Stearns County, Minnesota: [specimens] 5000-5043. No. 13 1883-07

Hall, C. W.
[s.l.]: [s.n.], 1883-07

Hall, C. W.

U. S. GEOLOGICAL SURVEY

FIELD NOTE BOOK

No. 13.

July 1883

Stearns Co.

5000–5043

C. W. Hall.

Survey of the Pre-Cambrian Rocks of the N. W. States.

INSTRUCTIONS.

1. Devote at least two pages of this note book 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. 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 smaller spaces as 100 paces, each of the spaces between the red lines as 500 paces, and four of these large spaces as one mile, or 2,000 paces. Usually the southeast corner will be placed at the first red 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 down one space, 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, after which give in order 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 exposure as possible. Very often the notes for one section will cover more than one page in which case pass to the next right hand page, *repeating the map on each left hand page* as long as the notes, with regard to one section, continue.

3. Collect a specimen from each separate ledge of rock, or whenever 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 the note that it is of a rock identical with specimen so-and-so. Under the same conditions small sized samples will be allowed, but in all other cases *large sized trimmed specimens*, with chips for slicing, must be selected in accordance with § 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. All specimens are to have numbers painted on them, in white on a black background, in camp.

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, etc., etc.

5. Forward this note book, as soon as filled, as registered mail matter, to R. D. IRVING, U. S. Geologist, Madison, Wisconsin.

#13

C. W. Hall Hearing Co Minn
July 1883.

(9—891.)

Sec. 19 T. 123 R. 27 W.

5000;
668 (500+168) ft; 625 (500+
125) N.

A large marsh extends thro several sections
passing thro this one in a Southeasterly, northwesterly direction. An island 8 or 10 ft high extends
along northern side thro part of SE ¼ It is probably underlaid with rock altho this does not appear except at northwesterly end

Two exposures; one which has been
quarried in years past by the + Merchants or Clearwater farmers near as they
wanted foundation stone for their buildings — this forms
the end of the "island in the marsh" + rises some
10 ft above the slough, It is 18×40 paces in extent
Passing NE 10° E into the slough for 15 paces which
sounding showed to have a continuous, rocky bottom
at 3½ feet the other exposure is reached. It stands
3–4 ft above the water + its surface as well
as that of the first one is glaciated. The weathered condition of the surface has obliterated all striae
— the rounded outline is the only indication
There seems to be no regularity in direction and inclination of the joints. The surface is worn off to an incline of
some 10° East + west from the top of the ridge

The rock is of medium grain; some feldspar crystals
are quite large; others are green resembling amazon stone
in color. Occasionally triclinic striae are observable
Hornblende is abundant; in places nodules of the
mineral 2½ to 3 in in length by 1 to 1½ in breadth are shown on
the quarried faces of this exposure

(9—891.)

Sec. 19 T. 123 R. 27 W.

5001;

685 N; 700 W.

This number was taken from the smaller of the two islands in the marsh located in the direction of #5000. As stated it rises in a rounded form above overlain some 3 or 4 ft above the water with no part except that near the water covered with soil.

Grooves + ridges formed by the unequal weathering away of the rock at the time its form was established show the positions of the softer + harder parts of the ledge.

The joints show some varying directions as on the larger island when #5000 was taken; it does seem to be no main system of joints.

The color is brownish in this more weathered sample; And the gradual change from the color of #5000 to this of 5001 is seen on the face of the quarry. — the fresh color appearing to within 5 inches of the surface when a bronzing of the feldspar is apparent which coloring becomes more + more marked until the surface is reached. Where the rock is protected by soil it is disintegrated + crumbling for 2 or 3 inches in depth + only the feldspar can be distinctly recognized.

I should judge there is mica mingled with the hornblende and the appearance is stronger on the weathered than the fresh (5000) specimens.

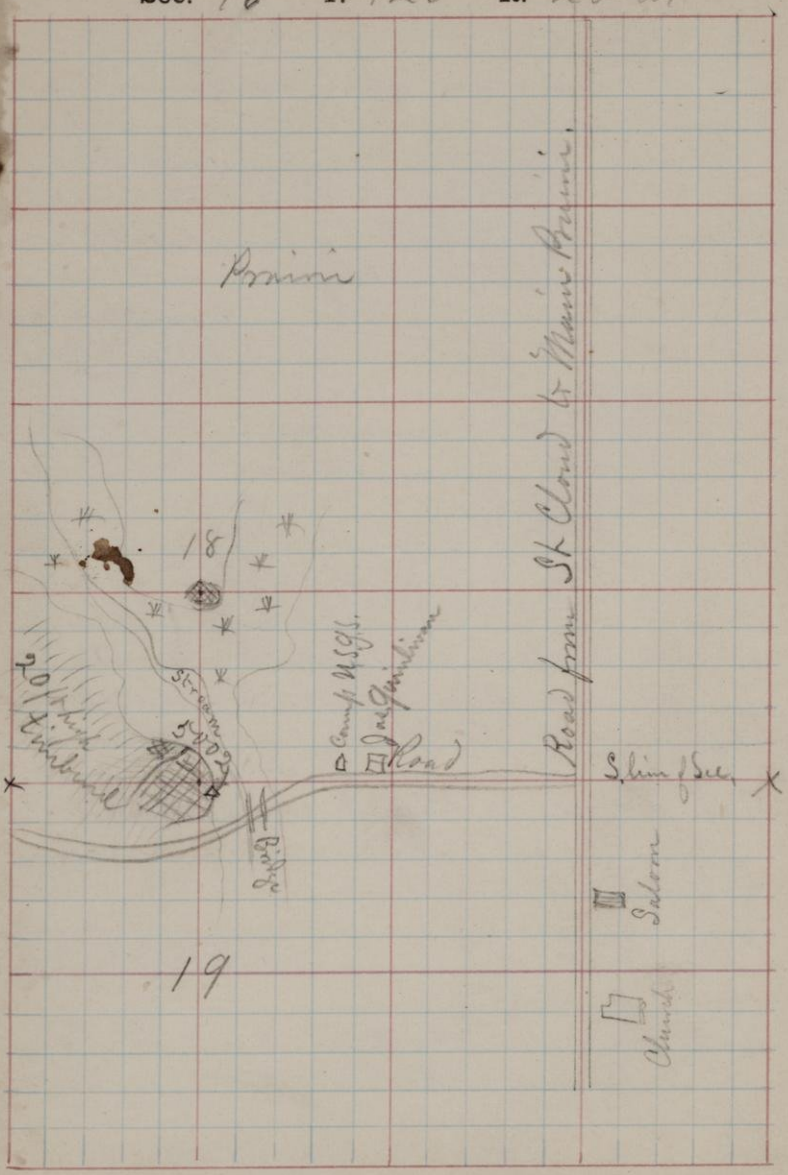
Quartz cannot be distinctly identified with unaided eye.

The Series 5000 — A — 5001 is designed to show the series from the freshest in bottom of the quarry to the most weathered on its upper edge.

Pyrites is the only accessory mineral observed.

(9—891.)

Sec. 18 T. 123 R. 28 W.



5002;

1500 N ——— N

N distinct dip and strike observable

This locality is under the corner post of the pieces of land { S N 1/4 S W 1/4 Sec 18
S E 1/4 S W 1/4 "
N W 1/4 N W 1/4 Sec 19
N E 1/4 N W 1/4 "

and the pieces were taken within a few paces of the corner at a spot where some quarrying had been done, — on the side facing the Slough

This Slough is of considerable extent extending some distance to the N + N W + filled with a rank growth of grasses, sedges + reeds.

From the Exposure to the N W extends a ridge (probably of rock overlaid by drift) covered by an Oak Grove with much underbrush.

The extent of this Exposure is considerable

From the "Corner post" the uncovered rock extends some 50 paces towards the S and 30 paces to the East when the glaciated surface disappears under the marsh, at an angle of 55° to 60° and finally stretches to the N W at least 150 paces.

Trees grow over the surface from the patches of soil here + there

The rock is partly upon the land of Jas. Quinlivan

The Country is prairie interrupted by Simmons marshes and occasional ridges covered with a growth of oak

The Joints seem to run at right angles: two directions observed were — S 65° E and N 65° W

(9—891.)

Sec. 18 T. 123 R. 28 W.

5002;

15-08 W

This rock is a coarse hornblendic Granite. In the freshest parts when the rock has been ground the deepest the color is a beautiful pale flesh tint owing to the feldspars. But this mineral shows in many grounds a greenish tint — the relation of the green grounds to the pink ones was not made out, the the green seemed rather to accompany the segregations of hornblende & mica. Some of the feldspars upon the surface and on the grassy faces showed cleavage surfaces an inch or more in length.

Quartz occurs in fair proportion — it is certainly not excessive and the grains are not large.

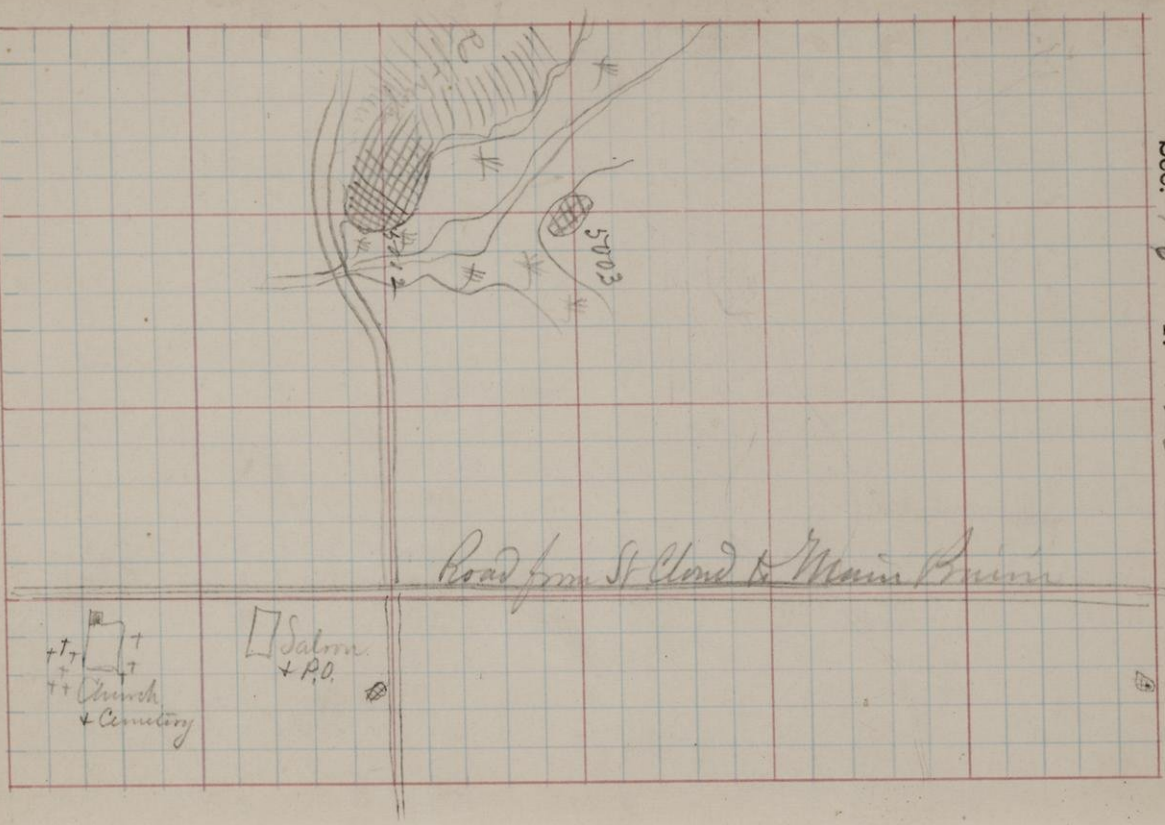
The mica is biotite and the grains are those of quartz are small as compared with the feldspar; the latter mineral in short appears porphyritic.

Vein like bands more compact and of a lighter color occur here and there sometimes several inches wide. They are observed on the surface and in the ground parts.

All the grounds appear in this Exidence the marsh over which the rock is drawn in the winter.

(9—891.)

Sec. 18 T. 123 R. 28



5003.

1500 N; 500 N

This Summit is surrounded by low land and this is marshy on the S. + E. + Oak grove N. + W.
The exposure is 31 paces N + S; 42 do E + W.
and greatest distance is S. E. and N. W.

The surface is rounded this somewhat uneven and slopes off under the surface of marsh &c in all directions at angles varying from 8° to 15°.

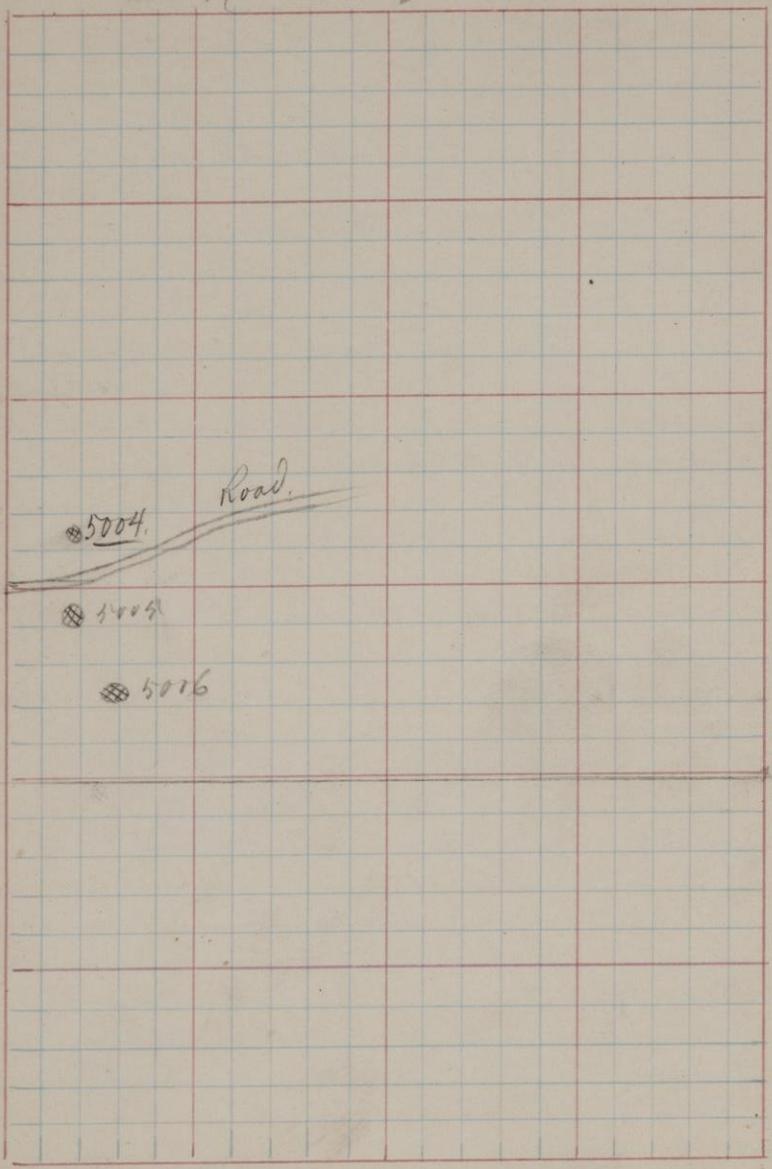
The highest part is some 10 ft above the marsh with Colored reddish by weathering and in this respect as in general appearance of the rock it resembles the exposure #5002 + indeed I should pronounce it identical

The minerals recognized by the eye are:
1 Quartz in moderate proportion
2 Feldspar with the green + pink tints so noticeable in #5002 solid + shaded by weathering
3 Mica the species biotite
4 Hornblende in fair proportion.
5 Possibly pyrite occurring thin not identified with certainty

Seams in several directions especially:
E 15° S + S 25° W.
Along these seams where the material is protected against removal complete disintegration is seen + feldspar crystals + grains can be gathered by the handful - Some of the pieces are inch or more in length.

(9—891.)

Sec. 17 T. 123 R. 24



5004;

625 ft; 1808 ft.

This Exposure lies in the midst of a wheat-field and stands but little above the Prairie. Some quarrying has been done, enough to show the general character of the rock.

Joints N+S; N 75° W; nearly E+W; Slt.

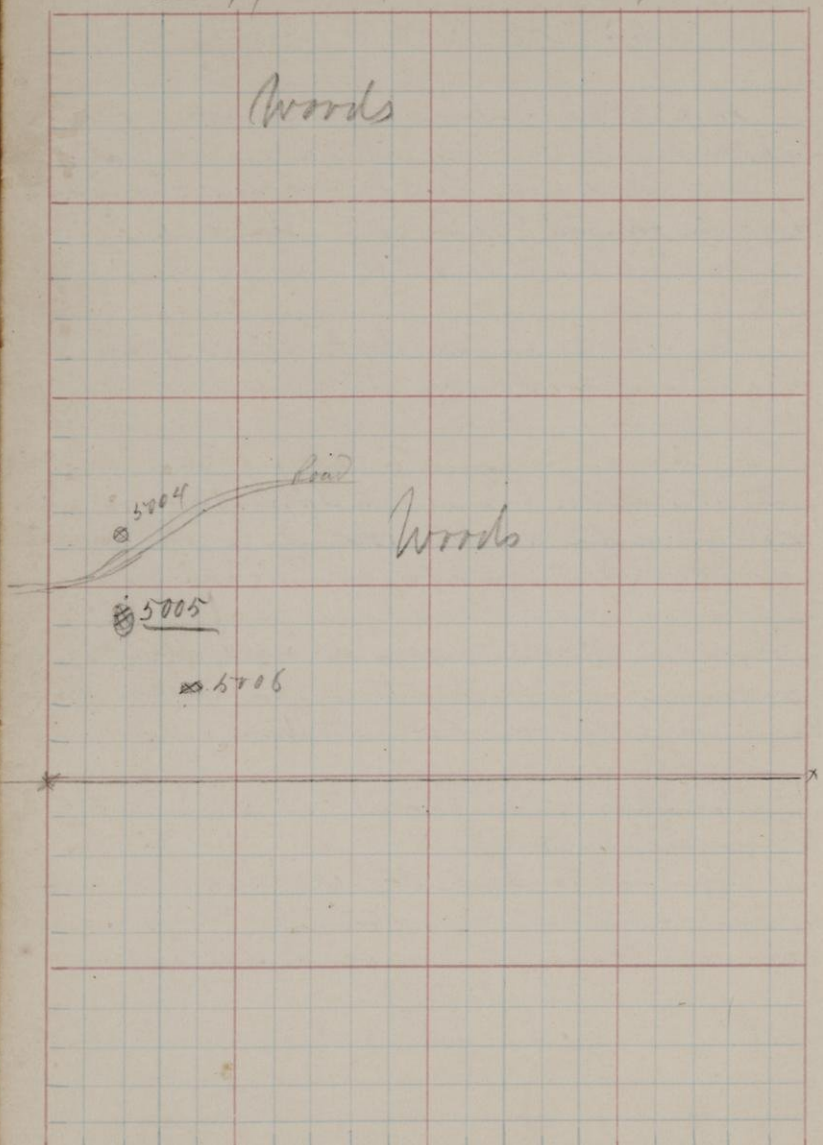
The rock shows the dark color which is characteristic of many localities near this mine rock. It differs very materially in this respect from the rock found on the W side of the N+S road from St Cloud to the South to Maine Prairie + other towns. Nos 5002 + 5003 are referred to.

