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Region between D., SS. and A. Ry and M. L. S. and W. Ry, west to Gogebic, Michigan: [specimens] 14302-14408. No. 92 1889

Bayley, William Shirley, 1861-1943

[s.l.]: [s.n.], 1889

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

No. 92.

1889.

Region between D., S. S. & A. Ry and
M., L. S. & W. Ry, west to Goebic, Mich.

W. S. Bayley

14302-14408

SURVEY OF THE PRE-CAMBRIAN ROCKS OF THE N. W. STATES.

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 figure attached, showing the amount and inclination of the dip. Denote slaty or other very plainly bedded rocks by lines running in the direction of the strike, with figures and a dip arrow attached as before. In all cases where there is the least doubt about the true bedding directions, 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 as 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.

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.

3. The ruling of the left hand page is also arranged so that a smaller scale can be used. Each one of the black lines may represent a section line and the red lines quarter sections and "forties." The scale of the maps may thus be reduced, if desirable, to two inches to the mile (the ordinary town plat scale.)

4. Collect a specimen from each separate ledge of rock, or wherever there is a change of rock on any one ledge. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be sampled, the position and extent of the ledge being marked on the map, with a note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples, trimmed to a uniform size of $2 \times 2\frac{1}{2} \times \frac{1}{4}$ 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 § 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. In all cases collect chips for slicing. All specimens are to have numbers painted on them, in white on a black background, in the field.

5. 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., etc.

14302

Field Notes for
Season of 1889

Region bet. D. S. S. & A. R. R.
and

M. L. S. & W. R. R.,
west to Logchic Lake

W. S. Bayley

No 1

July 7-

Left L'Anse via Dssra. R.R.
for the Falls of the Ontonagon
River, where arrived at night.

July 8

The Falls of the river, in the
S.W. $\frac{1}{4}$ Sec 8. T 47. R. 38 are
over red sandstone. The first
plunge about 20 ft. in height
is visible from the R. R. bridge, but
the second of 40 ft. is hidden
by a turn in the river. Above
the bridge (to the south) the sand-
stone is exposed in the bed of
the stream and also along its
banks for a short distance.

The railroad bridge is
450 N, 575 E of NW cor Sec 8.
From this place ran east a-
long the railroad track to
Trout Creek station, and then
north in track between Secs.
11 & 12. T 47. R. 38

The railroad runs over clay
and red sand, the cuts all be-

ing through these two materials, indicating the existence of red sandstone just beneath.

On trail ran north to creek crossing west line of Sec. 36, T⁴⁸. R. 38, and camped.

No rocks were seen in this line but the soil as before indicates underlying sandstone, as does also the topography. The country is low, flat, and swampy.

July 9.

Rained all day!

July 10.

Ran north from camp on west line Sec 36, T⁴⁸. R. 38 and ran north to N.W. cor. Sec 36, then east to N $\frac{1}{4}$ first same section. From here went N.E. to East $\frac{1}{4}$ first Sec 25, then north $2\frac{1}{2}$ miles to S.W. cor. Sec 7.

T⁴⁸. R. 37. From here ran east and north to little creek emptying into E. branch of the Ontonagon River in Sec 7.

A few hundred paces east from the mouth of the creek

14302

on its N.E. side is a high cliff of red sandstone, which forms a rapid. The rock is flat lying, and coarse grained. It rises to quite a height, and extends along the stream for a hundred paces or so.

The soil of all the country traversed is red sand and clay. Returning, went S.E. to S.E. Cr. Sec 7 then S. to S.E. cr. Sec 18, E. 500 paces and south to S. line Sec 20. Then west to river.

All the streams crossed, have high perpendicular bands of red clay and sand.

July 11.

From N. W. Cr. Sec 29 went S.E. to S.E. cr same section in T48. R. 34. then east on south line of Sec 28, three miles to trail running along East line of Sec. 26, and thence north to river on line between Secs. 25 and 26. No rock was observed during the day's journey. The soil is the red

clay and sand indicated the existence of underlying Cambrian sandstone. At S.E. cor. Sec 28 is a hill of drift material, in which many of the boulders are quartzitic and Huronian rocks.

July 12

Ran north on trail to W. quarter pt of Sec 24. T 48. R. 37 and then East to East quarter pt of Sec. 19. T 48. R. 36, passing through good Hardwood country over the surface of which are a few boulders of Huronian rocks.

From E quarter pt. Sec 19, ran south to S.E. cor same section then east two miles to S.E.

cor. Sec 21, north one mile, west to N.W. cor. Sec, and south to Camp on stream in S.E. cor Sec 29. T 48. R. 36.

In moving camp the boys travelled one east from S.W. cor. Sec. 25. T 48. R. 37, to S.E. cor Sec 29. T 48. R. 36.

No rocks observed.

July 13
 Ran south from S. E. cr
 Sec 29 to T 48. R. 36, trail-
 road, then west to Outaouais
 river where camped over Sunday.
 No rocks!

July 14-15-16-
 was absent from camp in
 Champion to meet Prof. Van
 Hise and Mr. Merriam.

July 15.
 During my absence in Cham-
 pion King and Oley went into
 Sec 32, T 48. R. 38 to examine
 ledge reported to occur at 500 E
 and 40 N. of S.W. cr of Section.

The rock was found, but was
 decided to be a boulder. Specimen
 14306. However was taken. It is a
 vesicular trap. Boulder 10 x 10
 x 4 feet in dimensions.

July 16.
 King and Terreio ran from
 N. W. cr. Sec 16 T 47. R. 38. south
 to south line of town then east
 two miles and north to the rail-



T. 47

P. 38

road track, and back to camp.

No rocks were discovered, except those found as boulders in boulder hills. At 350 paces west of S.E. Cr. Sec 34 is a large boulder of trap which was at first thought to be a ledge, but was afterwards decided to be a boulder.

July 17/89

King and Terreis again ran south. They started at N.W. cr. Sec 16, ran S.E. to S.E. cr same section, then south one mile to S.W. cr Sec. 22, east two miles and north to railroad track.

Saw no rocks

July 16/89

day and Less ran from camp
at Falls of Ontonagon River
S. W. to ^{quarter} corner just of Sec 18
T 47 R. 38, then followed river
up to the falls in Sec 1. T
46 R. 39

The bed of the river along this
portion of its course is composed
principally of boulders, most of
which are hard and trap-like.

14303

At 1550 W and 600 N of S. E.
Cor Sec 1. T 46 R. 39 is the
first exposure of rock. There
is a fall of 40 ft. over trap - a
purple rock, evidently of the
Copper series. This rock extends
south along the sides and bed
of the stream 300 paces.

14304

is a chip from an exposure
200 paces south of 14303.

From the falls went south to
the south line of Sec 1 then
E to S. E. Cor. Sec 6 T 46 R. 38
and north to camp.

On south line of Sec 6 two ex-
posures are marked on the

flat. Oley thought that one only
was a genuine exposure, and for
it he took a specimen.

- 14305 200 E. 15 N of S. W. Cor. Sec 6. T
46 R. 38. This rock forms a
ledge about 8 ft. in height and
250 feet (100 paces) long, and in
character is like 14304.

July 1889

Went East along R. R. tracks
to the water tank of the D. S.
S and A. R. R. and took trail
running south near the town
line for the first mile, and
on the town line for the rest
of the distance as far as 600
paces south of the N. W. Cor.

