a dyke, that crosses the pit in its extreme N.W. corner.
The same dyke separates this pit from another one further south whose limits are marked
(938) by (938), (939), (940), (941).
(939)

(940)

(941)

The north wall of this pit is consequently chert? The south slope is the banded jasper and ore. The contact of the dyke with the jasper is marked by contortion in the bands of the latter. In some places on the north side of this pit the greenstone is well exposed.

(942)

East end of little pit about 4 ft. wide. The north and south sides are jasper. The west end is schistose greenstone, with a width about equal to that of the pit. Strike of jaspers about 15° S of E. Dip about 65° S.

(943)

West end of another pit.

(944)

North side of "

(945)

Little bridge between this pit and the one East.

(946)

West end of south fork of pit whose end is 942.

(947)

E } end of another pit in ore and
(948) } W }

Jasper. Rock here is nearly

- 19869 vertical and strikes 120° S by E.
- (949) Small ledge cut into jasper, with others at 12 ft. NE and at 10 ft S.
- (950) Ledge of schistose greenstone running west about 10 ft, with
- 19440 a width of about 3 ft.
- 951 } Points in pit. All its walls
- 952 } are of greenstone schist, ex-
- 953 } cept the extreme southern
- 954 } are at its east end, which is
- 955 } in jasper.
- (956) Schistose greenstone dyke on north side of the Eastern Extension of the large L. Superior pit. The pit at this point is about 110 ft wide and is triangular with the apex towards the alidade. Its south side is of ore and jasper.
- (957) Same greenstone dyke further west.
- (958) Exposure of ore and jasper 35 ft E. W. 15 ft. N. S.
- (959) 30 ft. north of western end of large open pit.
- (960) Jasper exposure in same pit.

- (961) Greenstone schist opposite (960)
The contact of the schist and the
jasper is only a few feet further
north.
- (962) South side of pit. Rock is
19871 schistose greenstone
- (963) Southern limit of pit. Schistose
greenstone
- (964) Small greenstone ledge on side
19872 of hill, just south of pit.
- (965) Greenstone ledge
- (966) " "
- (967) North side, E end of pit.
- (968) S. end of pit. The rocks
19871 are exposed on the East side
near the bottom, but are so ob-
scured by drift that could make
little of them.
- (970) Shaft house
- (971) North side in middle of pit
in which other sides (962) and (963)
were taken.
- On the south side of this pit the
predominant rock, extending
almost its entire length is
schistose greenstone, that is so
like the massive greenstone as

to seem like but a phase of this. On the South side the iron and jaspers are exposed.

(941) separates this pit from another one to the north, in whose

(942) East end (942, was taken

(973) N.E. end of same pit. On the S. side of the pit the rock seems to dip to the S. at an angle of about 30° . It is here the iron and jasper schists. About 30 ft N. of (976) is a dyke of schistose gneiss, exposed for about 30 ft. It probably runs N.W. but is soon lost in the iron-bearing rocks. It was traced for 20 ft from the edge of the pit. All the other rocks exposed in the walls of this pit⁽⁹⁷⁴⁻⁵⁻⁶⁾ are jaspers and ores whose strike is very much contorted, but in general is about 30° S of W.

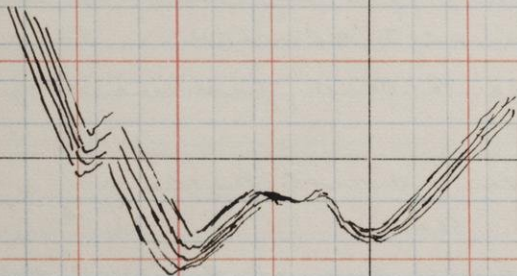
(974)	N. side of pit	} Pit mentioned in last paragraph.
(975)	S.W. " " "	
(976)	E " " "	
(977)	N " " "	

- (978) Small ledge jaspers etc.
- (979) " " "
- (980) Small pit in jaspers etc.
- (981) Top of knob at ne of Thompson's triangulation point. The entire top of knob is one ledge of continued chert.
- (982) N. side E and pit west of top of this.
- (983) Middle of south side } of Sandpit.
- (984) west end }
- The whole south side of this pit is schistose greenstone and the north side as far as 40 ft. East of the N.E. corner. The balance of the north side is continued jasper.
- 19843
- (985) Chapel house
- (986) Jaspers and ores dipping 45° southerly. Strike not obtainable because of lack of Sec. 1988 is 40 ft from N.E. corner of pit.
- (987) South side, East end of pit.