There are dark masses or segregations of a hornblendic mineral scattered here + there thro' the mass of the rock. Some of these several inches in diameter.

Samples of these appear in some of the specimens sent.

The rock is dark colored rather medium grained and very firm + hard. It appears to consist chiefly of hornblende + feldspar.

Sec. 17 T. 123 R. 28



5005;

1807 W; 400 N

This is an exposure standing out on the summit some 8 or 10 ft above average level and disappearing at a gentle angle beneath the soil on all sides; there is a gentle inclination of 5°–8° towards the W. apparently; and set stands directly S from #5004

Some few blocks have been taken from the upper layers which can be picked off there an apparent bedding of the rock

The exposure measured 57 ft N+S; 45 ft E+W

The surface is dark colored from a heavy growth of lichens & the rock does not feather so rod as that on Limitations (#5003)

The joints were observed to run N W + S E, N 75° W, N + S + principal one E + W

Some nearly perpendicular (as E + W) while others give angle of 75° Northerly + westerly;

The minerals observed were

1 Feldspar — apart of which at least is triclinic — Striae can be seen twinning

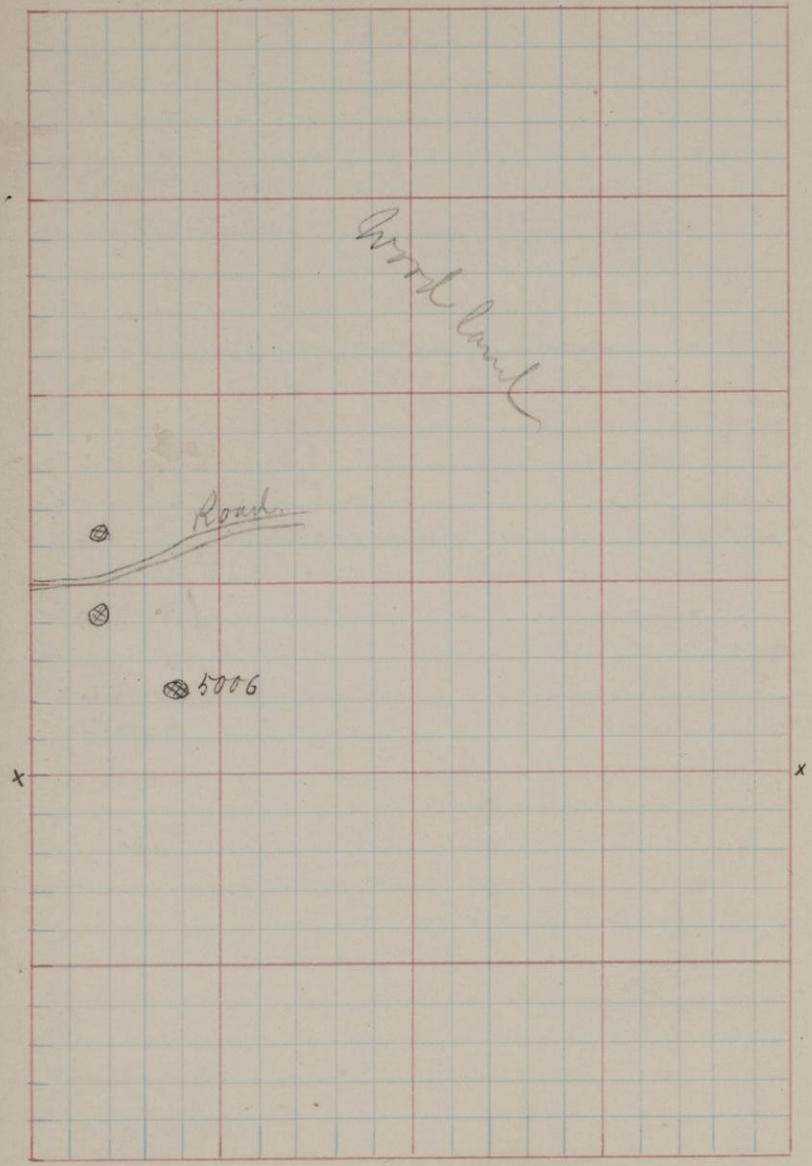
2 Hornblende forming the

3 Mica present a considerable portion of the mass.

Quartz believed to occur in a few small grannules.

The rock weathers to a brown dusty modification.

Sec. 17 T. R.



5006;

1600 + W.; 220 +

This Exposure lies 230 paces S + 15° E of that furnishing # 5005.

The general inclination of the surface is westerly altho from the central ridge of the exposure the surface slopes off both northerly + Southerly.

Locality is 50 paces long + 20 wide.

The mass is not over 3 or 4 feet above the level of the surrounding province. The slope under the ground around is so gentle that the field is not plowed to within several feet of the ledge around; this gives opportunity for a growth of brush which serves to guide one to the spot.

This is true of localities of 5004 + 5005;

The joints extend in several directions but what seem to be the principal set are E + W and are apparently perpendicular.

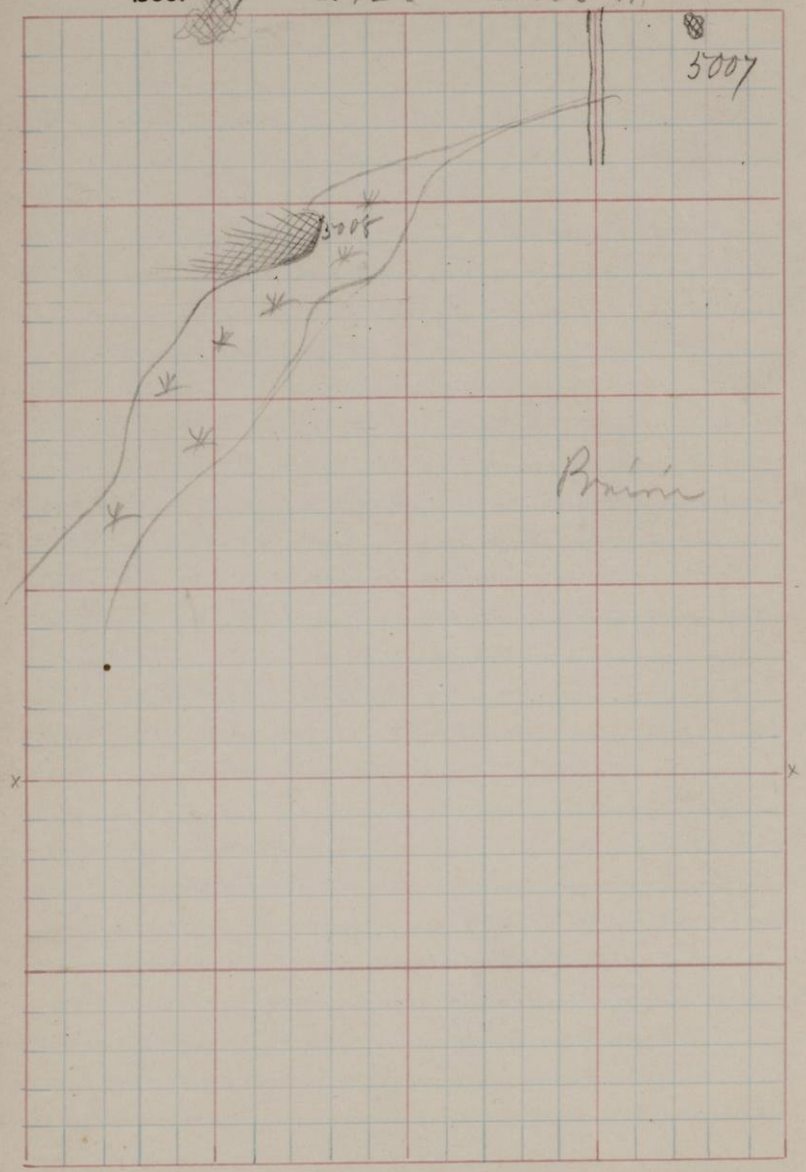
The surface is considerably weathered and the specimens secured show a semi-disintegrated condition of the rock.

Feldspar is the predominant Mineral so far as quantity is concerned.

Hornblende and mica can also, I think, be distinguished (The mica is biotite.)

No Quartz was detected with unaided eye

Sec. 19 T. 123 R. 28 W.



5007;

260 W; 1990 N

Outcrop is small; 25 X 12 feet; longest measurement N W + S E.

Situated in a grove of small scrubby Oaks + other underbrush.

Rocks stand up only 3 or 4 feet above the ground. A few pieces have been removed for foundation stone by farmers around.

The joints were obscure - one set N E + S W another nearly E + W.

Masses of hornblende + Silica (?) were present also streaks of this combination possibly to be regarded as veins - a welding together of the fractured rock;

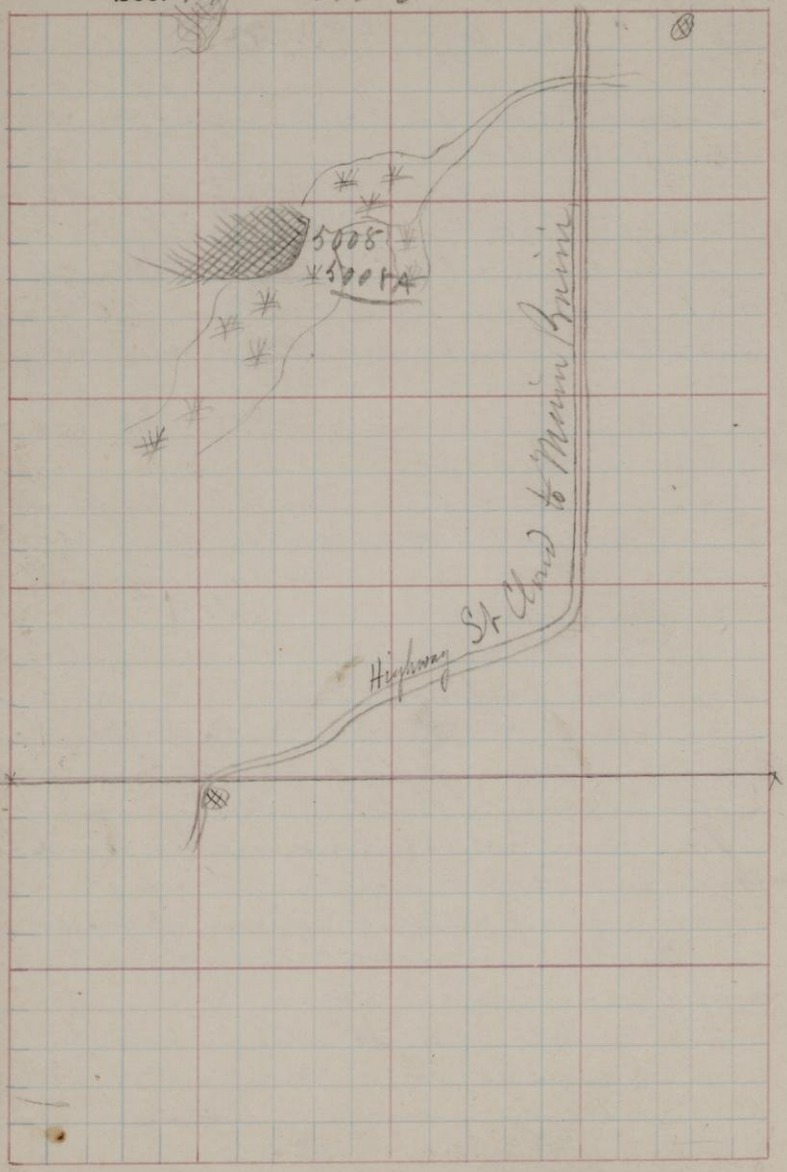
also a vein of lighter colored material differing to the naked eye apparently only in a smaller % of hornblende + mica - this vein was 2½ in wide with a few narrower ones in other parts of the exposure.

The above are shown in the hand specimens + chips gathered.

Twinning striations of triclinic feldspar can be distinctly seen on on many of the longer cleavage surfaces.

This is apparently identical with the stone preceding nos. - the material being taken on account of more grooving having been done

Sec. 19 T. 12S R. 28



5008;

1465 ft; 1210 W.

The N ½ S ½ NW ¼ S 19 is owned by Joseph Lochner

The side facing the Slough is abrupt & bare standing some 20 or 30 ft above the water & mud of the marsh.

It has been quarried & some explosives along this side, the SE face, & has fresh material can be gathered.

Extending back some paces the rock rises to 35 or 40 ft in height & is covered with scattered oaks

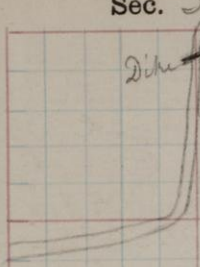
Massive coarsely crystalline granite with joints nearly N & S, N W & S E, E & W, & —— no leading seams were observed nor were any dips or slopes of the rock surface — the inclinations of surfaces being wholly due to weathering & glaciation so far as could be observed

The rock is remarkable for its coarse texture The feldspar — especially those crystals apparently orthoclase — is very coarse; some of the cleavage surfaces being 2 inches or more across. Some are tinted light brown by stains of Fe_2O_3 & this coloring matter seems to be along cleavage fractures instead of being disseminated evenly thro' the mass of the crystal Some are quite white while others are tinted green.

Proportionally the hornblende is in much smaller individuals than the feldspar. Quartz grains are sometimes quite large. Pyrite in occasional crystals was the only accessory mineral seen

5008 A Show Segregations of hornblende seen here & there in the mass.

Sec. 30 T. 123 R. 28



5009; 1990 1490
~~2000~~ N; ~~1500~~ W;

From the wheel rut in the highway to the fence & beyond into the field extends a flat, smooth Exposure of a very coarsely crystalline rock. It is within a few paces of the corner post of the NE ¼ NW ¼ of the Sec. The rock reaches not more than two or three ft height above the prairie around the So side & the oak grove upon the north.

20–25 yrs ago the former living just W of the road used this rock for a threshing floor.

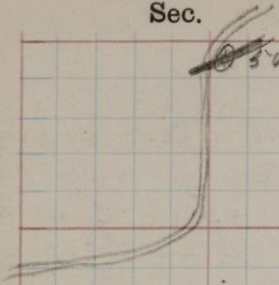
There are several joints but they seem to curve around as an intersecting dike crossing the exposed surface near the middle.

All the surface showed effects of glaciation all striae were obliterated

The crystal grains in this rock altho' more even textured than in the granny or Mr Dochow's land seem to have the same Chemistry & I should call this rock identical with that as #5008. & description is reserved to that Sample.

(9—891.)

Sec. 30 T. 123 R. 28



5010 1990 1490
~~2000~~ N.; ~~1500~~ W.

Extending N 65° E thro' the flat surface of #5009 is a dike having an average width of 4½ feet; the greater or less width apparently owing to the irregular way the Granite separated to let the intrusive material thro to the surface. The dike rock is very much shattered; so much so that it was almost impossible to get good hand specimens of the regulation size. Owing to this shattered condition the dike #5010 weathers & disappears faster than #5009 so that the course of the dike is seen by a channel a foot or so deep in some places stretching across the Granite

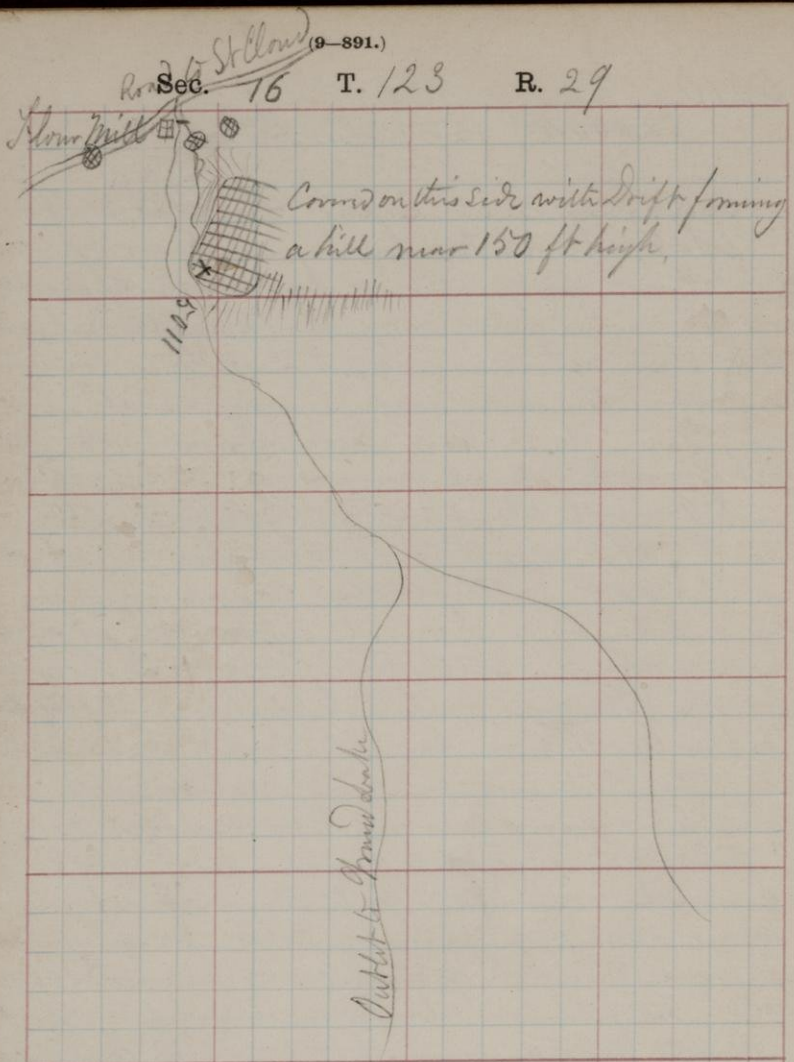
The dike rock is a porphyry; both quartz & feldspar crystals are large & completely developed. Quartz crystals are in some individuals a half inch or more across. They are short & are rudely terminated with a pyramid. Angles & Edges are generally rounded; quite clear & free from inclusions; but has a smoky color arising perhaps from the dark ground mass between & around.