Sec. 30. T 47. R. 39.

- 14307 Here found a large ledge of
amygdaloidal trap forming a
high wall at the foot of which
is a little creek. This wall runs
about 40° N of W and extends for
some distance. Its continua-
tion is probably the same ledge
as that marked in the flat.

at the west quarter part of
Sec 30.

The Homesteaders in the S.W.
 $\frac{1}{4}$ Sec 19, T 47, R. 37, says he
dug a well 6 or 7 ft. deep and
found only red clay, like that
characteristic of the Sandstone
area.

July 19/84
Went east from W. $\frac{1}{4}$ part
Sec 19, T 47, R. 37 and the
S of E along trail over boulder
covered ridges to N.W. cor Sec
29 same town.

14308 A little S.W. of this corner
is a high ridge of hills in which
is an exposure of an amyg-
daloidal trap - a very much al-
tered greenish purple rock,
filled with amygdules of quartz
and epidote and little dark
green pseudamygdules of chlor-
ite.

From the N.W. cor. Sec 29 ran
south 300 paces, when found
very high precipitous ledge
with its face to the south.

This ledge extends about east and west and is composed of very massive trap, both fine grained and dense, and in places amygdaloidal. Attempts were made to discover the relations between the denser variety and the amygdaloidal kind, but without success.

14309 is a specimen of the denser variety, from near the bottom of the cliff.

14310 is the amygdaloidal kind from near the top.

There was nothing to indicate that the latter is related in any definite way to the former, as the top of a flow or the side of a dike to the interior portion of the mass.

From this point ran S. E. to N. W. cor Sec 33, same town, where struck a branch of the E. Branch of the Ontonagon. At this point no rocks were observed, but a creek to the east of the point where the line

crosses the stream, on its north side at the water's edge is a low ledge running across and apparently dipping with a smooth surface to the south at about an angle of 60° .

14311

To the south of the stream the country is low. To the north it is bordered by high cliffs from which there are no outcrops.

At the point where the line crosses the stream, this latter is over boulders, many of which are very large, and some seemingly in place. These latter are fine grained gray quartzites. Since their bedding was not uniform they were regarded as boulders rather than as ledges.

14312

Chip of one of these.

From this point continued south on W. line of Sec 33, T 44 R. 37 to W $\frac{1}{4}$ post of this section, then East to East $\frac{1}{4}$ post and north to E $\frac{1}{4}$ post

Sec 21, then west to creek in center of this section, where camped.

Crossed hills covered with boulders, but saw no rocks in place. The hardwood country characteristic of underlying copper rocks extends as far north as the $\frac{1}{4}$ part of Sec 21.

The boys in moving ran S.E. from W. $\frac{1}{4}$ part Sec 19 to S.E. cor. same section, then east two miles and north to stream, seeing no rocks in transit.

July 20th

Drove center Sec 21. T 44y R. 37. went to S.E. cor Sec. then east to S.E. cor. Sec. 22, crossing Junco Creek at 500 E of north $\frac{1}{4}$ part. The river here flows over sand and pebbles. The hills on both sides of it are high and very steep as if cut from drift. From S.E. cor this section went south 500 paces to creek, which followed east.

14313 At 700 S and 100 E of N.W. Cor Sec. 26 T 47 R 37 found a little knob of slate, in which the rock strikes 70° S of E, as nearly as could be determined. They dip almost vertical, but very slightly inclined to the south.

Went East to East line of this section.

A few paces East of the above ledge (14313), is another of the same kind of slate, striking 12° S of E. and dipping almost vertical, but apparently tilted slightly to the north.

At about 300 paces west of E line of the section and 700 south of the north line is still another exposure of slate dipping high to the south and striking about 7° - 10° S. of E.

The country for this mile is rolling. On the sides of the high and steep hills are boulders of slate and quartzite. Ran north along the east line of Sec. 26. We struck creek

530 steps south of U.E. cor to Section 26, and followed creek north, finding ledge of shaly slate striking 10° S of E, and dipping S. This exposure is on the creek about midway between the East line of Sec. 26 and north line of same section.

A little further N.W. of 14315 is a bluish slate with strike same as above and dip of slaty cleavage a few degrees S. of E.

About 100 S. of the line of this same section and 700 W. of corner, is a high ledge running E-W. On its south side it consists of slate dipping south and striking E-W.

On the north side of the bluff the rock is a gray slate gray-wacke or quartzite. The rock is quite massive, but occasionally a trace of a north dip can be detected.

Continued down stream to Center of Sec 14. T 47. R 37.

14318 At 150 N. of S. line Sec 23 is a ledge of slate with the usual characteristics.

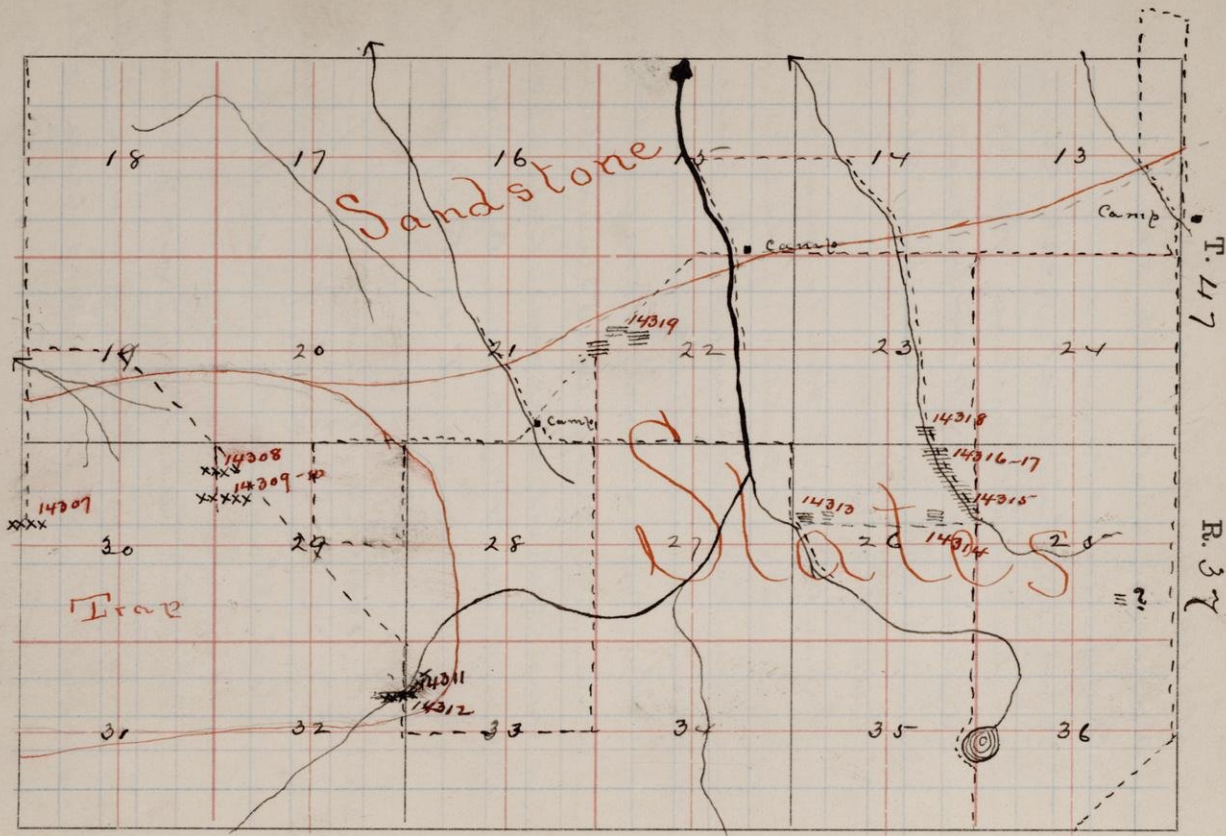
This is the last rock exposed in the creek; during the rest of its journey it travels over sand and pebbles, apparently derived from slate.