The large pit in which is the Crow's nest was not measured. The exposures are so important and so instructive that it was

T.

R.



Diagrammatic sketch of
fold in ore and quartzite
on west side of L. Superior
Hard ore pit.

best to leave until cured space sufficient time to make a very large scale map of it. The South side of the pit is schistose greenstone, very near the great massive greenstone of the hill to the south. An older cleavage of the same schistose greenstone runs N.W. through the pit. All the other rocks are the gneisses and ores. To the north they dip about 45° to the S, at the south they dip about 45° to the N. On the west side of the pit this same formability of dip is beautifully shown by the exposure of a W shaped fold. The extreme north and south portions of the fold are steeply inclined, while toward the center the inclination is much less. See sketch opposite.

U.B. Thompson promises a photograph of this fold.

Aug 17/91

only 30 or 40 ft. beyond the Bar-
rum Mine is a drift hill stop-
ping to Lake Bancroft.

(988)

(989)

(990)

(991)

(992)

(993)

(994)

Are points in this drift hill,

Top of Pilot Knob, which is a great
mass of greenstone, perfectly bare
over its entire surface.

(995) East foot of knob.

(996) Edge of Lake

(997) North side foot of knob

19909 is specimen from the west end
at foot of knob.

(998) in plain at foot of knob.

50 paces south of (998) are 4 pro-
cesses of greenstone 40 x 40 ft in
area. They are separated from
the main mass of the knob by a
grassy slope, but are undoubted-
ly extensions of it.

135 paces about 15° E. of S. is the
western end of the main mass of the

Knob

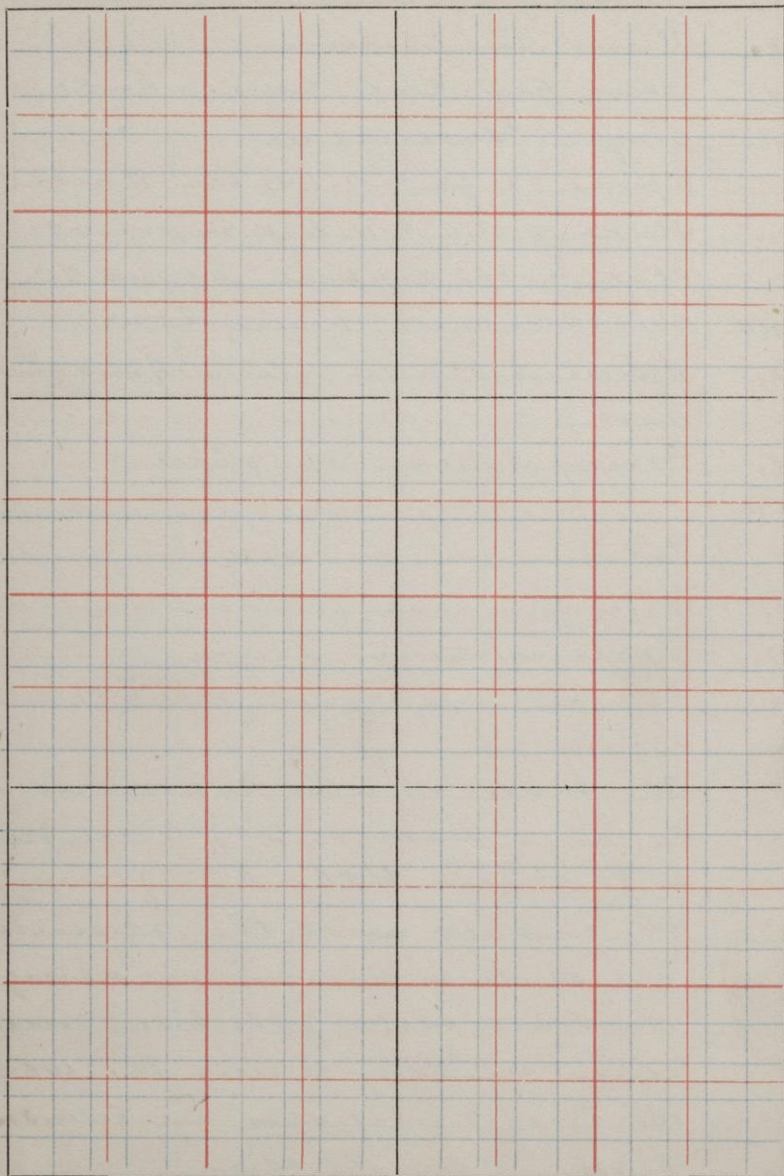
- (999) about 30 ft from west end of
top of Knob of greenstone
- (1000) About 15 ft from East end of
same ledge.
- (1) Further East in same Knob.
- 19910 Specimen
- (2) Further East on south face of
hill.
- (3) At bottom, East end of bluff.
- (4) Point on north side of Knob
- (5) An outcropping of black slate^d
on the north slope of this Knob
at its East end. The ledge is
about 50 ft long, with a trend
a little S of E. The strike is a
few degrees N of E and dip end
15°-25° to the South.
- 19911
- (6) Valley
- (7) S. side west end of Knob between
- (8) S " East " " "
- This Knob is greenstone, exposed
throughout entire extent of Knob.
- (9) West end, top of next Knob west.
- (10) Edge of swamp.
- (11) Little round ledge of greenstone
19912 on plains.