The feldspars also have rounded angles & edges. They are of all sizes up to 1½ in in length & half as broad. Both Quartz & feldspar resist weathering better than the ground mass and it stand out on the weathered surface quite prominently a full half inch when protected. They are bleached by exposure.

5010A is the fine grained material in the shorter columns standing near the granite. Essentially the same. The basaltic structure is clearly marked in this dike

(9—891.)

Sec. 16 T. 123 R. 29



5011; 1600 ft; 1550 W.

Exposure best reached by passing up the East bank of the Stream + Millpond at Rockville 250 + 300 paces from the bridge

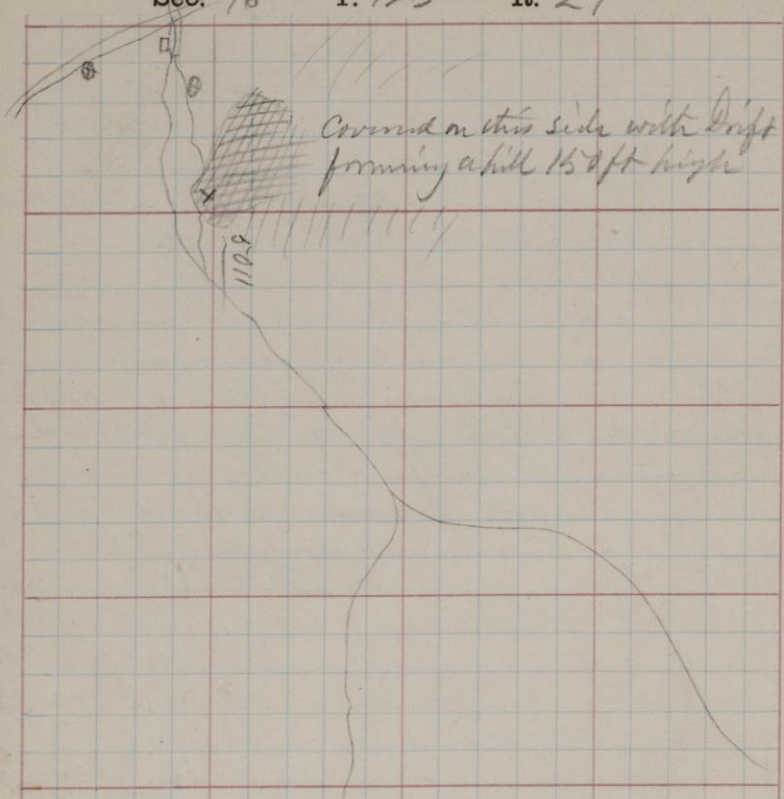
The Outcrop is 300 paces long + 200 or more wide probably Extending under the drift indefinitely towards the East. Height of upper part of the ledge some 150 ft above the Stream from which it rises at an angle varying from 45° to 70°. Scattering trees (oaks) grow on the surface. In protected places the weathered + disintegrated portions form accumulated masses of feldspar Crystal grannules and Gravel pieces of Volcanic mixed with a dark-colored dirt in part the Mica + hornblende grannules which accompany the feldspar + quartz of the rock. The color becomes reddish as the fresher portions overlie the Crumbled condition; this coloring brings the feldspar into greater prominence than the other Constituents in the more weathered portions of the rock

The decomposition of the rock along Surface joints + the disintegration of the hornblende + mica around the feldspar grannules afford an excellent foothold for the rank lichens which cover the surface

There are many joints here as well as Elsewhere in or on the other Exposures in this vicinity and they Extend in many different directions: One set runs nearly

(9—891.)

Sec. 16 T. 123 R. 29



5011

1600 N; 1550 W.

Exposure 300 feet long by 200 wide ~~continued~~

East + west; another which appeared to be the principal one gave N 18° W with a dip of 83° towards the Southwest, W. S. W.

The feldspar crystals are very large + orthoclastic &c for as the angle of the cleavage planes could be determined by the unaided eye. Some were colored red others were quite light. Even white. At this place the red color seems to be very evenly distributed while at other places in the vicinity the color was noticed only on cleavage + fracture surfaces.

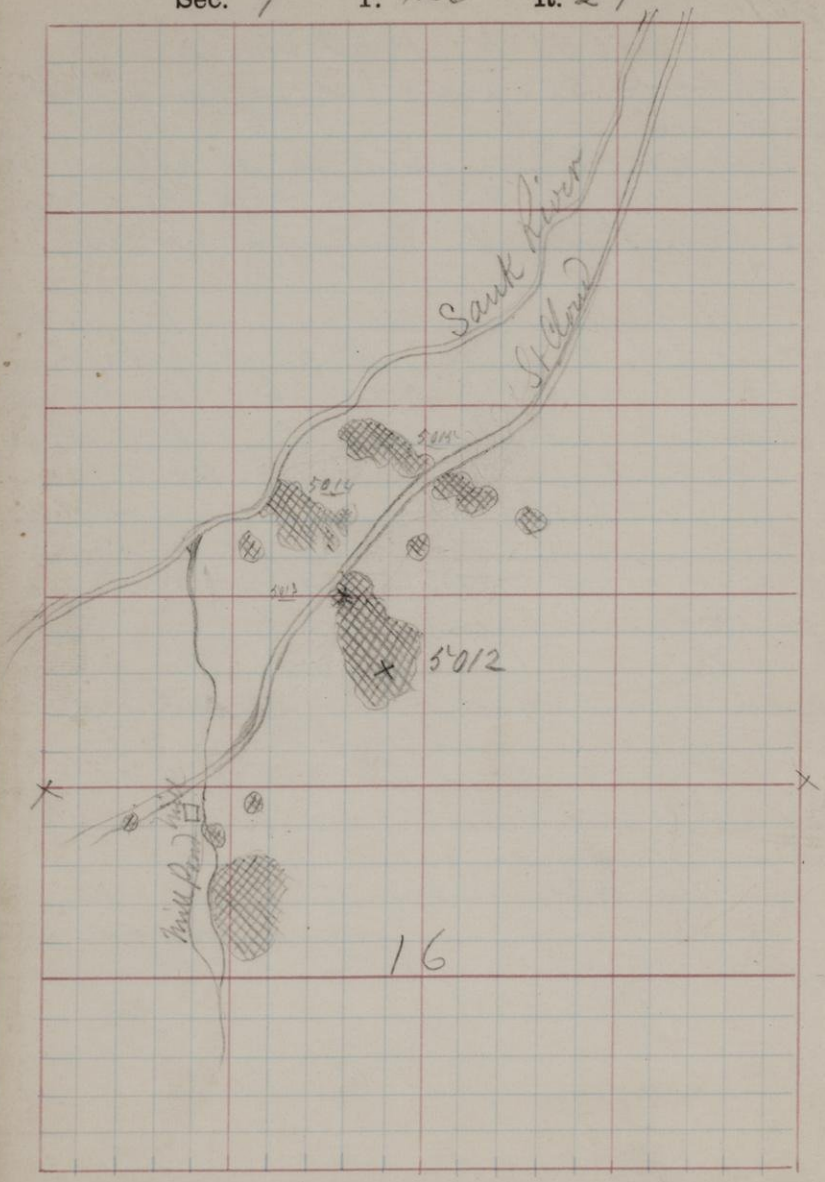
This rock bears considerable quartz packed away among the feldspar crystals as granules, not crystals.

Hornblende is present but in amount is less than the mica + seems to be mingled confusedly with it.

The mica sometimes weathers to a yellowish hue giving a golden ~~weather~~ sparkling to the weathered surface of the rock.

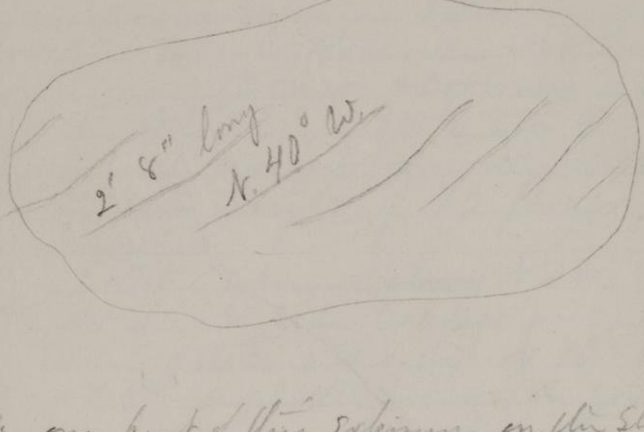
(9—891.)

Sec. 9 T. 123 R. 29



5012;

300 N.; 1100 W.



On one part of this exposure on the slope towards the road a twisted joint or a series of diagonal joints ~~in~~ this above order can be seen. The lengths of the separate seams & their direction are given above. Flowers grasses & mosses are growing in the crevices.

[illegible] no other [illegible] this exposure as no grouping of consequence has been done.

The rock seems to be identical with 5011.

5012;

300 N.; 1100 W.

This Sample was taken from the highest part of the Lake Expsure extending from the road between Rockville + St Cloud towards the Southeast + forming a good shew of the N E ¼ S E ¼ S W ¼ Sec 9
In a gradual ascent from the road ~~the~~ of 5° & 12° the height of 75 ft above the river is reached
Length of the exposure ~~along~~ N W + S E. 230 paces; dip of S W side (about part) 200 pa
Direction of this S W Side N 70° W., at a dip of 55° and the principal joints of the Exposure have this direction the N 35° E, N + S, &c. were measured
While from the highest point there is a slope in all directions that towards the N W seems to be longest + most indicative of a "dip" to the Exposure
Weathering has changed the color of the surface to some Extent - the feld spar resists better than hornblende + pieces of this mineral are washed out leaves cavities on the surface + can be scraped up by the hand
The Samples taken are considerably weathered — no better could be found as the Exposure as no grouping of consequence has been done
The rock seems to be identical with 5011.

(9—891.)

Sec. 9 T. 123 R. 29

5013;

500 N; 1200 W.

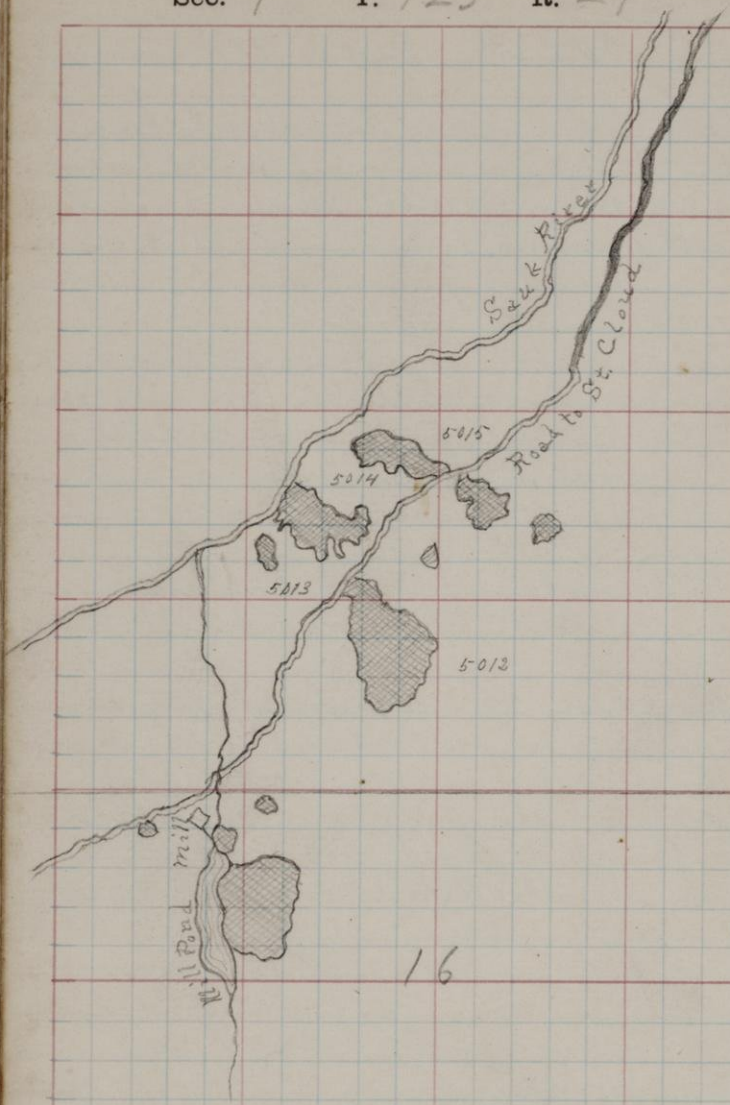
At the lower side of the outcrop from which 5012 was taken occurs several veins of some width. These veins of a width varying from ½ inch to 8 inches or more occur frequently over the surface of the exposure.

This number was taken from one of these veins of a width varying from 6 to 8 inches & extending in a nearly north & south direction.

The walls were uneven & ragged as shown by the course of the vein along the surface of the coarsely crystalline granite thro' which it extends.

At the edges the vein material seems to be finer & more homogeneous than along the middle part of the vein and this or some other circumstance produces a smoothness of surface near the sides while the middle decomposes to a rougher surface.

Sec. 9 T. 123 R. 29



16

5014;

750 ft; 1350 ft

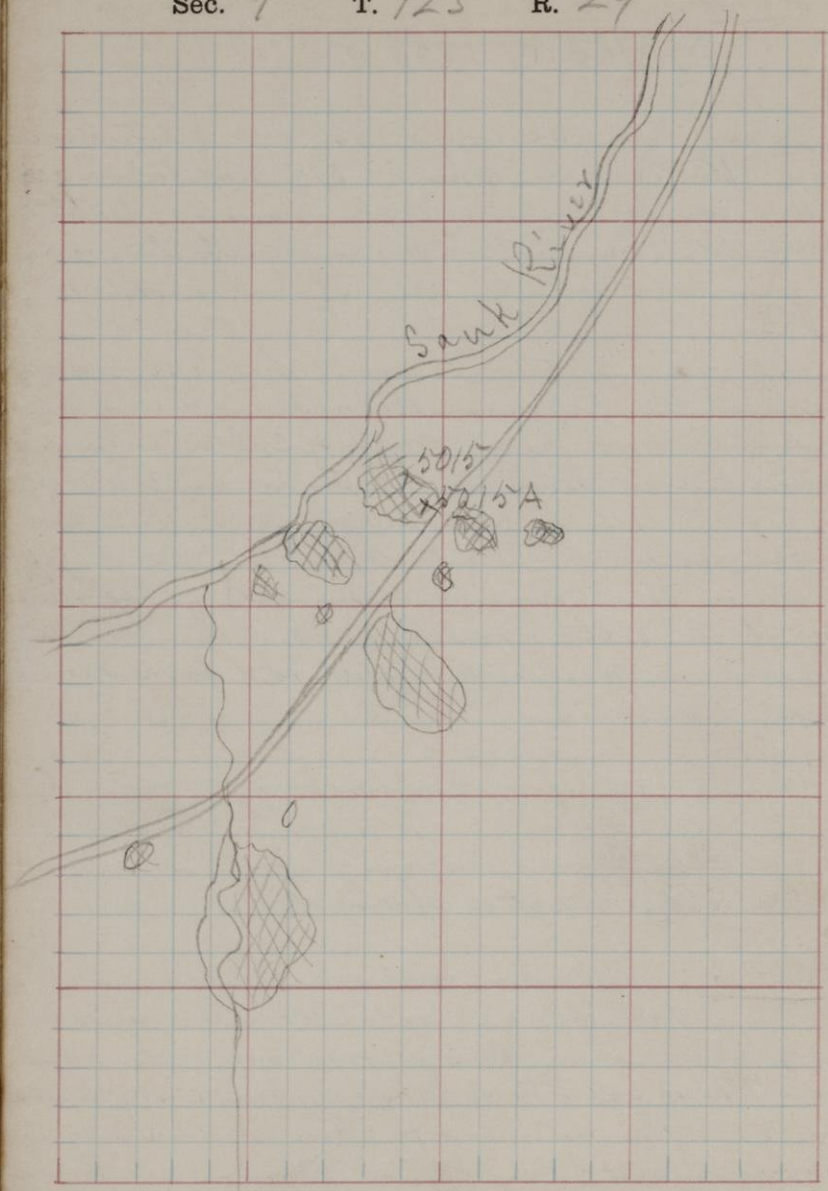
Passing down the river + 150 paces before reaching the Exposure whose 5015 was taken occurs an outcrop of rock nearly identical with the one following — indeed they are separated only by a turf and shallow soil.

The inclination towards the N W is gentle and the exposure disappears under the river. The rock has a redder color than that at any other of the localities in this vicinity; as the rock is highly decomposed this difference may indicate some slight differences in the original chemical composition by which in the breaking up of the minerals of the fresh granite a higher % of iron oxide was separated.

Quartz feldspar + micas (biotite) are found as constituents. The rock is coarsely crystalline some of the feldspars are quite large + of an orthoclastic character.