From center of Sec 14 ran west one mile to center of Sec 15, and then up stream to S. line of Sec. 15.

The river here seems to flow over red clay and sand. Where line crosses stream left latter, went W to $\frac{1}{4}$ post, then S.W. to W $\frac{1}{4}$ Sec 22, T 47. R. 37 and to camp.

14319 At 1000 S.W. of north $\frac{1}{4}$ post Sec. 22 is a ledge of slate in which the strike could not be determined.

At the West $\frac{1}{4}$ post of the same section another exposure of the same kind of rock was seen. The hills to the S.W. of this $\frac{1}{4}$ post as well as the character of the



sand in little creek in Sec 21
 points to underlying slate.

July 21

Ran to S.W. cor Sec 21. T 47. R. 37
 the S. W. 1/4 part Sec. 28, east
 to center of this section, then
 N. line and east to
 north to ^{the} camp.

The copper range rocks to
 the west of the camp (as shown
 by this trip) are not found as
 far east as this point. The
 range of hills exists, however,
 and there can be but little
 doubt that the traps underlie
 it.

In afternoon moved camp to
 W. branch of E. Branch Onto-
 nagon, very near the point between
 Secs. 22 and 15. T 47. R. 37.

July 22

Went south on E branch of Onto-
 nagon River in Sec 22 one half
 mile to find outcrop of slates and
 sandstones if possible. The red
 clay and sand extends a few hun-

ared faces S. of S. line of Sec 15, where soil changes and boulder clay takes its place. The country is high, the banks of the stream are steep, and from them boulders of slate and quartzite protrude.

July 23/89 -
 From ^{camp in} ~~camp~~ Sec 15. T 47. R. 37.
 ran S. E. to S. E. cor of the Section
 then east to S. E. cor Sec 14 and
 south three and a half miles
 to W. $\frac{1}{4}$ post Sec 1. T 46. R. 37.
 then N. E. to E $\frac{1}{4}$ Sec. 36. T
 47. R. 37 and north to camp at
 450 paces north of S. E. cor. Sec 13.
 to camp.

The boys in the meanwhile
 runned camp along the south lines
 of Secs. 14 & 13, and then north along
 E. line of Sec 13 to stream 450
 paces N. of S. E. cor this Section.

The entire country traversed
 consists of hills covered with boulders
 of slate and sometimes of trap.
 The only rock seen was in a high
 bluff facing north and trending
 a little N. of W. This consists -

of quite massive and shaly slate,
the latter occurring to the north
of the former. The two strike
70 N of E.

14320 Massive variety.

14321 Shaly "

In the afternoon went down
stream flowing through Sec 13,
T 47. R. 37.

As far as 700 paces down stream
from camp its bed is gravelly
and sandy as if cut in drift.

At 700 the red sandstone clay be-
gins, probably indicating the south-
ern extension of the Cambrian.

From this point ran north to the
river, which is through sand and
clay, followed this to East line
of Sec 13, and south to camp in
old trail, where location was not
plotted.

July 24/89.

From D. E. cor Sec 13 T 47. R. 37
went East one mile, crossing sev-
eral ledges of rocks.

14322 about 400 N. and 20 E of the S.E. cr Sec 18 T 47. R. 36 is a decomposed slate, with a strike and dip which could not be determined.

14323 At 600 E of this corner is a very high bluff of gray wacke, striking 30° N of E. and dipping about 40° to the south. The ledge forms a high ridge running a little E of S. It is more massive to the north and slaty to the south. A few paces south of the S.E. cr. Sec. 18 is another ledge of slate.

14324 From S.E. cr Sec 18 went north to 1/4 post of this section, passing ledge of massive slaty rock at 400 N of S.E. cr. The rock dips to the south and strikes about 10° N of E.

From this 1/4 post ran East one mile, then South a mile and a half to the S.W. cr. Sec 21, crossing hills covered with boulders, but seeing no rock in place.

From S.W. cor Dec 21. ran east
one mile, then north brace-
road.

- 14325 At 1640 East of the S.W. cor of
this section, in Swamp, is a
Knoll of massive gray wacke
slate. The rock is exposed in
a ledge running about N.S.,
and has a southeasterly dip and
a strike of about 10° S of E.

On the west side of this Swamp
is also a ledge of slate of which
a specimen was not taken.
In the run north, crossed high
precipitous ledge of slate, fac-
ing north and trending about
E and West, at 540 faces N.
of S.E. cor. Dec 21..

14326

At 900 N. of same corner is
a large high ledge of massive
slate like 14325. The ledge
runs about E and West, and the
dip and strike of the slate is like
that of 14326.

14327

At 1200 North of the same cor-
ner is another exposure of the
same rock from which no speci-

men was taken.

14328 At 760 ft. of D.E. Cr Sec 9 T. 47, R. 36. is a slate exposure in which the rock strikes about 10° S of E, and dips about 70° to the south.

North of this as far as the railroad no rocks were discovered. The soil is a mixture of red sand and clay. The timber remains of the same character as that further south, so that it is probable that the soil is derived from glacial clay and sand, and not the Cambrian sandstone.

July 25-29

These four days were occupied in transporting camp from Ritchie to Bruce's Crossing at the junction of the Military road with the D. S. & A. P. R. R. on the line between Secs. 21 and 22 in T. 48. R. 39.

From this time we began to take variations and dip of magnetic attraction in order to discover the existence of a belt of iron ore

in the western portion of the
Huronian area, or its absence,
at Bruce's Crossing, July 29th

Variation 2° W. Dip. 27° N.

July 30.

Moved provisions along mili-
tary road and into the woods
as far as N.W. Cor Sec. 5. T
46 R 39. Following north line
of this township. The banks
of the stream crossing north
line of Sec 5 are of drift
material. In the stream are
boulders of gneiss with oblique
and rounded inclusions of a
fine grained dark rock.

14331

July 31.

From N.W. Cor Sec 5 went south
to S.W. Cor Sec. 8. T 46. R. 39,
crossing high hills of drift, very
steep on both sides and contain-
ing boulders of granite? etc.

From very high hill 500 paces
S of N.W. corner Sec 8 is an ex-
cellent view of the valley of

Licker Creek to the west and south. To the north are flats covered with fine fine.

From S.W. cor Sec 8 ran east two miles to the military road.

14329

At 160 E of the S.W. cor Sec 9 turned east found a small ledge of rock under the upturned root of a tree. The ledge presented a smooth surface dipping at a low angle to the north. The rock is a fine grained fine-grained amygdaloid, with amygdaloides of a red mineral (carnumite?) quartz and Epidote. The rock extends under the ground about 300 paces to 500 East of the corner.