- (12) Edge of Secump.
 (13) Out in plain
 (14) East end hill toward Lake Buena
 19913 crop. Greenstone
 About 20 ft. S of (14) on south
 slope of the hill are exposures of
 19914 slaty rocks dipping about 80° W
 and striking nearly E-W.
 19915 Specimen from letter further
 west.
 (15) Greenstone in W of hill
 (16) " " "
 (17) Slate " " "
 (18) " " "
 (19) Greenstone " " "
 (20) " " "
 (21) " " "

The slate is not exposed at the
 extreme west end of hill, but
 a few feet W of the S.E. of (21) is
 its contact with the greenstone.
 The slate is exposed all along
 the south slope of the hill, some-
 times running to near the top of
 the hill, sometimes only extending
 half way up the slope.

T.

R.



1/2 Post

19916 Drift core from Dec 16. L. Sup-
erior mine. About 350 ft S.E. of
New shaft.

Aug 19.

(22) S. boundary of swamp

(23) " "

(24)

(25)

(26)

} Three points in little knob of
chert in swamp. The strike
of the rocks is about 10° N of E
and their dip 50° S. The main
ledge is only 4-5 ft in width.
(25) is in reality - a small ledge
north of main ledge

19945 } Specimens from this little
19946 } knob.

(27) Edge of swamp.

(28) " "

(29) " "

(30) " "

(31) 30 ft. north of base of cliff
of greenstone forming long hill.
The East end of this hill is
109 paces further East.

(32) Base of cliff.

(33) Dito.

- (34) Base of cliff
- (35) " "
- (36) " "
- (37) on slope of hill
- (38) Base of cliff.
- 19947 From talus a little west of (38).
- (39) Base of cliff.
- (40) " " slope
- (41) " " cliff.
- (42) " " slope
- (43) Near west end, top of cliff.
The top of the hill is practically all greenstone, though the slope that extends from (43) about 200 ft westward is grass covered.
- (44) Front edge of cliff.
- (45) Top of hill. Ledge runs west S.
- (46) Front face of cliff
- (47) " " "
- (48) " " "
- 19948 From ledge 50 ft. west of (48) at end of little ledge that weathers like conglomerate.
- (49) Face of cliff
- (50) " " "
- (51) Ledge greenstone 20 x 20 ft.

- (52) Face of cliff.
- (53) Near East end of ledge in top of hill. Ledge 20 ft wide, runs 20 ft East and 40 ft west.
- (54) Face of cliff.
- (55) " " "
- (56) Toward East end of cliff. These both points indicated in the map are greenstone
- (57) Further East on north side of hill.
- (58) Greenstone further down on north side of cliff
- (59) Small ledge of greenstone in terrace
- (60) Greenstone ledge on edge of terrace.
- (61) Greenstone ledge forming face of terrace.
- (62) ditto.
- (63) "
- (64) "
- (65) Greenstone
- (66) "
- (67) "
- (68) Valley
- (69) Plains

- (70) West bank Crops River
- (71) N. side little glacial tongue
- (72) Small ledge E. end of hill, south of station
- (73) Small ledge S side " "
- (74) " " " " " "
- (75) Greenstone ledge running 20° S, and East to (76)
- (76) Top of hill. Greenstone ledge runs 40° ft. further South.
- (77) Further up in hill.
- (78) S. edge top of hill.
- (79) East end small brecciated
- 19949 ledge from which took specimens.
- (80) } Greenstone ledges on North
- (81) } side of hill at top.
- (82) }
- (83) Large ledge of greenstone
- (84) " " " " top
- (85) " " " " bottom.
- (86) Plains
- (87) N. side of hill, at west end of ledge of slaty rock, striking 50° N of E and dipping about 80° S. It is well banded and runs as far as (85)
- 19950
- (88)