5014 A Is the vein material occurring at this outcrop as at several others. The veins are harder than the surrounding rock + resist weathering better thus forming ridges over the surface. The material of the veins is essentially the same as that of the coarser granite on either side + in the weathering it is lighter colored

Sec. 9 T. 123 R. 29



5015;

850 N; 1000 W.

This exposure extends with one or two interruptions from the river to a point some distance S of the road — its whole length is about 600 paces with a greatest width of 125 paces.

The highest part of the rock consists of two high knobs near together & standing 30 or 40 ft above the river (the Sauk) running along past the lower end of the Wider knobs like the rest of the surface of the exposure is worn smooth evidently by glaciation & has a rounded shape as has all the knobs in this vicinity.

The joints run in several directions but those appearing to be the main ones have E 15° N: in some places these are weathered & excavated 2 or more ft deep leaving rounded & parallel ridges between them.

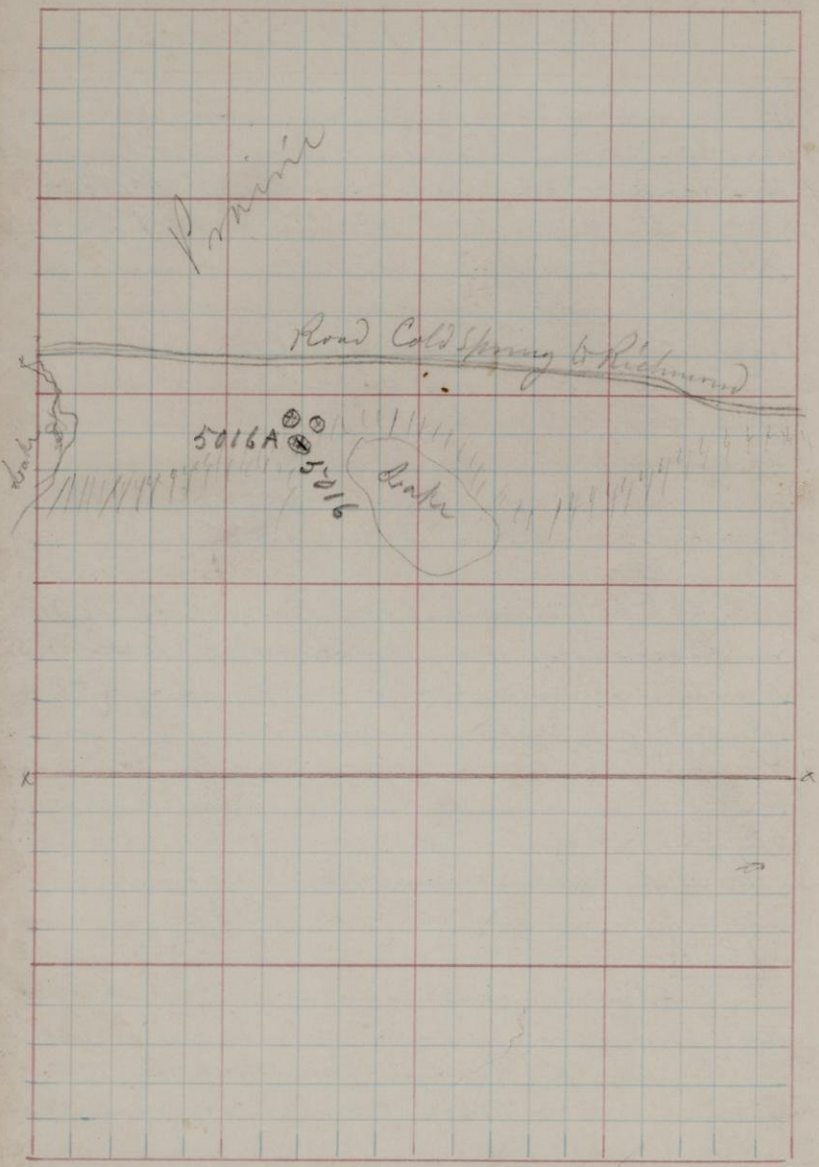
The inclination of the surface of the lower & larger part of the area is from 5° to 10° while that of the higher is at least 15° in the direction varying from E to E 15° N.

The rock closely resembles 5012

5015 A

Is a compact siliceous vein material from veins from 1 to 3 in wide so much harder than the mass of granite thro which they run that they stand out in ridges over the surface. The direction is not uniform but the curve in many directions

Sec. 19 T. 123 R. 30 W.



5016;

900 ft; 1300 W. 5016A Min in 5016

At this locality are 3 exposures S ...

5016 A

The three exposures together are not large. e.g.

Northerly 6 X 17 feet
Southerly 15 X 25 "
Easterly 3 X 5 "

But on the Southerly is a mass of very coarse granite. At first it seemed like a vein within the dark colored rock around it, but from general principles + observations at other localities subsequently it is altogether likely that if there be any vein or dike the dark is the rock forming it. This no, 5016 A, is a very coarse Crystl aggregate of Quartz feldspar + Mica in which some of the feldspar + Mica grains are two or more inches across. All are much weathered + easily separate on trying to dress samples

Diorite

Sec. 19 T. 123 R. 30 W.

On the surface where the rock has been for some time exposed to the weather the feldspar has disintegrated to a white coating looking like Kaolin. The dark colored minerals seem to disappear leaving a dirty gray surface full of hollows out of which the grains of Xtals have been weathered. There are no iron stains about to indicate the presence of much iron in the rock.

5016;

900 ft; 1300 W. 5016A Min in 5016

At this locality are 3 exposures small in extent and without much promise of material for building or bridge purposes.

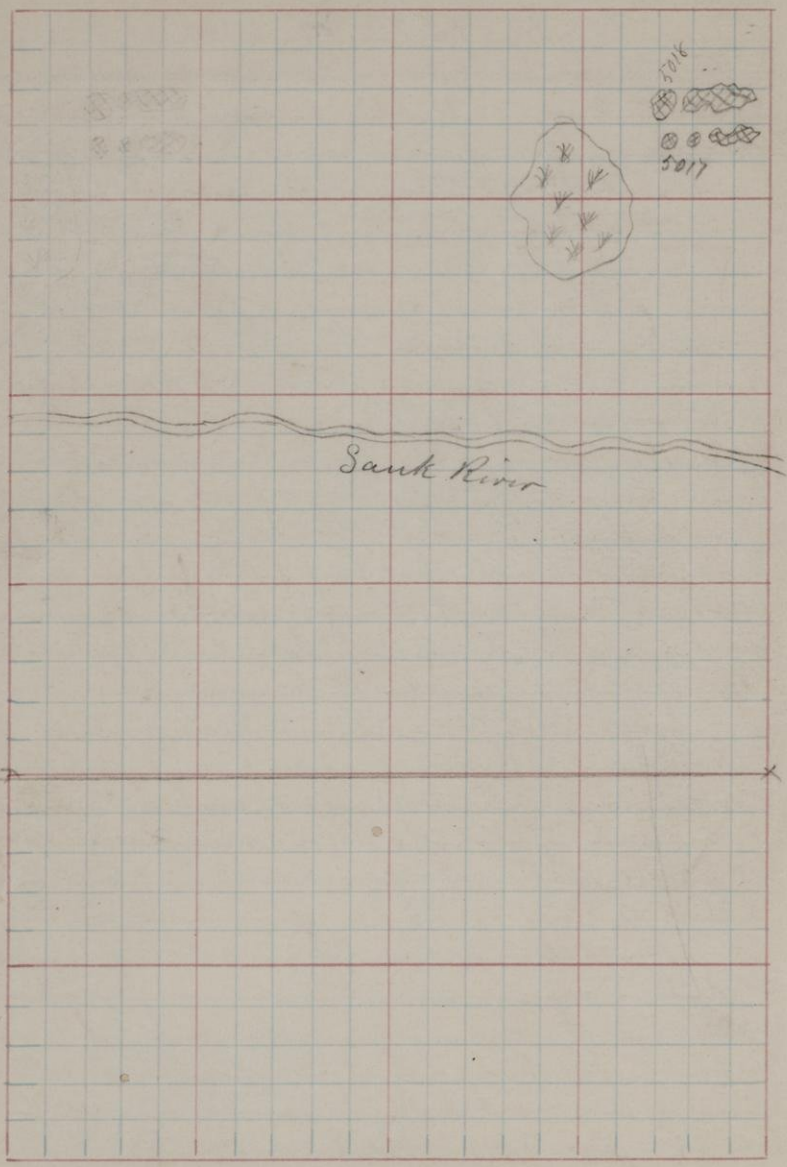
The most northerly of these is located 50 paces S + 165 paces E of the N W cor N E ¼ S W ¼ Sec 19; the most Southerly is 50 paces South of the first named + from this the samples were taken; the third + most Easterly of all is not more than 50 paces from either of the others.

Some cords of stone have been removed from the South exposure + fresh samples were found but Elsewhere the rock was so coated + so decomposed that but little idea of its characters could be formed more than what could be seen in the small quarry.

The rock seemed to be thoroughly shattered; no large blocks can be taken unless a considerable depth be reached. This shattered condition seems to prevent any determination of the leading joints; those measured were N 55° W perpendicular, another N 55° E with a dip S 55° W of 70°.

The rock has a dark color + apparently contains mica with a triclinic feldspar + a pyroxenic mineral. The mica shows parallel position of the scales or folia when the specimens are held under the light in certain positions. The rock may be a Mica Diorite

Sec. 30 T. 125 R. 30 W



5017;

1650 N; 275 W.

On the farm occupied by Joseph Klimentitsch occurs a number of small exposures of this sample all being only large masses of rock under a thin coating of soil — so thin that what will not grow from it.

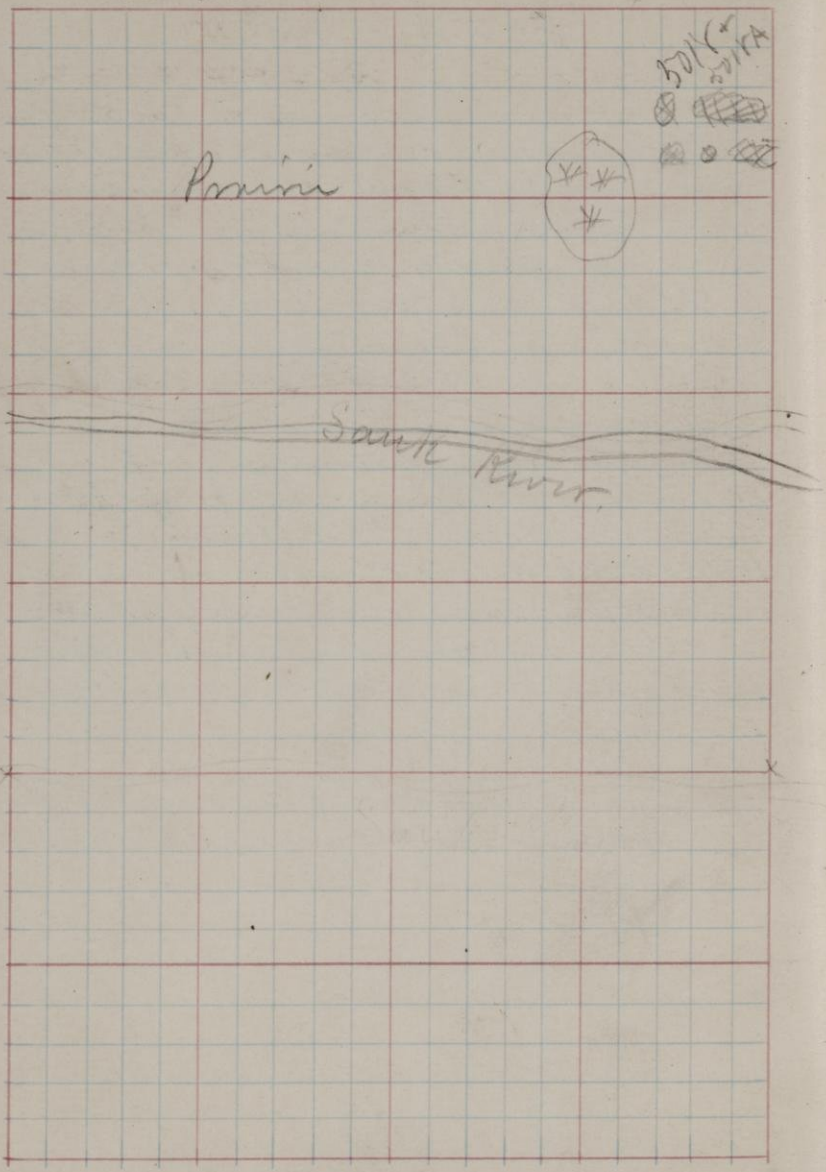
The knight above the river is not more than 40 ft above it but the horizontal distance is considerable. The country has to a considerable extent been reclaimed from

The joints show several directions e.g. N 20° W; N 73° E; — the former dip 83° in the direction N 70° E & the latter 75° to the N 25° W.

Some of the rock at this locality seems very coarse grained. The weathering is quite marked extending into the stone so as to alter the color to the depth of an inch.

The rock is strikingly similar to that described from Sec 19 under the No 5016.

Sec. 30 T. 123 R. 30 W.



5018

1750 N; 275 W

Surface of ground slopes both N + S. from top of the E + W ridge extending into the sec to the slough from Sec. 29. Other than this no dip nor strike. This exposure is 100 ft N of the preceding. The rock has been quarried for building the Richmond Schoolhouse. It is less jointed than at 5017 or 5016 with both of which it seems nearly identical.

Joints extend N 75° W dip of Seam 70° N.
Area of Exposure 15 X 35 paces.

The rock shows considerable weathering + where this is prominent the porphyritic character of the rock is clearly brot out - large feldspar crystals standing out on the surface in whitish gray blotches. Crumbling + disappearance of all min ingredients but feldspar result from weathering.

5018A

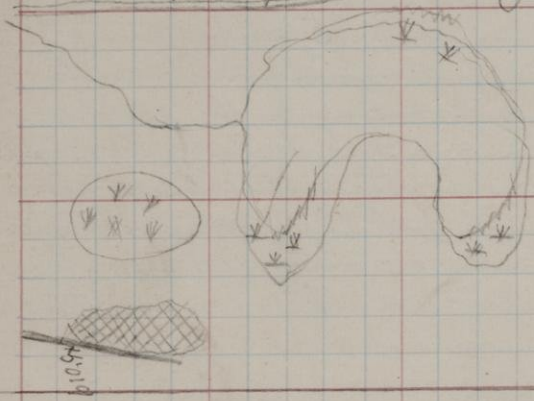
Running nearly N + S thru this quarry is streak of quite coarse grained decomposed material. On the surface of this mass nothing but feldspar crystals can be seen, + some of these are 2 inches long. When they are broken folia of mica can be seen — of hornblende I am not so sure — quartz in small quantity is recognizable. As this rock lies in the driveway to the quarry its extent cannot be determined but in one place it passes quickly thru not abruptly into the dark porphyritic rock of the quarry.

(9—891.)

Sec. 20 T. 123 R. 30

Prairie

Road from Cold Spring to Richmond.



5019;

100 ft; 1700 W

This number represents a dike or other occurrence of an apparently interesting rock at the base on the South side of a high bluff which will be described as # 5020.

The South side or boundary of this rock cannot be found + only how + then can the northerly wall be seen. Wherever it can be seen it is nearly perpendicular; in one place the direction of contact is N 45° W in another N 70° W.

If this dike (?) is broad enough to underlie the space between this Exposure + #5021, + the Contours seem to suggest this, this rock will cover the localities of nos. 5016 – 17 + 18

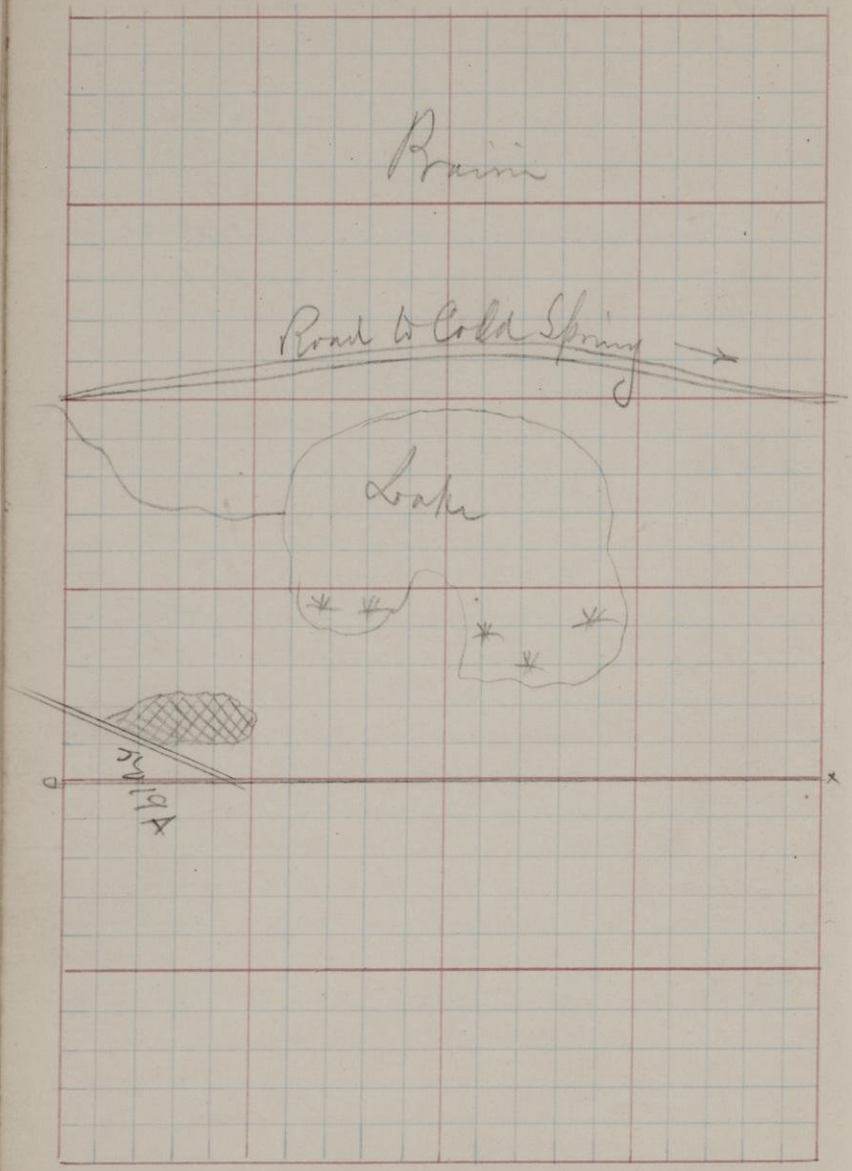
On some of the feldspar surfaces the beginning of the triclinic crystallization is seen, some of the glassy surfaces of this mineral show long large crystals occasionally occurring.