14330

At 900 E and 170 N. of this same corner is an east and west trending ledge in the side of a hill. It is a light gray rock speckled with little elongated crystals(?) and containing white nests of quartz. The rock is bedded as is evident from its cleavage, but its dip could not

be determined.

In returning we camp, went
north on road and west to camp.

Aug 1

Rain.

Aug 2

Went west four miles on
town line to N.W. cor. Sec 3.
T 46. R 40, through swamp
and very small patches of hard-
wood. The country is generally
low and streams cut through
sand and gravel. From this
point went to S.W. cor. of the
same section and camped.

N. B. to July 31.

On the military road 1600
paces south of the N.E. cor
Sec 21, T 46. R. 39. is an ex-
posure of slaty rock, containing re-
crystallized quartz. To the east
of the road the rock rises and
forms a perpendicular bluff
with the precipitous face to the north.

The rock is quite massive in
structure and possesses a shin-

ing course. The ledge trends 160° N of E and strikes about E.W. The dip is about 75° to the south. The surface of the rock as seen on the road is covered with glacial striae running 40° E.S.

14332 The prevailing rock in the bluff is a fine grained bluish mica slate. In places it contains secretions of quartz mingled with a little red feldspar. Around the secretions the rock is slickensided, giving rise to a chloritic slaty rock, 14333 fractured and twisted

There is also present at the base of the cliff a fine grained black quartzite, where original position in the bluff could not be found.

Aug 3.

Went south from U.W. Cor Rec 10 T 46 R 40 to S.W. cor same section, then east one mile to S.E. cor same section.

At the W $\frac{1}{4}$ part of this section Hardwood hills begin and continue

me to the S.W. corner of the Section, extending along the South line as far east as traveled.

From N.W. $\frac{1}{4}$ Sec. 14 went S.E. to S.E. cor of this Section through Landwood, then west to stream in S.W. $\frac{1}{4}$ Sec 15. T 45. R. 40 and north to camp.

14334 The falls and rapids marked on the map are over a red quartzitic sandstone. The rock is exposed on both sides of the stream and in its bed. It is a coarse grained red sandstone dipping 10-25° to the north and striking a very little south of west. It is well bedded and presents the appearance of the red Cambrian sandstone, but is rather hard for this. In the bed of the stream are many trap boulders. N. B. If sandstone beds are interstratified with the traps of the Copper series in the South Range, should say that this is undoubtedly one of them. It appears to belong to the Copper series.

as copper rocks are exposed to the north of it; and the northerly dip corresponds to what is to be expected of the copper rocks in this portion of the country.

14335 At 110% N and 35° W of S. W. Cor Sec 15 is a ledge of rock running 40° N of E. This presents a low perpendicular face to the south. It is a porphyritic trap, veined with blue veins.

No other rocks were observed on the run.

Aug 4.

From camp ran west on line between Secs 4 and 9. T. 46. R. 40 to 1250 paces west of N. E. cor. Sec 9., then S. two miles crossing Snake stream at 1200 S of N. $\frac{1}{4}$ post Sec. 9 and river at 600 and 830 S. of N. $\frac{1}{4}$ post Sec 16. The stream bed is gravel and boulders, no rock showing at either crossing.

The country is mainly a cedar height and hard wood, mixed with pine. At S $\frac{1}{4}$ post of Sec. 16.

T.

R.

Aug 5-

Moved camp from N.E. cor Sec
9, across this section to S.W. cor,
then west two miles to stream
in Sec. 12, T. 46, R. 41.

No rocks!

turned west and went to stream
in Sec 18. T. 46. R. 40.

At 150 East and 50 S. of S. $\frac{1}{4}$
East of Sec 18 is a low bluff
of blue slate extending some
hundred paces or more S.E.

14336

The slate dips right to the south
and strikes E.W.

14337

At 200 West of this same $\frac{1}{4}$ point
are other ledges of rock not dif-
fering from 14336. The rock
here dips to the south and strikes
N.E.

The ledge continues with a
height of about 3-6 ft, with an
almost uniform character.

14338

At 340 West of the $\frac{1}{4}$ point,
it changes to a dark slate con-
taining little flakes of chert.
This dips to the south about 45° .
on weathered surfaces it is
marked with little white specks.

Aug 6

Went west from camp on south
line of Sec 12 to S.W. cor of the Sec-
tion. At the S. $\frac{1}{4}$ point of this Sec-

a hardwood hill begins and runs a little S. of W.

On this hill at 130 W. of the corner is a small ledge of amygdaloidal trap and 35 paces N.E. of this is another of the same kind of rock with pseud-amygdules of chlorite, red feldspar and quartz.

At 300 N. of this exposure is another ledge about 3 or 4 ft. high running west from the N.W. line between Secs 12 & 11, as far as 300 paces west and perhaps further. The rock composing it is a bedded purplish amygdaloidal trap. From the N.W. cor. of Sec 13 went S.E. to river, passing test pits about 50 and 30 ft. deep at 317 and 455 paces S.E. of this corner. The hills are bone-dry hills. River 900 paces S.E. In the test pits are gravel and red sand and clay.

From this point on the river went west 190 paces then north

14341

50 paces, where discovered a ledge of apparently horizontal sandstone. It can be seen along the sandstone at the rapids and falls in the south line of Sec 15. T¹ H6. R. 40.

The rock is in the side of a hill or bluff just along side of the river. The bluff is about 30 or 35 ft. in height and runs along the river.

A little west of this the bluff runs to the river forming a high, perpendicular cliff on its north side.

From the point where first struck it, the cliff runs 250 paces west. The rock in this cliff is red sandstone and shaly red soft sandy slate, apparently horizontal but really dipping about 14° to the north. It ends to the west at 275 East and 420 N. of the west quarter part of Sec 13.

A little to the west of this slates and shales occur and can be seen in the bed of the river and on both

sides

About 100 paces S of the W. end of this bluff on the opposite side of the river the slates are exposed in a high cliff, about 30 ft in height. In this the

14342 slate is a dark micaceous rock like that found in the south line of sec 18. T 46. 40. It dips about 60° - 75° to the S and strikes 30° N of E. About 20 paces south of this in the same locality is

14343 a dark greenish-purple trap, evidently a copper rock. Its dip could not be taken, nor could the contact between it and the slate be found, although the two rocks were found within a few feet of each other.

Following stream down toward camp discovered another exposure of red sandstone dipping about 15° N. It forms a little cliff about 6 ft. in height on the west bank of the river at 480 paces S and 70 W. of the Work 1/4 part of sec 13.

14344

From this point went 530 paces
West to the end of the sandstone
bluff, where there is a little
stream, on the east side of which
is the sandstone bluff and on the
west side the red shaly rock
mentioned by Irving. The specimen
was taken at 670 ~~to~~ and 440
S. of W. $\frac{1}{4}$ pt. Sec. 13. The river
is at 530 S. of the $\frac{1}{4}$ pt. at this
place.

The dip and strike of the rock
was not determinable. It is
thought, however, that the shale
is a portion of the red sandstone
series.

From this point went up stream
to falls at 200 E. of W. line of

Section, crossing trap dykes on
both sides of which are greasy
chloritic slates striking 35° N. of E.

The falls consist of a little plunge
of a few feet over a massive
much jointed rock.

The trap found in the river (14346)
is more probably a dyke in the
slates than a flow of the copper

series. It appears to be such on the west side of the stream, but can not positively be so stated.

A little to the south of this place (up stream 50 paces) are shaly, white weathering slates dipping south and striking 30° E of north. Their location is 145 paces E of the W. $\frac{1}{4}$ pt of Sec. 13.

From this $\frac{1}{4}$ pt ran along road as far as west line of Sec. 14, T. 46. R. 41.

14349 About 300 N. W. from the $\frac{1}{4}$ pt between Secs. 13 & 14 is a ledge of slate (?)

14350 On the west line of Sec. 14 at about 500 S. and 50 W of the N. W. corner of the Section is a ledge of massive quartzitic rock.

Ran north on west line of Sec. 14 to about 500 north of the N. W. corner then east 1000 paces, south 400, east 1000 and to the N. E. corner.

14351 At 610 East of the west line of Sec 11, struck ledge of copper trap in a portion of the bluffs marked on the plat.

14352 A second ledge of the same amygdaloidal trap is found at 800 west, and others at 900, 990, 1655 and at various intervals along the south line of the section.

King and ally went N.W. from camp, passing through swamp for 400 steps and then ascended hill, near where summit found ledge at 870 paces N.W. from starting point.

14354 At 1225 N.W. found another ledge in same hill.

Continued on N.W. course to W. line Sec 12, T 46, R. 40 and then north to the corner, making the descent of the hill. Followed section line between Sec 1 & 2 T 46, R 40. Crossed stream at 1200 N. of S.W. cor Sec 1 and continued to N. W. corner of the section, ^{3.6 mi} ^{to} T 47 R 41, then the

and a half miles East to the North $\frac{1}{4}$ part of Sec. 31 T. 47 R. 40, and South to the center of the Section.

The country north of the town line is low and swampy.

From center of Section went to S.E. corner, then 1500 paces South to the river.

Followed the river in a South-westerly direction to camp.

At 1600 N.E. of Camp found a high ledge from which took
14355 Specimen. The trend of the ledge is about E and W.

About 200 steps S.W. of this ledge, which is on the East side of the river found another on the west bank, but took no specimen from this.

Aug 7.

Went west to S.E. cor Sec 11 T. 46. R. 41, then N.W. crossing ledge of amygdaloidal trap on N.E. side of line at 700 paces N.W. of S.E. cor Sec 11.

At 1000 N.W. of this same corner

14356 another outcrop of the same kind of rock occurs. It is a purplish, dense rock with amygdules of Epidote and red feldspar?

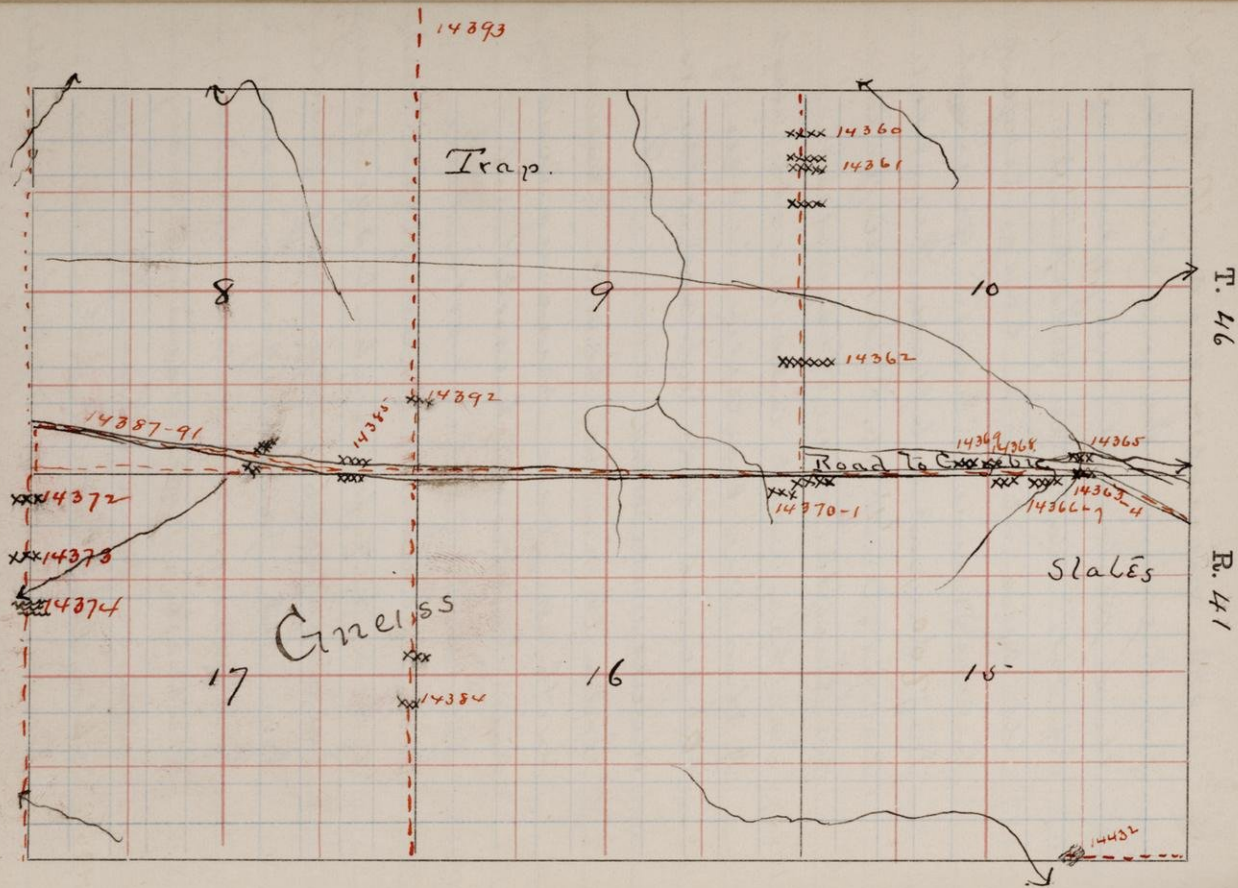
14357 At 2400 steps a large ledge of a medium grained greenish trap, from 3 to 6 ft. in height, and at least a hundred paces in length was discovered.

To the west and north west of this are smaller ledges of the same rock exposed only in small outcrops.

From S.E. on Dec 3 ran north on line crossing Swamp and Hardwood hills.

14358 At 130 S. of the north line of Dec 3, and 10 West of the corner is a 6 to 7 ft high ledge of amygdaloidal trap with very dense, brownish purple groundmass, breaking with a conchoidal fracture, containing amygdules or pseudamygdules of chlorite, Epidote etc.

Continued north to 1000 paces north of this corner (to 1/4 past



T. 46

E. 41

between Secs 34 and 35, T 47, R. 41,)
down hill covered with boulders,
then west center of Sec. 34,
S.W. to N.W. cor Sec 3, T 46, R. 3,
and south to S. line of Sec. 10 and
west on road to camp.

At 700 paces south of the N.W.
cor Sec 3, T 46, R. 41, is a ledge
of amygdaloidal trap, of which
14359 chip only was taken in hurry
to escape thunder shower.

14360 at 175 S. of N.W. cor Sec 10 is
a ledge of trap about 20 ft.
high, extending north and west.
The rock is a coarse grained
dark green rock with blebs of
quartz.

14361 At 340 South is a ledge of con-
fect greenstone, and at 360
another of the same kind. Both
in same line.

At 645 Saw another ledge of
trap but took no specimen
from it.