Mica cannot be with distinctness determined without a microscope; but it is present in surrounding Exposures.

The rock is quite free from accessory ingredients (macroscopic)

(9—891.)

Sec. T. R.



5019 A

100 N; 1700 W

The position extent & direction of the dike 5019 have already been given

This no, 5019 A represents some of the features of contact of 5019 & 5020,

Everywhere observed the original mass in 5020 in contact with the dike is more or less decomposed

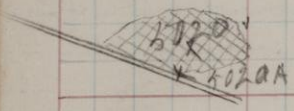
Many cords of stone have been quarried at this spot & the dark colored dike rock has been chiefly taken

Bands of the massive rock pass into 5019; whether they are of the original, 5020 or not cannot well be determined here; but the curious position of the mica folia & the crystals especially of feldspar standing in nearly all cases at right angles to the wall of the vein suggests infiltration & growth of the crystals in situ. Notice also the same fact shown by the samples of # 5016 A,

Singular mixtures of the two kinds of rock can be seen. Nodules or masses of considerable size occur when the rock has a decidedly schistose structure.

(9—891.)

Sec. 20 T. 123 R. 30 W



5020

15' N ; 1700 W.

This is a high ridge running in general direction N 70° W, 75' or more ft. high, sloping off northerly + southerly with a width of at least 100 paces which length 300 paces or more. Towards the S the Gypsum slopes off into a prairie broken by several small Exposures of a rock identical with 5020

There are quite a number of joints seen on the surface Principal ones S 75° E ; N 75° W with a dip of 70° northerly

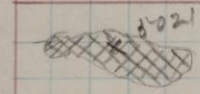
The surface of the rock is much weathered + in protected places shows accumulations of feldspar crystals + shaved chips. A coarse porphyritic structure is shown — brought out much clearer by the weathering. The feldspar crystals are large + sharply defined many of a pink or reddish color.

The weathering may be distinctly traced for several inches into the rock by the browning or reddening which it imparts to the rock.

5020 A Shows a peculiar modification of the 5020 or a vein extending into the mass at nearly right angles or apparently so to the line of contact or dike wall between 5019 + 5020. It has a redder tint a finer texture + a firmer fracture appearance

(9—891.)

Sec. 29 T. 123 R. 32 W.



5021;

1400 N; 1700 W

Drift upon this exposure are quite numerous + run in directions N 45° W; N 10° W; N + S, etc but further than some 100 or 150 ft either strike nor dip shown by the outcrop. Its extent is 300 or more ft along by 100 wide; direction of the ridge is about N 70° W. The top rises 40 or 50 ft above the field below it.

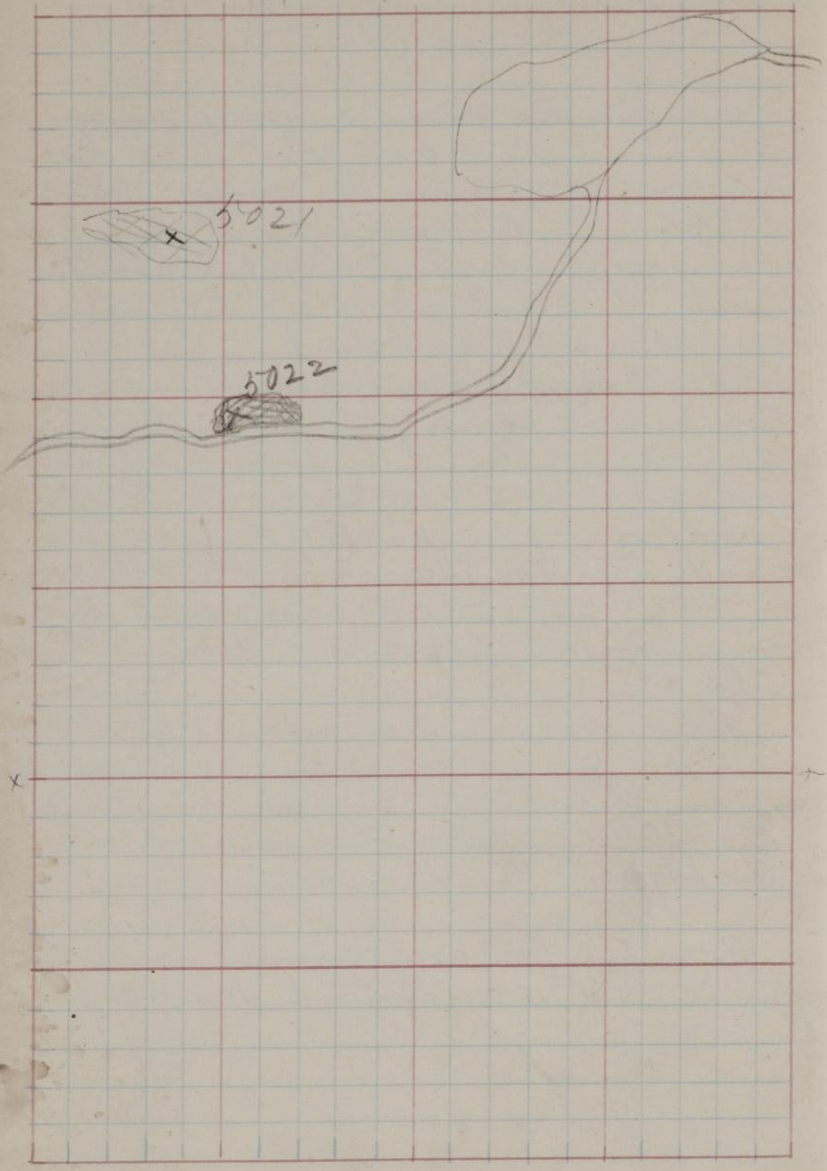
The north side was followed from the west end to the East + examined carefully for some appearance of the dike seen on Secs 17 + 20 but the rock was not seen. The bluff breaks off abruptly — for a part of the way there is a well defined talus — and the direction of it, N 45° — 55° W corresponds with the dike observed in one spot on the dike wall at Sec. 20.

Bands or veins of a more compact nature stand on some of many places over the surface. That they are much harder also is shown by their resistance to weathering + their prominence upon the surface.

The mass of the rock seems to be in the general channel is identical with 5020

(9—891.)

Sec. 29 T. 123 R. 30



5022; 950 N; 1450 W Down by Sauk riv
Sidney visits

A cliff of rock 20 to 25 ft high visible at an angle of 75° S from the river for the distance of 200 paces or more. The Mass seems to rise in two knobs one at each End of the exposure with a height of only 8 or 10 ft between.

The width of the exposure is 75 to 100 paces & the ground rises gradually from the rear of this exposure to the Summit of the one just described, # 5021

Direction of the ridge, S 80° W
Inclination of Surface 10° to 12° N, + N E,
Joints run E + W with a Southerly dip of 75°.

Rock is a coarse crystalline, the Surface very much weathered, the color dirty brown & the constituents feldspar Mica & Quartz; in short it looks very much as # 5021 would look if weathered to the same degree

Close inquiry of the people living in this vicinity but no reports of rock exposures up the river from this point.

Sec. 21 T. 123 R. 30 W

5023 + 5023A

N line of Sec 21

Road to Richmond

5024

5025

Section on the lower part of the page.

5023;

1975 ft; 1950 W.

This Exposure alltho lying chiefly in Sec 21 Extends into Secs 16 + 17 to the distance of 20 + 30 feet

The rock rises to a height of 25 ft above the level of the marshy grove of oaks and tamaracks to the E + SE of the comm.

Area of Exposure in Sec 21, 60 X 175 feet

The mass shows a rounded worn + weathered contour with no dip nor strike more than that general direction of the ridge is E + W + it slopes north + South.

Joints run N 50 W; N 25° E; etc.

The rock is a coarse granite with probably some hornblende; it is very much weathered at the surface; the feldspar is in very completely developed individuals and quite large. No good samples could be found for ore quarrying has been done.

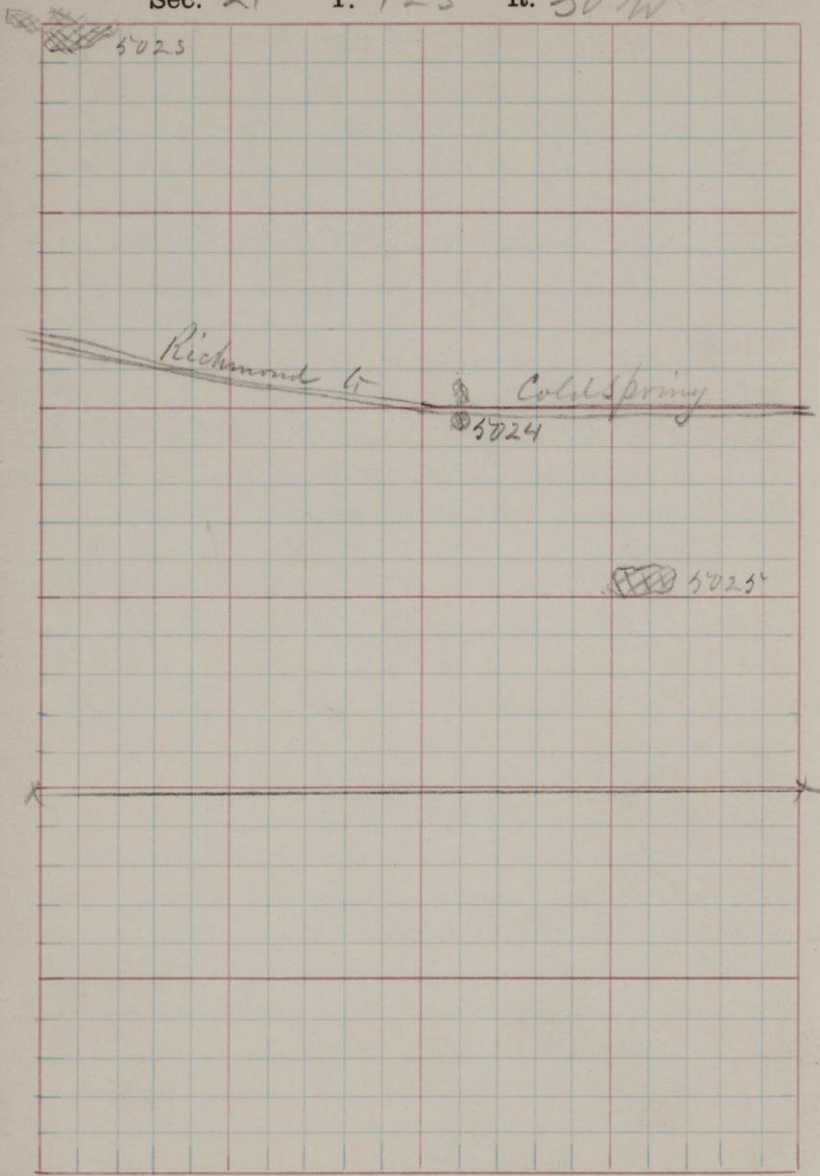
5023A

Is a finer + redder modification of the rock seen in several different places as a vein or band + in other places apparently in nodules or masses within #5023.

As seen from the samples feldspar is the chief constituent altho to a pale or pinkish red color + an easily disintegrating mass.

The band is 3 or 4 ft wide in one place; it could not be well studied as it was too much covered by the soil + shrubbery

Sec. 21 T. 123 R. 30 W



5024; p72 notes.

1000 ft; 900 W

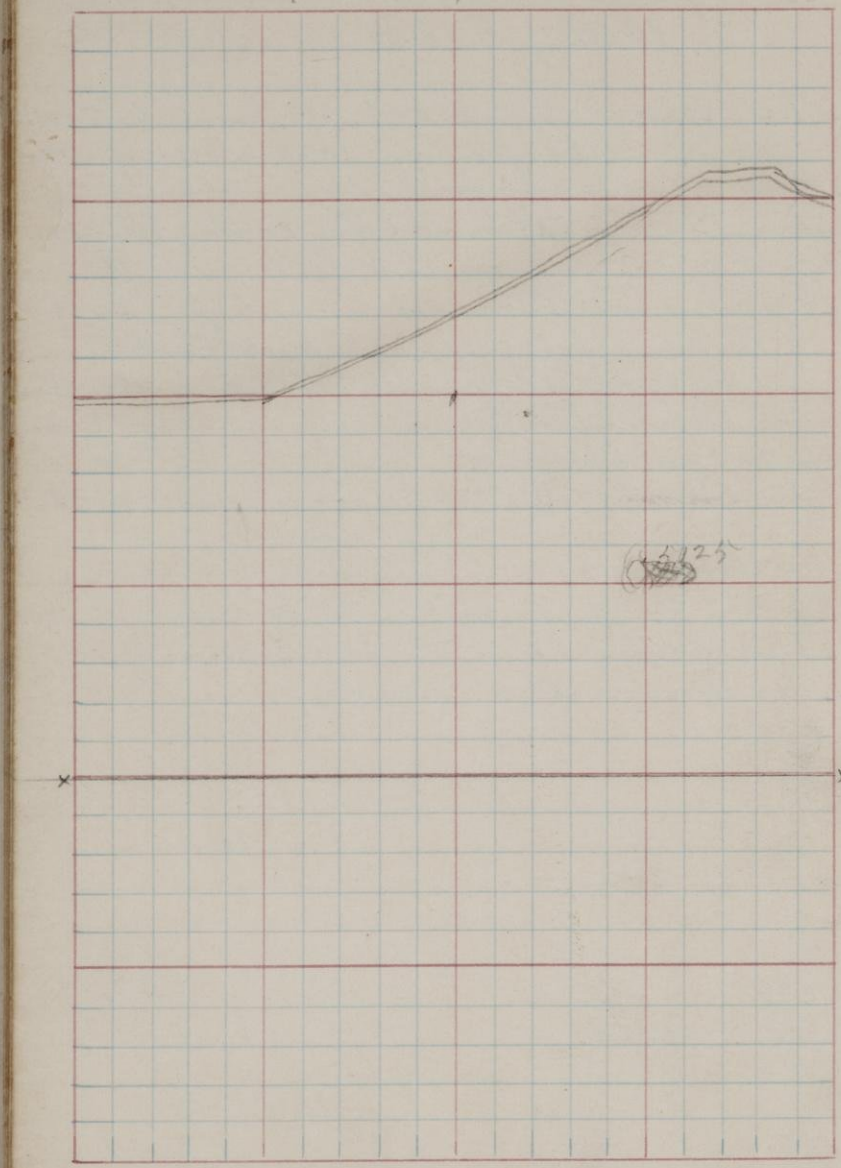
This Exposure stands out only from 6 inches to 3 ft above the prairie. It has been quarried S. of the road so very fresh specimens were taken; nothing taken N. of the road. The whole length of the Exposure is little more than 100 paces — width not more than 10 or 15'

The principal joints are nearly E + W.

Dip + Strike not readily determinable; the mass slopes off in all directions under the soil but perhaps more markedly towards the South ~~+ South~~ than East + West, + North

The rock is a very fine, red, hornblendic granite quite similar in general characters to the samples from many other localities in this township.

Sec. 21 T. 123 R. 30W.



5025;

500 N; 450 W.

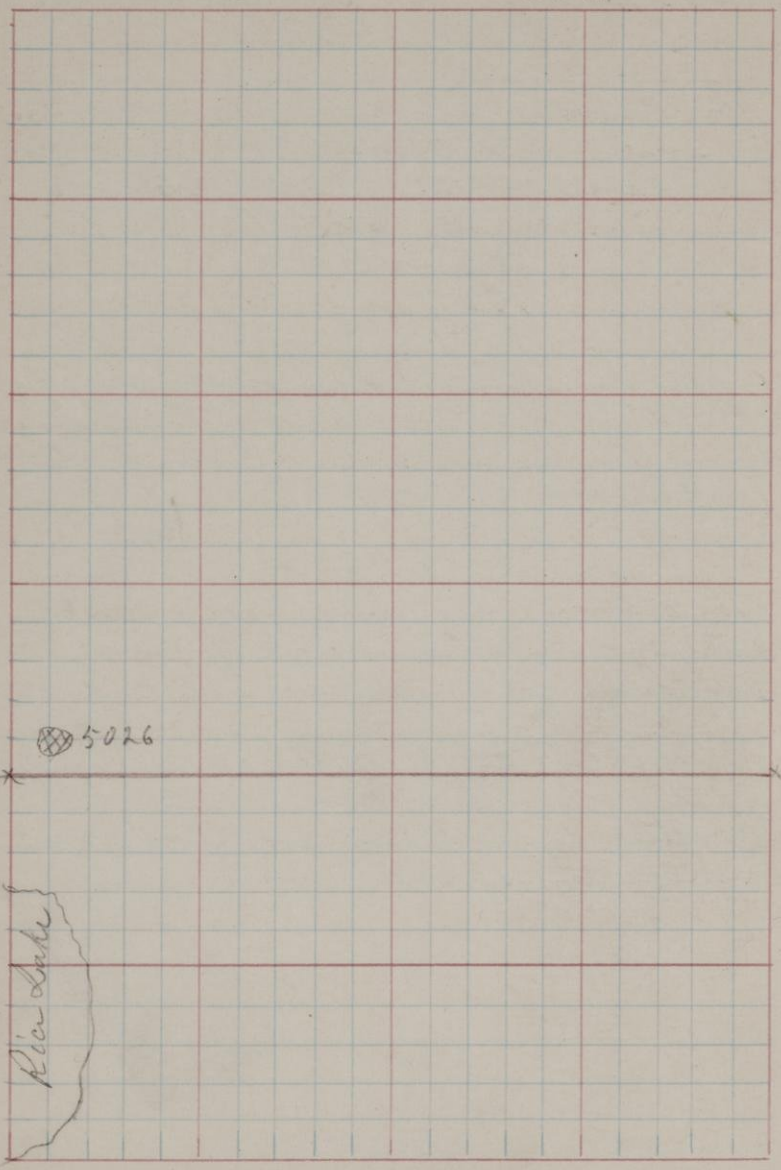
This Exposure has never been grubbed; the surface is mostly covered with soil & a sparse growth of oaks & shrubs. Consequently the samples are very unfresh & poor.