14362 At 1400 South is a large
ledge of black, slaty, hornblende
rock, containing veins of white

quartz.

On the road running to Lake Gogebic along the south line of Sec 10 - T⁴⁶ R. 41. Found the following ledges.

Aug 8.

14363 1500 paces E of U. W. Cor Sec 15, T⁴⁶ R. 41. Ledge of slightly schistose dark rock looking something like Van Hise's mica schist[?] or gneisses. Provisionally regarded as Archaean. It is a dark quartzitic looking rock, striking nearly north and dipping high to the East.

14363 Massive kind.

14364 Schistose variety.

On the opposite side of the road (North side), about 20 paces north of the first ledge is another. This is of a light colored very massive feldspathic rock speckled with light dots of feldspar.

14365 200 west of these on the south side of road is another ledge, where the rock is very like

that in the first ledge (14363), it is schistose and micaceous, and strikes a few degrees E of N.

14366 Is a fine grained, very schistose variety.

14367 Less dense variety. This is coarser grained in color, and has much the appearance of gabbro.

At 400 W of the first exposure (i.e. 100 E of corner), is an exposure of black, schistose rock very like 11364.

14368 At 480 W. on the north side of the road is a little hillock of red, coarse grained granite, whose relations to the other rocks were not determined, but which is probably an intrusion in these. This granite contains red feldspar and a great deal of quartz, and is cut by veins of the latter mineral.

~~At 820 East of the same corner on the south side of the road is another ledge in which the rock is very similar to that in the first ledge. It is~~

14369

At S 70 E of the same corner is another ledge of pink granite. Here the granite occurs in a schistose rock of a dark color.

Other ledges of the same kind occur at various points between this and the corner.

At the corner itself is a very large ledge of granite and schist. At the creek 210 W and 15 S of the U. E. Cor Sec 16. T 46. R. 41 the granite again is found in a dark schistose rock striking about EOW.

14370

dark rock

14371

granite.

Aug 9.

Went to Waters meet for supplies.

Aug 10.

Went ^{West} East on road between Sec 708 then 380 paces to U. W. Cor Sec 17 T 46 R. 41. At 100 S of U. W. Cor of this Section found ledge of granite running about N. W. The rock

14372 is a coarse grained pinkish rock, with red feldspar, white^d feldspar and gray mica. Chip may taken

14373 At 445 South is a low ledge of trap, which is probably a dyke in the granite^d

14374 At 670 S. is quite a knoll of coarse gneiss, on the south side of which is a trap like dyke

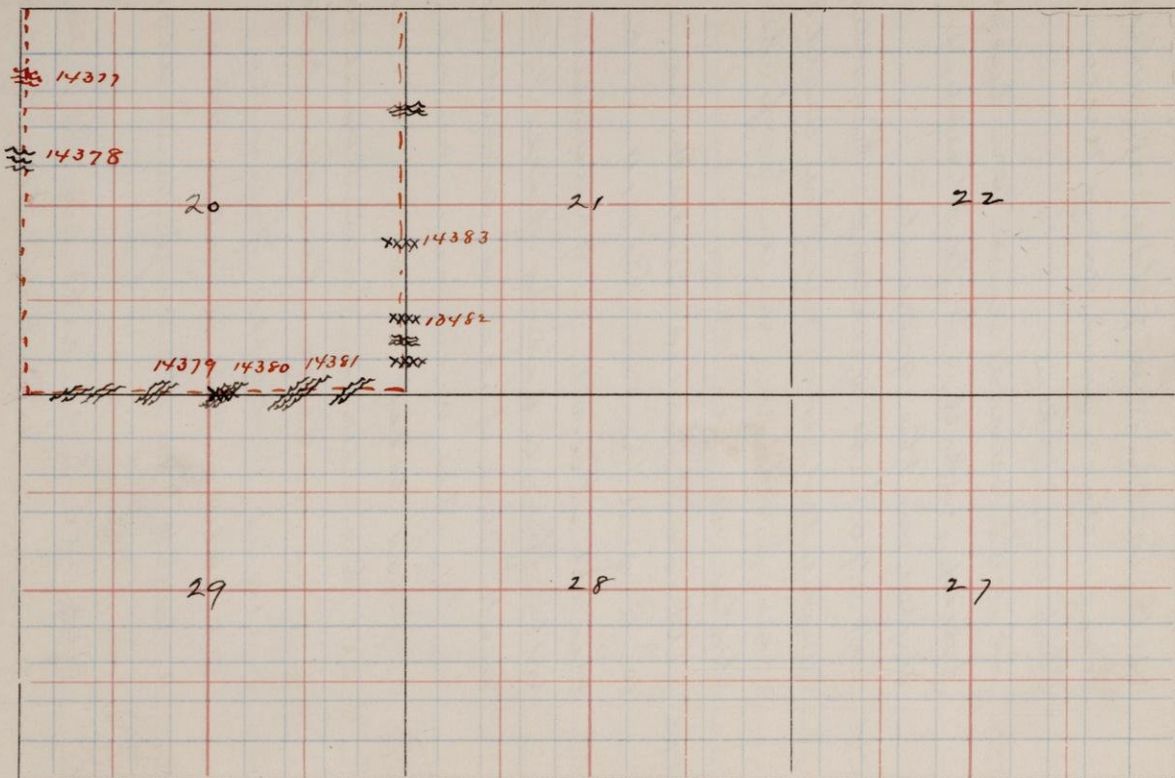
14375 At 200 faces west and 10 S of N.E. cor Dec 19 is a small knoll of granite^d, with precipitous face to the west. This face is about 6 ft. in height and runs about 50 paces west.

14376 (?) At 800 west from same corner is a still larger ledge of light colored granite^d, trending 30° N of W. It is about 6-10 ft high and about 100 paces long.

At 250 S of N.W. cor Dec 20 granite^d and trap form dykes in mica schist or gneiss. The

T. 46

R. 41



trap form dykes of about 10-12 inches in width. The granite occurs in much larger dykes or veins.

- 14377 The mica schist strikes a little S. of N.E. and dips to the south.

- 14378 At 700 is a ledge of granite and at 900 south is a ledge of mica gneiss - a fine grained, gray rock striking about N.E.

Went East from S.W. cor of this section to the S.E. corner passing ledges of gneiss at 211, 300 and at various other points between the corner and the 1/4 post.

- 14379 At 450 faces East of S.W. cor Sec 20 is quite a large ledge of gray gneiss, with dip to the south.

- 14380 At 1085 East is another ledge of rock - apparently a mica-hornblende gneiss.

- 14381 At 1400 is another gneiss ledge and at 1500 a knoll of hornblende rock, coarse grained, black and

heavy.

At 1650 E is a ledge of hornblende gneiss, and at other points between this place and the corner.

At about 650 paces to and 100 north of the S.E. cor Dec 20 is another ledge of hornblende rock like 14380.

From this corner ran north to road

At 150 north of the S.E. cor Dec. 20 is a ledge of hornblende schist.

14382

At 420 north is a bluish gray granite with crystals of plagioclase.

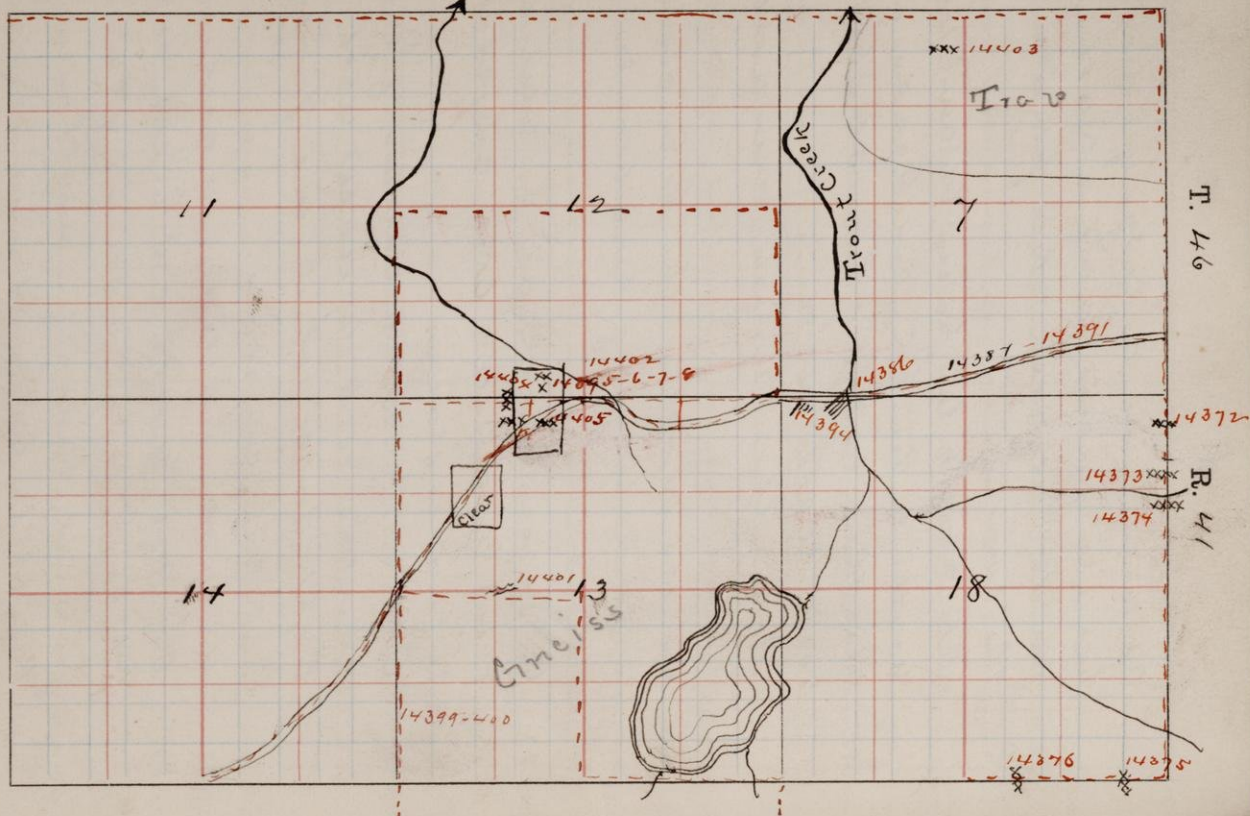
14383

At 800 Took specimen of dark schistose rock speckled with light dots, which are probably feldspar crystals.

14384(1)

At 1000 is a ledge of gneiss
At 920 north of S.E. cor Dec 14 is a ledge of gneiss of same general character as that of the other ledges examined during the day. Between the ledges

T 46 R. 42



whose locations are noted there are swamps and hardwood ledges.

At 1170 north of this same corner is a small ledge of granite, with its face to the east, and other ledges whose locations were not determined.

14385 When struck road at 40 paces north of corner went west, finding ledge of gray, fine grained granite with porphyritic crystals of plagioclase at 400 west of corner.

At 815 west is another ledge of the same rock and at

14386 1785 west of N & E cor Sec 18, on the west side of Trout Creek a ledge of slate - a fine grained grayish black rock, striking N-E and dipping high to the south-east.

King and George went ^{on road} to line between Secs 8 & 9 in T 46. R. 41, and from this point ^{we went north of} went north to town line & west line ^{maple} to N. W. cor Sec 32. T 47 R 41.

and south to road.

45

On the road they obtained the following specimens:-

14387 1200 W. of N.E. Cr Sec 8.

14388 700 W " " " 90 paces
North of road.

14389 " " " " 37 paces
E of road.

14390 583 " " "

14391 220 " " "

14392 480 North " " and 24
paces west.

14393 70 paces W. and 400 N. of S.E.
Cr Sec 5. T 40. R. 41..

All of these rocks are probably
members of the Archaean, with
the possible exception of 14393.
This latter should belong to the
Copper series

Aug 11/89

Went west on line between
Secs. 7 & 18

14394 At 100 E of N.W. Cr Sec 18 is
a ledge of slaty rock on south
side of road. It is a black
chloritic slate striking 40° E of
N. and dipping South.

Continued west to north
 $\frac{1}{4}$ post between Secs 13 and
 12, T46. R. 42.

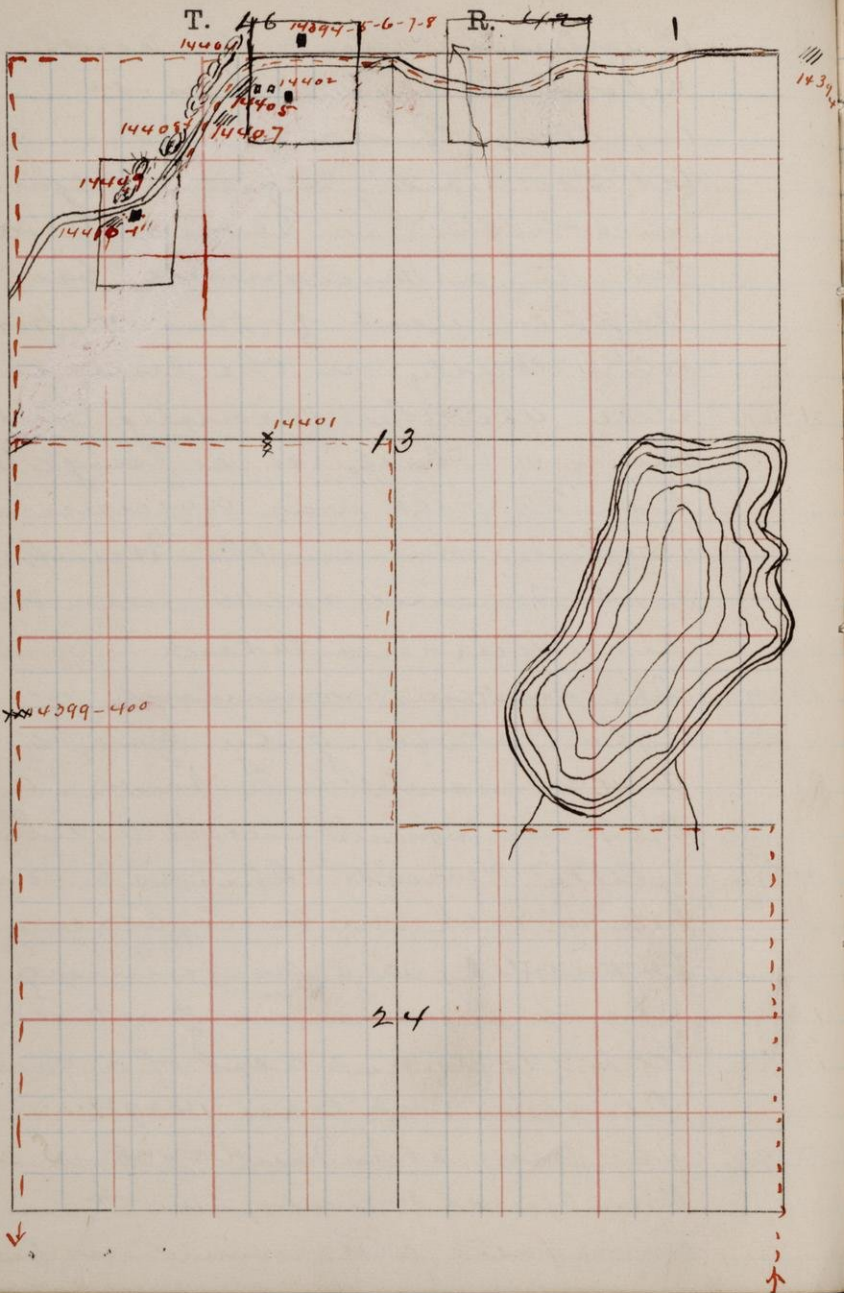
At 500 west begins a clearing
 in which are several test
 pits in a magnetite bed.