Exposure 150 paces long & 50 paces wide & disappears by sloping under the ground in all directions at a gentle angle, - 5° to 10° except for a part of the distance along the South side where it is abrupt. {Compare also the abruptness of the South {side of #5024

The main ridge runs East & West. No satisfactory determination of joints or other lines of separation.

The rock seems to be the weathered modification of a rock nearly identical with that lying to the north & to the South of this Exposure.

Sec. 22 T. 123 R. 30 W.



5026; 45- 1935-
~~100~~ N; ~~1900~~ W.

This Exposure within 100 paces of the Southwest corner of Sec. 22 is a mass of somewhat broken, much weathered, Shrub-covered Granite. Its area is ~~too~~ small — 65 X 75 paces being its measurement, with a height of 10 or 15 ft. above the prairie level.

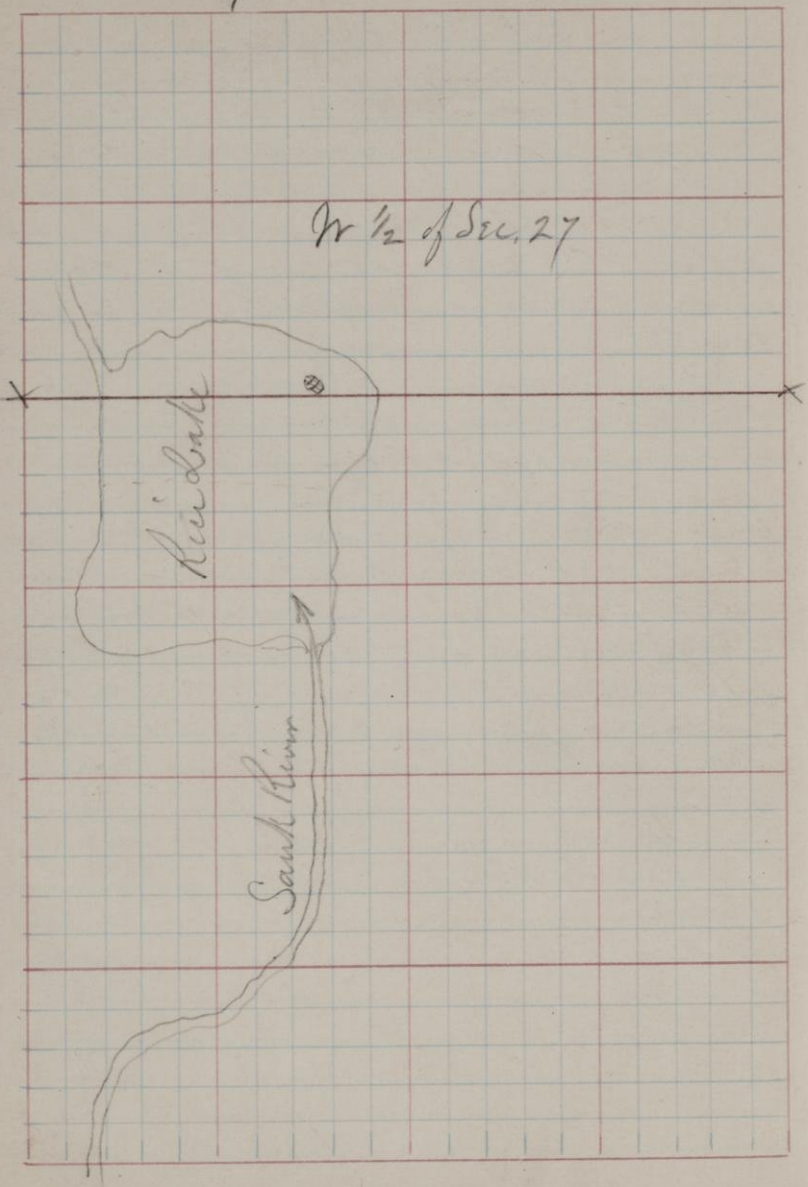
Some boulders of an apparently igneous rock lie upon the surface of the Exposure but no indications of a dike appeared.

The inclination of the Surface was from 6° to 10° West & here there were no abruptions observable upon the South as were the case in the two preceding localities.

There was no opportunity for Erosion of the Surface Consequently the weathered mass remains in place to a considerable depth.

The rock is the weathered condition of the Common Hornblende ? Granite of this Township

Sec. 27 T. 123 R. 30 W.



5027; This map intermit Sec not in

200 ft; 1950 W.

The island stands in the S E 1/4 of the lake + in the 1/4 1/4 Sec named according to our best opportunities for determining the location.

Dip + Strike not observable

Large joints N 20° W; N 30 W + N 35° E

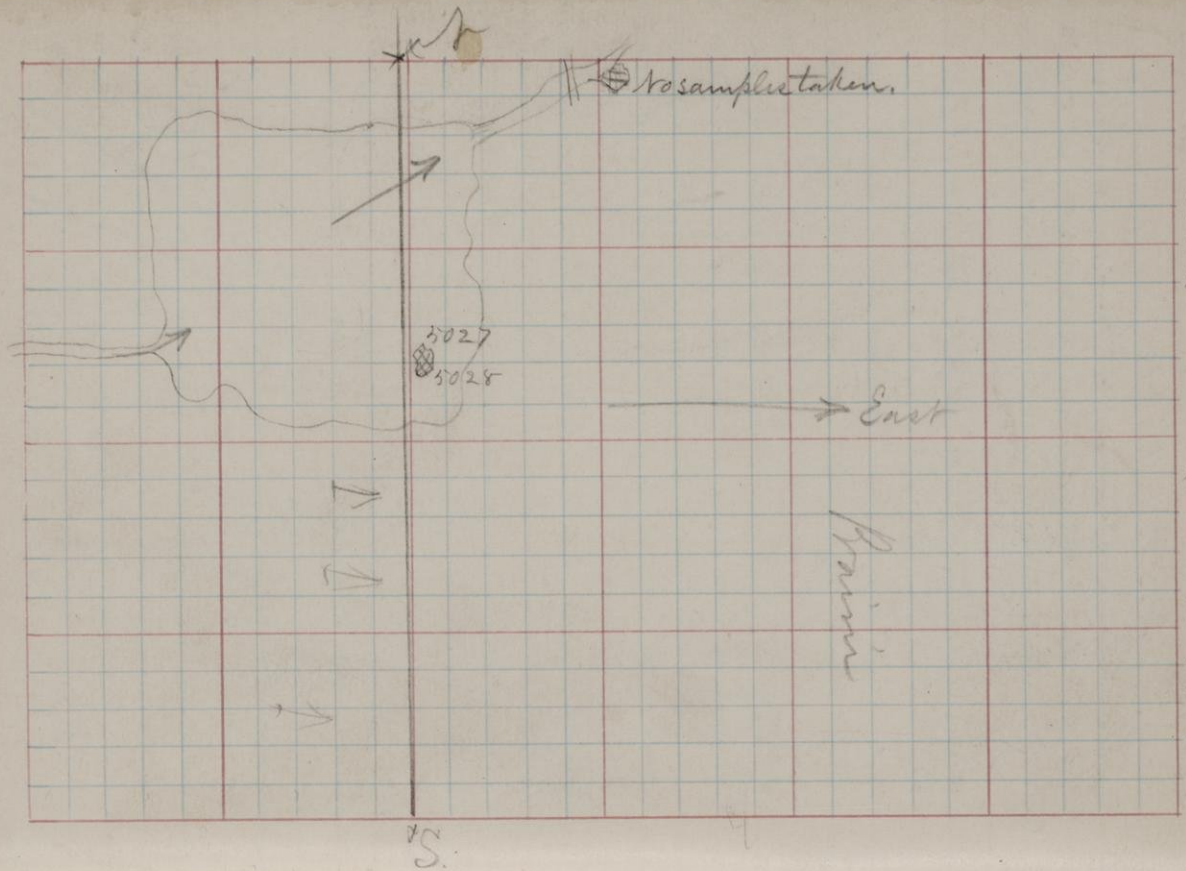
Separate the rock mass into divisions

Size of island — N+S, 20 paces; E+W, 15 paces.

The height of the rock is about 15 feet; trees + shrubs of small growth are living upon it by thrusting their roots down into the walls + sand of the lake thro' the joints of the rock.

This number was taken from the highest part of the rock + the South Side of the island. The sample is that of a dark colored rock more like a basic, hornblendic modification of the granitic mass than an intrusive rock yet the feldspar appears rather like a triclinic than monoclinic species. The texture is of medium coarseness and under the sledge proved to be from the toughest kind of very tough rocks.

The shape of the island + the direction of the heavy joints may be seen here



(9–891.)

Sec. 27 T. 123 R. 30 W.

5028;

See 5027

20° N; 195° W.

Description of the island on preceding leaf.
The measurements taken from near the water on the north side from two or three points.
Upon the northeast near the water the rock is porphyritic, the feldspar crystals being pink red in color. The crystalline grains are not large and the rock seems very compact & tough. The feldspar appears orthoclastic.

The shape of the exposure looking from the west may be seen by this outline.

1 This mass is porphyritic, the feldspar being red or flesh colored especially on the easterly side.

2 A gneissic modification of the rock with the bands as indicated by the lines shown in the figure. This appearance is best seen

(9—891.)

Sec. 27 T. 123 R. 50 W.

on the weathered surface, brought out by the white feldspathic spots standing out in advance of the darker matrix. The effort was made to gather specimens showing the clearest indications of this variation.

2 Showing a somewhat pinkish weathered mass of 5'0" 2" extending from the top of the rock into the water.

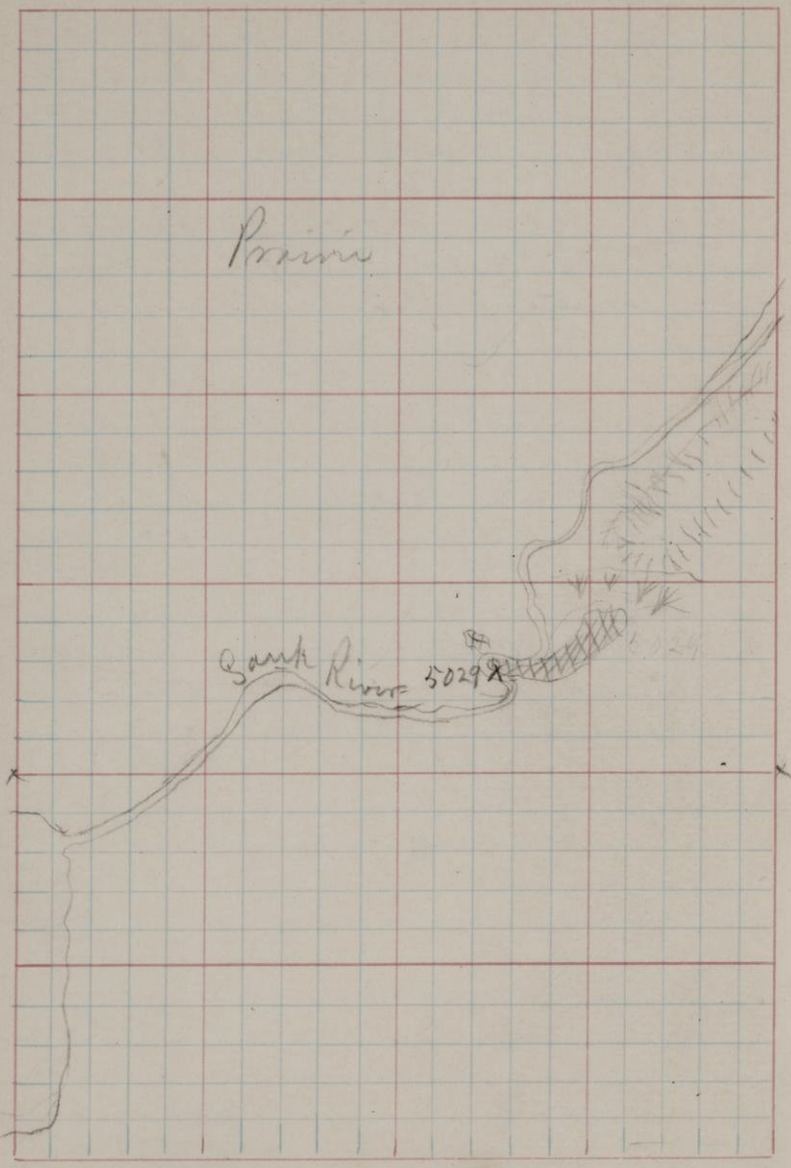
About 20 rods below the bridge going from the lake down towards Cold Spring is an outcrop of rock on the south side of the stream. The mass is small and very much weathered & crumbled.

It slopes off to the S 20° E at an inclination of 30°.

The rock appears to be the Gneissic Granite common in this township.

(9—891.)

Sec. 22 T. 123 R. 30 W.



5029;

300 ft; 700 W

At this point the river makes a sharp bend + cuts thro a mass of rock rising to a height of 75 feet on the East side of the Stream

The front up the water is 200 feet long + is broken up into huge blocks by a double or triple system of joints. These joints have as directions; N 30 W.; N 70 W; while the direction of the finer seams corresponds with that of the feldspar crystals, N. 10 W. There is a northerly dip of 75° to the joints of the system seen on the west + northwest exposures of the cliff. The water in the river is very deep under the cliff + within it are large bowlders broken off + fallen down to the bottom.

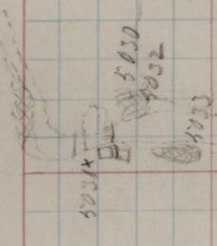
The rock is a coarse granite with quartz + feldspar as the chief ingredients. Over the surface of the rock especially on the SW corner of the mass the feldspar crystals stand out large + fine and they appear to have a general direction N 10° W which gives a grooving character to the rock This direction of the feldspars can be seen on some of the larger Samples with worn + weathered surface

The rock was too much weathered to afford good specimens + it was covered with a thin soil + a growth of trees upon the top + sides except the abrupt slope by the river.

(9—891.)

Sec. 23 T. 123 R. 30 W

See map book for county plan



5020

1700 N; 1800 W

This is lithologically the most interesting place yet visited. Along the east side of the river extends from the bridge towards the south a ridge of rock covered with soil + a growth of timber There are no rock exposures along this ridge excepting along the west or Mill Pond face until after bending towards the S W a point is reached within a few hundred paces of 5029 which is merely a continuation of this Cold Spring Cliff. The height of the ridge is at least 75 feet + the west slope shows several abrupt exposures all of similar character, being formed where creeks have cut their way down into the rocks in their course to the river from the prairies beyond the

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This number is not wholly fresh but it is not so weathered but the characters are clearly seen. Feldspar occurs in large individuals (part) while other crystals + granules + the hornblende are much smaller. The color is dark owing to the quantity of hornblende. Quartz is not a prominent constituent indeed in some samples not a grain of this mineral can be identified

The rock is quite free from accessory constituents except what result from the decomposition of the original constituents of the rock

(9—891.)

Sec. 23 T. 123 R. 30 W.

5031

1700 N; 1800 W.

ridge. But there is an interesting arrangement of rocks at the dam. This arrangement comes on both sides of the river. At a point 50 paces above the dam on the South Side of a rock mass 30 ft high from the water's Edge is a sudden transition from the ordinary Granitic rock represented by # 5030 to that seen in the hr. - 5032. The Contact is Clearly seen. Its strike across the river is S 47° W. & the line covers the point of contact upon the west side of the river at the Quarry now being worked for stone to be used in the construction of a Catholic Church in the village. The dip of this contact is N W 77°. The contact is well-defined; the seam is narrow & the two varieties of rock come up to it without any per-

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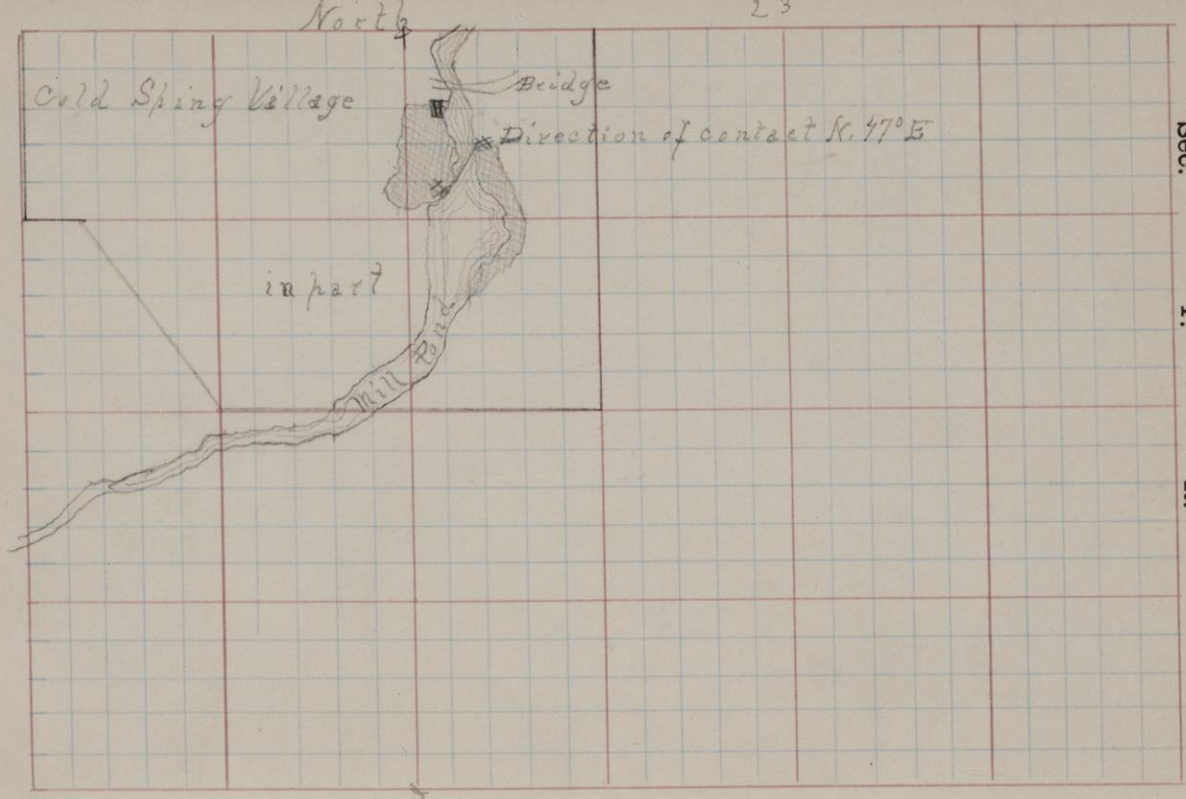
1700 N 1900 W

5031 This modification of the rock is formed by the river's edge on the west side between the mill & the bridge. The color is dark greyish or green with porphyritic red feldspar. It seems to be only a local modification of 5030 when the particles both of matrix & the feldspar take on a uniformity of direction. The appearance is one of indistinct "Streaming" rather than that of a schistose structure. The glass discloses a much greater percent of Silica & feldspar than the naked eye would lead one to suppose.