At 260 west of this $\frac{1}{4}$ post
 and nearly in the line is
 still another clearing in the
 center of which is a large test
 pit. No rock was discovered
 in place, but in the dump
 heap, several rocks were noted
 and specimens taken.

14395 The most prominent is a
 light colored gray quartzite,
 very massive and dense.

14396 Next in abundance is a mag-
 netite schist. This is a dark
 heavy rock, in some places
 brecciated, and containing
 sharp inclusions of a rock
 like 14395, and also of a green
 chloritic rock like 14398.

14397 The next abundant rock is a
 hornblende schist, sometimes
 corrugated with numerous fold-



ings, marked by lenticular masses of sugary quartz.

It was of course impossible to determine the relations between these various rocks, and of their positions. The run we obtained was all magnetic.

14398 is a green chlorite schist containing small red garnets.

Other ledges and test pits in this vicinity were located later. Their positions are indicated on map opposite.

From the N.W. cor Sec 13 T. 46. R. 42 went south. At 1720 south of the corner is a knoll of dark schistose rock cut by dykes of a light felsitic rock.

14399 is the Dark rock.

14400 chips of lighter rock.

Continued south to 1445-
paces south of N.W. cor S 24.
Then went East one mile
and north to N.E. cor of Section.

At 380 East of ^{line} ~~S.W. cor.~~ is
a small ledge of granite,
coarse grained, pink, like
that collected to the north.

At 400 N of S.E. corner is
a ledge of hornblende gneiss
striking 40° E of N.

From N.E. cor Sec 24 went
west 1000 paces, north 1000
and west 1000 to west 1/4
S. Sec 13.

On south line of Sec. 13 crossed
a few steep hills, covered with
boulders, and also several
swamps. On run north passed
through swamps and over
low ridges of hardwood.

At 680 E of west 1/4 first Sec
13 found ledge of run covered
rock, which when uncovered

14401

for some distance showed a
continuous ledge of grayish
blue, hypersthene or chlorite
rock, ochreous and coarse grained.
From this point went west to
road and back to camp.

14402

Dark brown blende rock from
test pit.

King & Terres, went north
on line between Dec. 708.
T 46. R. 41 as far as corner.
In this distance found no
lodges. The country is hilly and
the hills are covered with boul-
ders. From this corner went
west, crossing Hardwood Hills.

1440.3

At 75 paces west and 90 south of the north quarter of Sec 4 found a trap ledge in the summit of a hill, sloping gradually to the east and west, the ^{ledge} extending about 100 paces.

Continued west in line to Lake
Geogic, finding no rocks in
line.

Aug 12.

Went ~~over~~ ^{work} on line between
Sec. 7 T 46 R 41 and Sec 12
~~12418~~ T 46. R 42.

At 275 paces East of N. W. cor
Dec. 18. took variation, which re-
corded 30° N of N, and dip 19° W

the south.

at the S.E. cor Dec 12 turned north and followed line as far as quarter post.

In running north had no sun but only thought he recognized a slight variation to the East. The dip recorded but slight variation from that given above.

At 300 ft the needles seemed to be restless, but the attraction was evidently very near the surface as a step or two to the one side or the other changed entirely the character of the variation.

At this point the dip needles indicated 24° dip. At the quarter post it again receded 19° .

The variation taken at the $\frac{1}{4}$ post with a very poor light gave 7° N of N.

Went west from the $\frac{1}{4}$ post one mile then south to S.W. Cor Dec 12, where again found varia-

time of 4° to the W.

From this corner went East,
along the line

14404 At 510 faces East of corner
where variation is normal
found ledge of trap running a
little E of N.

Visited the test pits again
and found the location as in-
dicated on map a few pages
back.

14405 At about 380 W and 90 S.
of the 1/4 post is a ledge of
soft ochraceous rock very
friable and much decompos-
ed. On its western border is
a trap dyke.

The dips and variations tak-
en as the Sun appeared
between the rifts of the heavy
clouds are variant immedi-
ately in the vicinity of the test
pits?

Aug 13

Rain all day!

Camp transferred to Lake Go-
gevic.

Ran up East side of Lake Gogebic to mouth of Trout Creek.
No rock exposures.

Aug 14.

Rain!

14406. Went west on Lake Gogebic to ledge at mouth of Slate river. The rock is a slate with strike about E-W. It forms a high ledge on west (north) side of stream.

Aug 15

Went in to test pits again and found location as given before. The variation of needles in their vicinity varies immensely. On the north side of the line east of the test pits it is normal. On the ^{South} ~~North~~ line of the north half of Sec 13 it is likewise normal. In the interior of the north half of this section the needles are deflected in all possible directions.

14405 At the ledge S 30 W and 90 S of the north 1/2 part of the section.

the variation is 105° to the E and the strike of the rock is 40° E of N. Dip S.

10 steps north of this point the variation is about normal and the dip 20° .

14407 The ledge runs S.W. with the road and is found again at 450 W and 170 S of the same $\frac{1}{4}$ point. Here the rock presents a well marked schistose structure, its dip being south and its strike 35° E of north. It appears to be a Hornblende gneiss.

Variation 19° E of N. Dip needs point with its S. face 10° to the south (i.e. dip -170°)

14408 At 700 W. 200 S. is another ledge of schistose trap running a little E of north. It is a dark, heavy rock with a slightly schistose structure and full of vacuoles, in the walls of some of which are quartz crystals.

July 8.	7	7
" 9.	0	
" 10.	8 ²	8.5
" 11	5	5
12	9 ² + 3 ¹ / ₂	13
13	15	15
14	~~~~~	
15	2 ¹ / ₄	2.25
16	12 + 6 ³ / ₄	18.75
17	10 + 5	15
18	8	8
19	6 ¹ / ₂ + 2	8.5
20	6	6
21	5	5
22	1	1
23	12 + 3	15
24	9	9
25	} 10	
26		10
27		
28		
29	}	
30		12
31		

$$20 \overline{) 158.2}$$

7.9 miles.