North
Cold Spring Village
Bridge
Direction of contact N. 47° E
in part
Mill Pond

Sec. T. R.

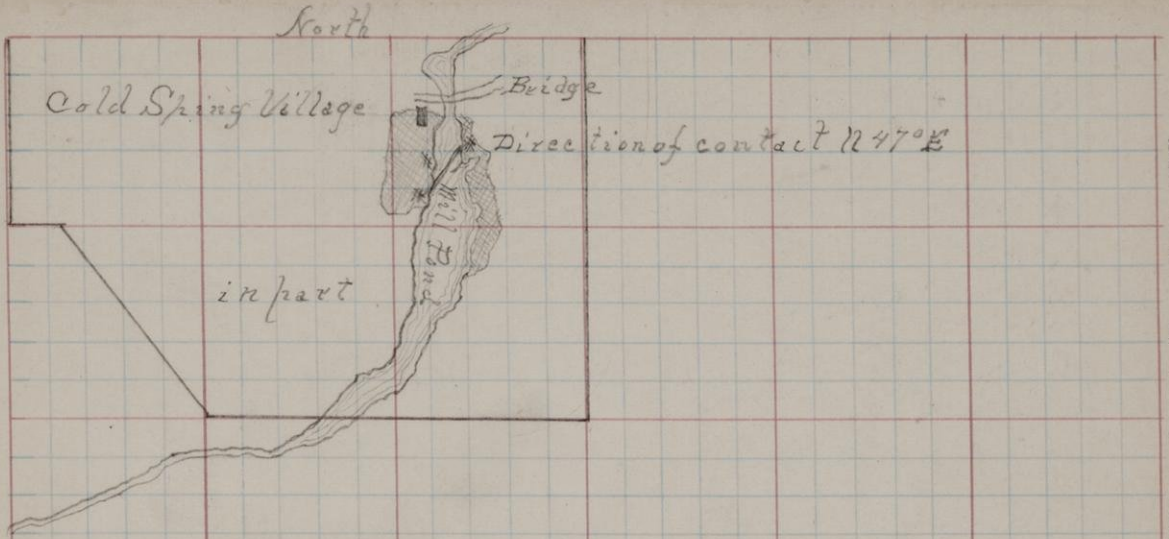
5032

1700 N; 1800 W.

ceptible change in texture except a slight weathering. On the west side of the river at the Quarry the observation showed the Strike of the Contact between the Common Granite + the Modification which is granitic is N 47° E passing directly to the point of observation on the East Side. The dip at the Quarry is 71° N W, a variation of 6° easily accounted for by a possibly displaced position of the rock upon this abrupt face.

Upon the opposite or NW side of this new or modified granite no actual contact could be seen. But at a point 25 paces north of the north end of the flouring mill a channel shallow + partly filled with soil showed upon one side the Ordinary + the other (the SE) the modified granite. Carrying the direction S 47° W to a point opposite the Quarry + measuring with a tape the distance across the modified granite is 401 feet; this, with the dip 71°, gives a thickness of the belt or vein of feet.

5032 is the rock upon the East side of the river + is a fair sample of the Modified Granite of the locality. The first point noticeable between it + the ordinary Granite is that this has a lighter color abundant Quartz grains + only occasional hornblende grains. This is probably several percent richer in SiO_2 than 5030 which was taken only 6 inches away on the opposite side of the contact.



Sec. 22 T. 123 R. 30 W

5033 1902

5033

This number represents the rock at the quarry now worked in Cold Spring. The stone taken out here are so broken that no large blocks can be secured & this condition is an obstacle to rapid working for many blasts will spread thro the fissures and no effect is produced. Further the rock is so very hard that two or three drills are blunted in drilling a single hole

There seems to be more hornblende in this sample than in ≈5032 taken across the river at the point of contact with the gneiss. The color of the feldspar is the same as at all localities & on all exposures in this vicinity

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[illegible] ion of the Potsdam observations. He did not observe this taste in other localities in Stearns County.

Sec. 22 T. 123 R. 30 W

3033. A.

At a point on the west side not many paces S W of the S W corner of the flouring mill this modification of the rock 3033 is seen at the surface.

The structure is pegmatitic but the mica is wanting — the feldspar being the mineral taking on crystal form.

At other places near the quarry the grounds are very fine and the appearance of the mass is decidedly different from the pegmatitic modification towards the mill from the quarry.

5033 1900

1700 N; ~~1800~~ W.

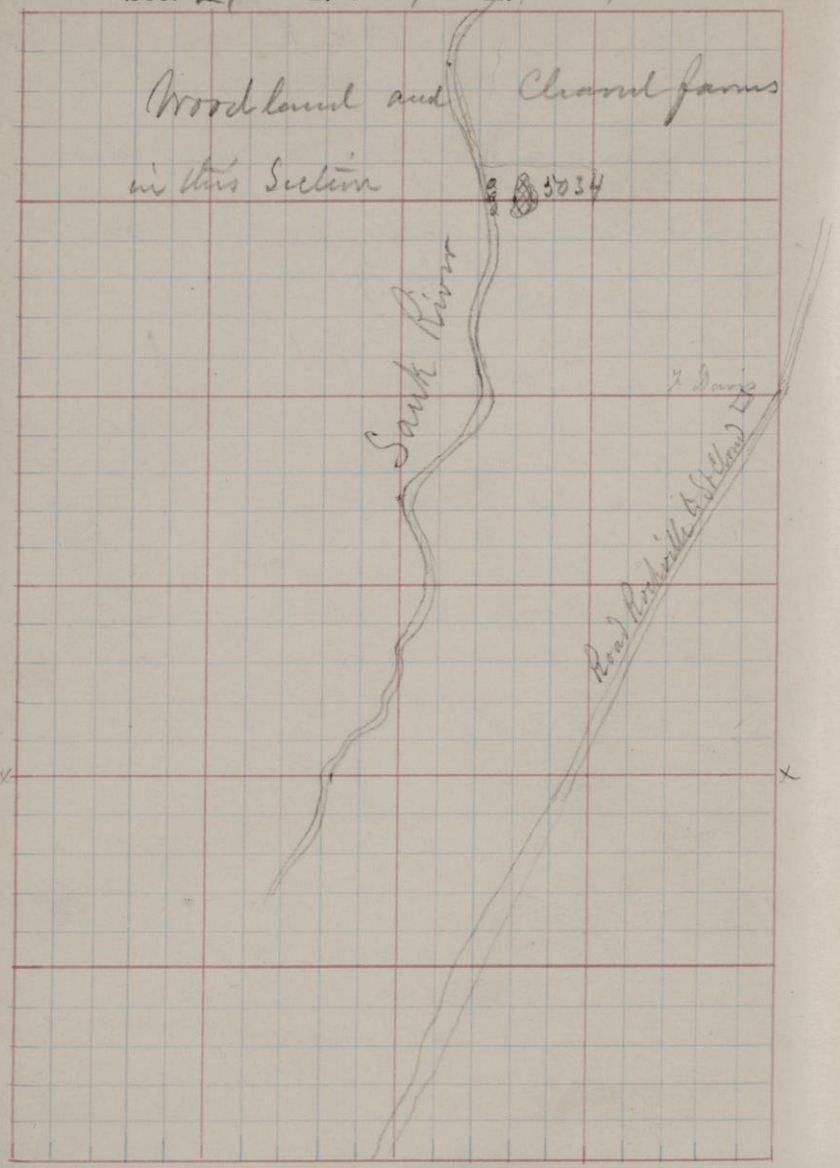
In the matter of weathering alone there is considerable reason for considering these two Granites, nos. 5030 + 5032 as quite different. The ordinary Granite (5030) Crumbles away leaving on the surface a quantity of feldespar Crystals in a loose mass; the mica gradually Changes from black to yellow + then by Crumbling breaks away + disappears; the quartz also disappears as no grains can be seen mingled with the loose feldespar. As the grains are small + form a proportionally small part of the rock they may be dissolved away by the alkaline products from the orthoclastic feldespar.

The Modified Granite – 5032 + 5033 – does not show such a marked Crumbling + separation of the feldespar; it may possibly be owing to the large % of free silica is quartz in its Composition Chemical analysis must show a considerable difference in the Composition of these two kinds Certainly in the quantity of SiO_2 – the modified showing much the greater %.

Professor A. F. Beckdolt of the Mankato Normal School in passing thro' Cold Spring about July 1 noticed a distinct Sulphuretted Hydrogen odor + taste in the Spring waters in this vicinity + called my attention to the fact. I did not notice the fact but make this mention of the Professors observations. He did not observe this taste in other localities in Stearns County.

Sec. 27 T. 124 R. 29

Woodland and Cleared farms in this Section



5034;

1500 N; 700 W.

This is a low flat exposure of rock 65 X 75 paces in extent + 70 paces from the river.

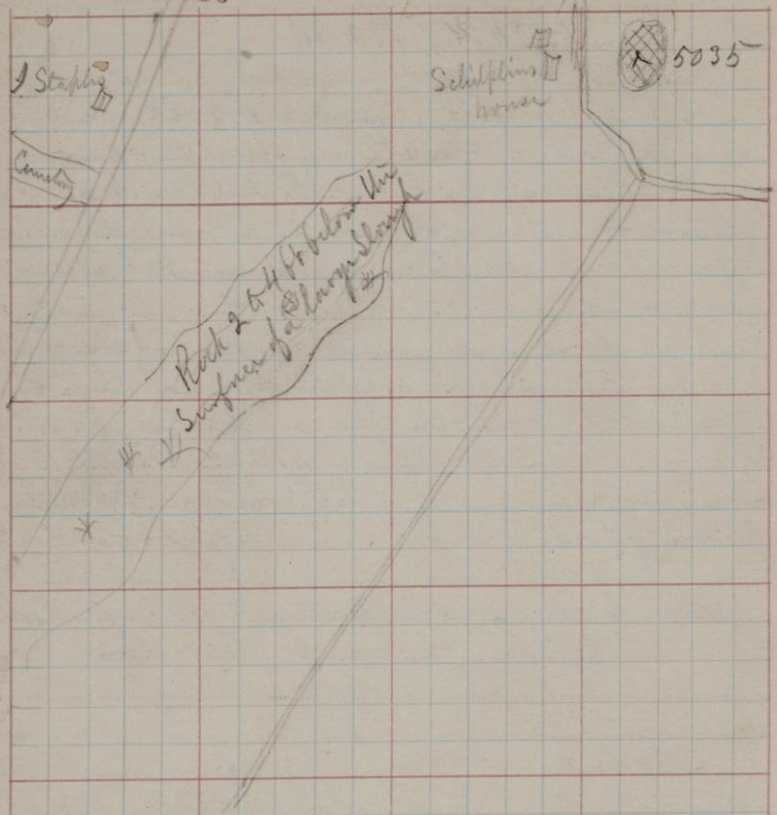
The locality is in a wooded part of the section — no quarrying has been done + difficulty was met in finding satisfactory specimens.

There are many large bowlders in the river by this place which appear identical with the rock in place at this exposure. Some of these bowlders would weigh 10 or 15 tons; they have been the source of building stones, posts &c for the neighborhood.

This rock is weathered to a dull reddish or brownish hue broken by the dull dark hornblende which is an important constituent of the rock. The feldspar develops many large porphyritic crystals among the smaller feldspars + even in these the granular texture is fine + scarcely perceptible grains. The hornblende is dark + dull thro' weathering but no decomposition products are to be observed.

The bowlders in the river + scattered along the way from the exposure to Mr Davis' house seem considerably fresher than the rock in place. Mr J Davis owns the land on which this exposure occurs.

Sec. 26 T. 124 R. 29



5035;

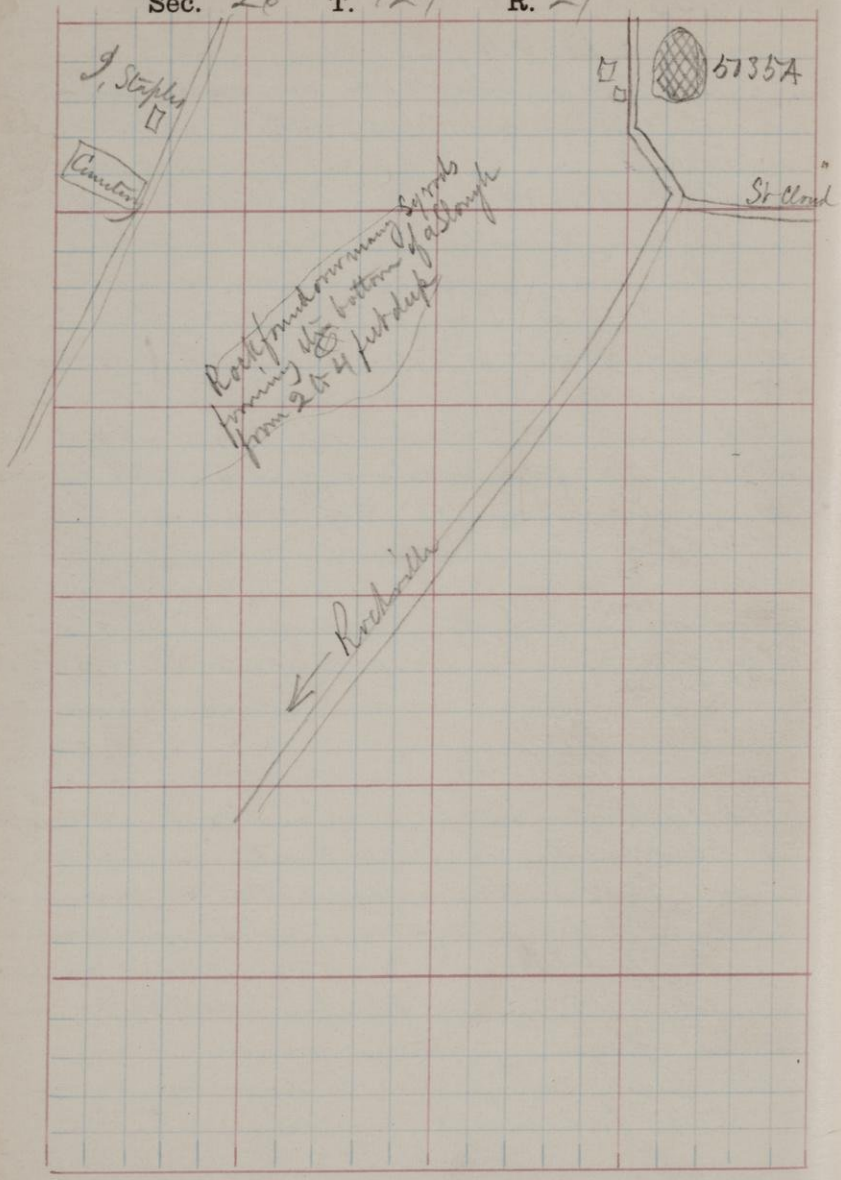
1800 N; 300 W.

This Exposure lies at the intersection of 2 roads
Length of Surface 185 paces N + SW; 125 do. NW + SE.
The rock rises in a mound 20 & 25 ft above the
wooded land on the W Side. The inclinations of the
Surface are; towards W 12°; N + S each 15°.
The Surface is nearly all smoothed; where the orig-
inal Surface is seen it is worn by glaciation.
When the rock has been removed by quarrying
a Surface appears parallel with the orig. one
+ equally smooth. So the rock shows a System
of joints & false bedding planes dipping in
all directions from the highest point with the
upper Surface of the rock + it is along these
planes that the rock has been quarried, lead-
ing up in large plates. These plates are remark-
ably free from joints or flaws + large blocks

5035;

This, a biotite granite with very white
feldspar, is a rather coarse rock — tho not
so coarse as that at Rockville (Nos.
5011 & 5015). There seems to be no pronounced
direction of the feldspar crystals. It contains
a higher % of Mica — Quartz in about the same
quantity as them. The feldspar weathers to a white
powder (kaolin) without much change of
Color. Quartz disappears as does the mica
so that feldspar is the chief constituent of
the mantle of Crumbled rock lying in pro-
tected places.

Sec. 26 T. 124 R. 29



5035 A

1800 N; 300 W.

the not thick ones can be worked. There are now lying upon the surface some split posts 14 feet long & 10 inches in section. These are worked out when the rocks dip to the N W 15°.

No glacial striae were seen. Considerable stone has been taken from time to time from this quarry by the neighbors for foundations &c. but owing to its distance from town & the less distance of other good quarries but little stone has been marketed. Judges affirm that this is the best quarry on the west side of the Mississippi River.

5035 A

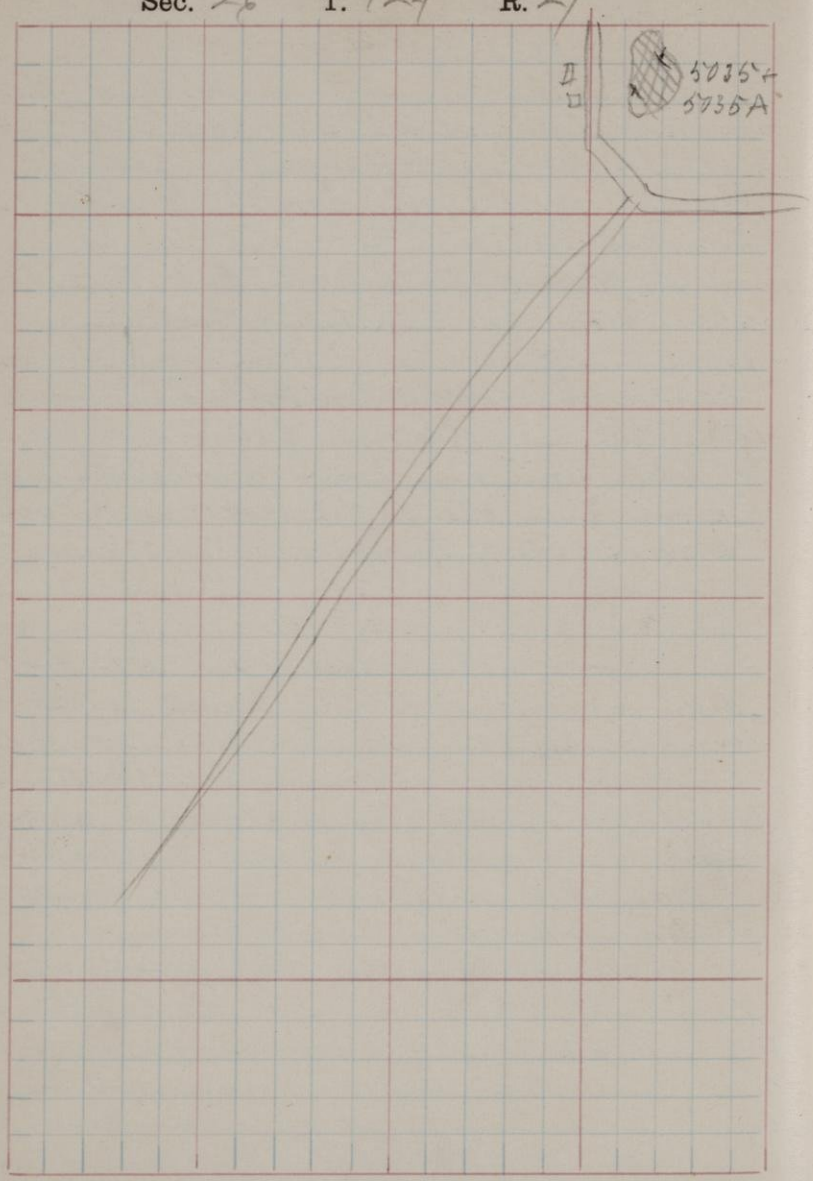
Running thro the exposure on N W. part is a dike direction N 45° E. Width 18 to 20 inches Perpendicular or nearly so. This rock is dark & finely granular, considerably shattered by fractures extending or across it at right angles to the walls = a basaltic structure.

The rock is very tough & breaks quickly & splintery under quick, sharp blows.

It is porphyritic; both quartz & feldspar crystals can be seen on the surface tho' neither so large nor so numerous as in 5010. In weathering the color becomes a dirty buff brown. Streaks standing out on surface indicate presence of thin irregular bands of some harder material as quartz as that mineral were seen to do at times in Geodic masses.

(9—891.)

Sec. 26 T. 124 R. 29



5035 + 6035A

1600 N; 300 W.

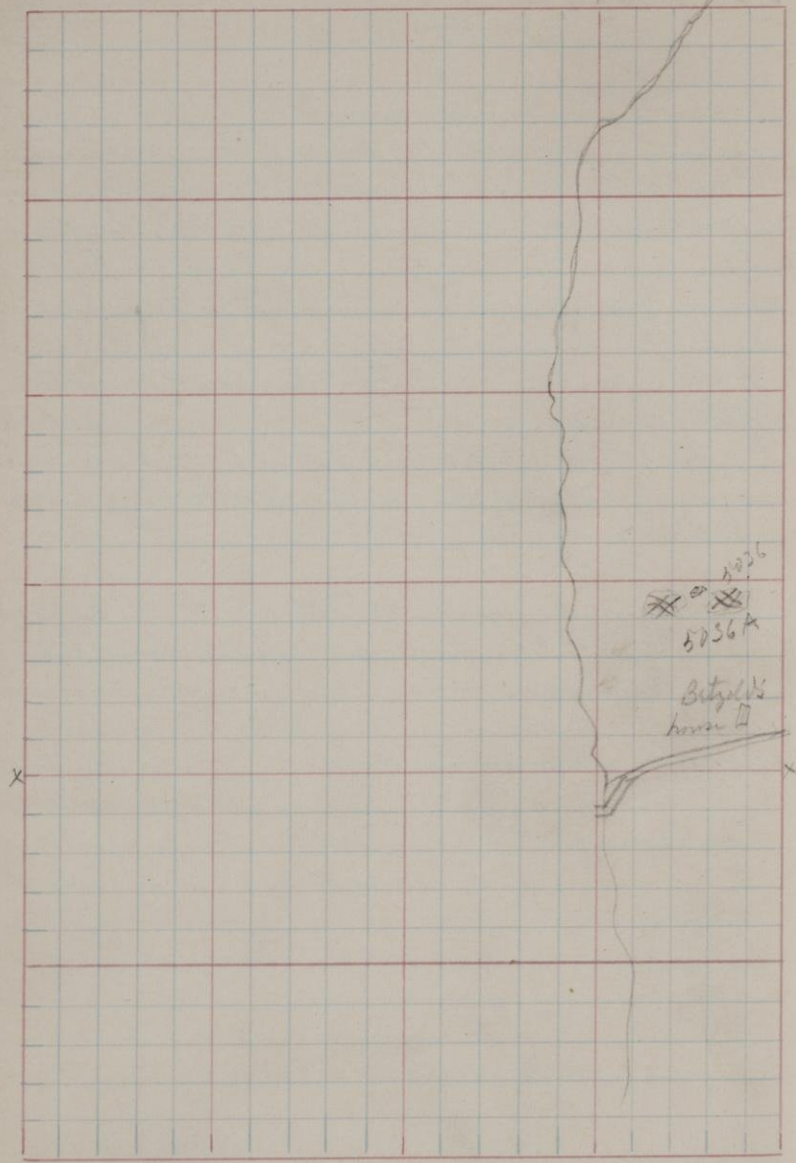
Altho no distinct direction to the feldspar crystals was seen; yet the position of this mineral & that of the mica suggest to an observer a gneissoid structure; as one looks down upon the surface he sees a light color & a predominating % of feldspar as he looks at the edge eg of a split block of the same mass he notices a dominating of the mica.

In other words, the feldspar is arranged horizontally & the mica vertically, referred to the surface of the granite.

Veins of quartz extending N 10° E. from 1/2 inch to 2 or more inches wide are scattered over the surface. Occasionally nodules the size of ones fist or smaller of a pink feldspar & a small % of quartz & mica; they are not numerous enough to injure the stone for monuments.

(9—891.)

Sec. 24 T. 124 R. 29 W.



5036;

450 N; 105° W.

Only 40 paces long & 20 wide with no particular dip nor descent.

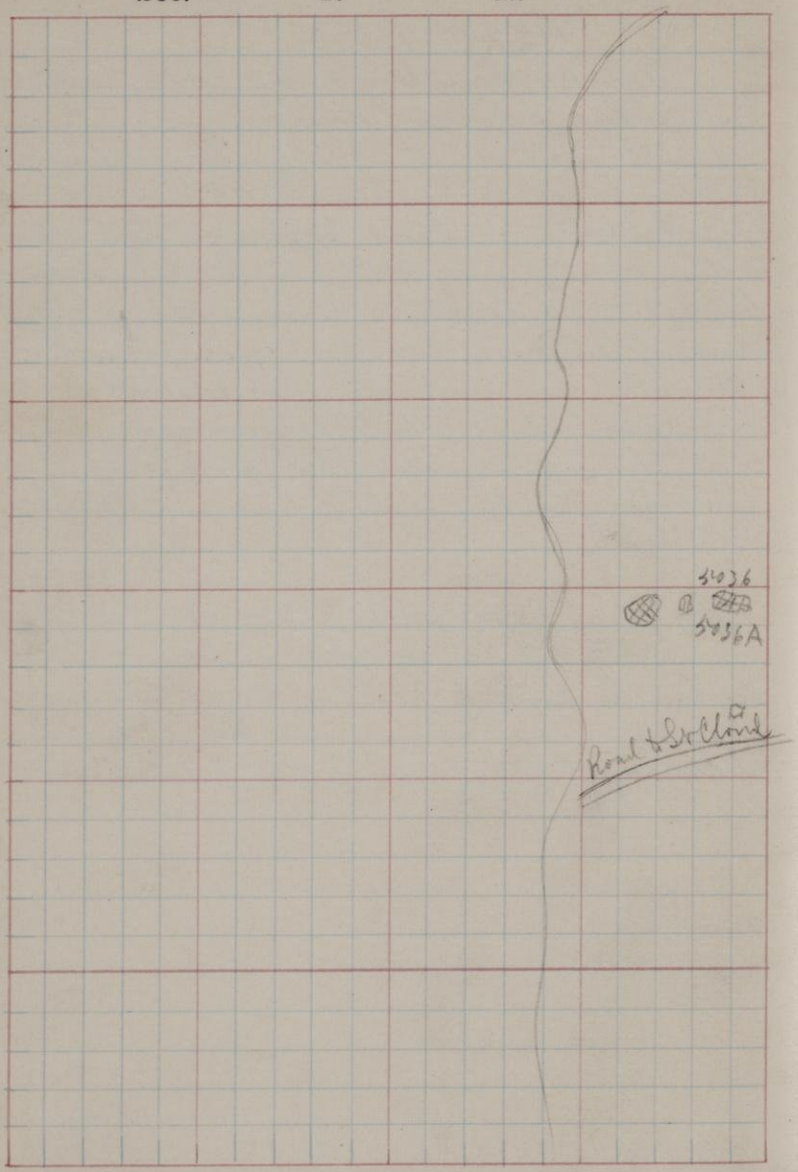
Joints N 5° W; N 20 W; The inclination of these joints is Eastward 45°.

The three or four Exposures lying here within 200 paces, all have the same general characters of location surrounding & appearance of the rock composing them. Direction of these Exposures north East & west As all were identical in all appearance in lithological characters, Samples were taken from but a single one — that nearest the Stockton town limit.

This rock resembles that at "Schilpins Grove" = 5035 except in color; this inclines to have a redder cast owing to a greater % of Fe_2O_3 in the crevices & cleavage planes of the feldespar

(9—891.)

Sec. T. R.



5036A

450 ft; 105 ft

This is from a dike 11 feet wide extending N 50 E thru the Exposure 5036.

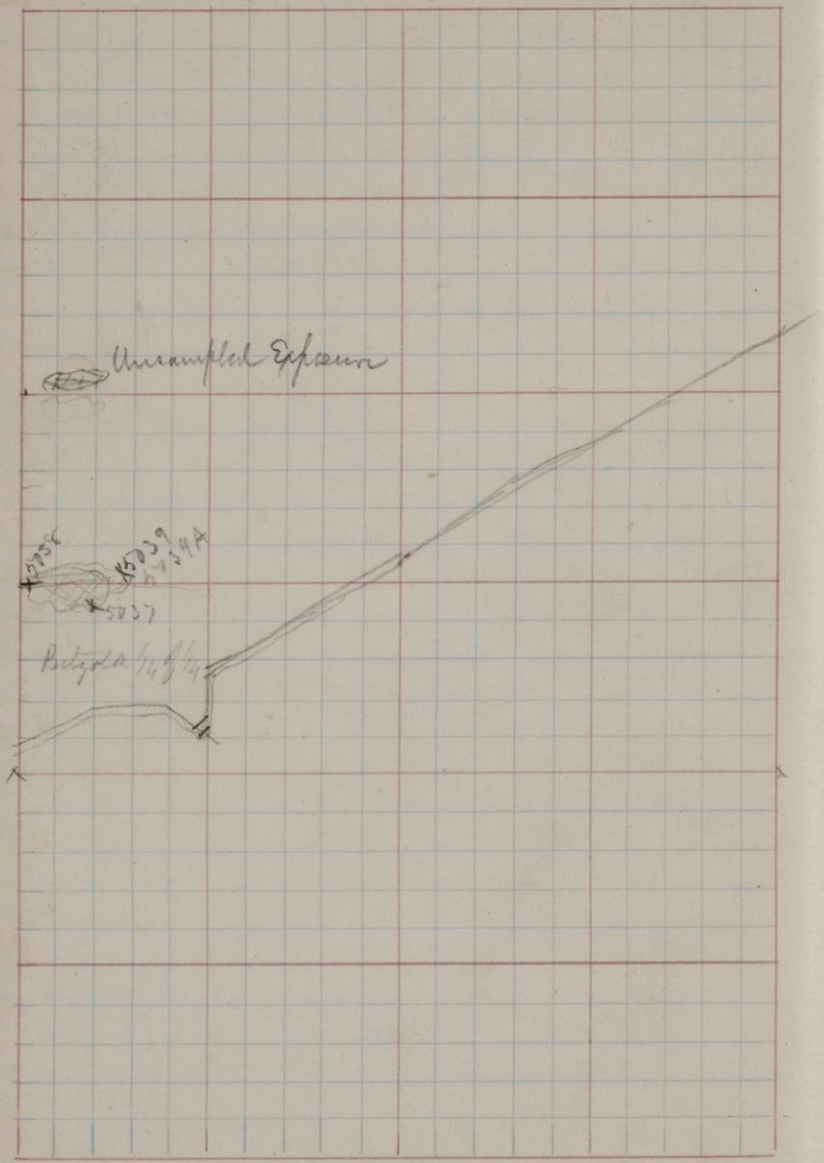
In some of the dikes for there are several & occasionally one is interrupted in its course.

Some are very fine in texture & the larger ones are the coarser.

Their course thro' the exposure is thus:

(9—891.)

Sec. 19 T. 124 R. 28 W.



5037; 450 N; 1720 W.

This Exposure shows a quarry face with an extension of the rock underground to the westward as far as the township line (bet. St. Cloud + St Joseph) + undoubtedly at a few feet below the surface is joined to the exposures represented by # 50 36.

Joints: N 55° W dip 76° toward W of S.
" N 20 W " 82° Southerly

At the quarry a face 12 x 15 feet is seen without a flaw.

This quarry shows the finest rock yet seen.

The rock is a granite with a good portion of the mica replaced by hornblende showing a change from the rock at # 50 36 where the basic constituent was chiefly or wholly Mica.

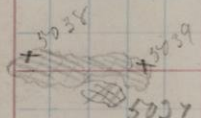
The feldspar is closely the predominant mineral in quantity + in the size + perfection of the individual pieces.

A large piece 60 ? tons weight was taken from this quarry ~~Cantonment~~ spur + taken to Milwaukee where it brought $1500.

(9—891.)

Sec. 19 T. 124 R. 28W

Unsampled Exposure



An interesting feature of weathering is seen on some of the samples of #5038.

There is a jointing or a false bedding plane or rather there may be a series of these along which the quarrying is worked. The surface of the rock after the layer is removed is clear & fresh, showing no discoloration nor crumbling from the effects of weathering. But the under side of the layer removed shows a browning & incipient disintegration to the depth of some inches. Blocks quarried show a clear fresh rock to the very surface upon the upper side which they are quite stained & discolored upon the bottom.

Some of the samples show this appearance.

[illegible] are not so large in this Exposure as at other places which have been visited. Quartz is not a prominent Mineral & hornblende seems to take the place of mica.

(9—891.)

Sec. 1

In the field to the north of this Exposure, 130 paces East of the Township line + 30 " north of the 1/2 Sec. line in Sec 19.

The seams or joints N 45° W and a dip of 50°. One face dips S 45° E ~~at with~~ an angle of 35°—40°

The rock stands up 20 or 30 feet above the prairie on the west front but runs off under the surface towards the East, it is in sight for 100 or 150 paces. As the rock seemed identical with 5038 no Sample was taken.

Unsampled

5038

5039

5037

5038;

500 N; 1975 W

This quarry stands only a few paces from the township line & just north of the ¼ Sect. line between the N W & the S W ¼ of S W ¼ Sec 19,

Joints: N 80° W — dip 55° W

N & S

Length of Exposure 95 paces & three courses under the surface until the localities of nos 5037 & 5039 are reached.

No dikes were observed: The surface consists of a rounded knob or westerly end of the mass. The rock has been but little quarried yet tolerably good specimens were secured.

The feldspar could not be seen in the exposures of this locality to have that uniformity of position as in Schilpins Quarry # 5035 nor of direction as at Rockville nos 5011 & 5014.

The rock is light colored rather than dark with but slight tint in brown given by occasional feldspar crystals in that color.

The constituent granules are not so large in this Exposure as at other places which have been visited. Quartz is not a prominent Mineral & hornblende seems to take the place of mica.

Sec. 19 T. 124 R. 24 W.

Prairie

Oak Grove

Prairie

5039. Hiltons 2d Quarry

500 ft 1650 ft.

This Specimen is merely a continuation under the roots of a Growth of oaks & vines of the same rock which have been visited & described as 5036, -7 & -8,

The Joints run in the same direction as nearly so as those on # 5038

The rock has been quarried to a considerable extent but still the weathering of the rock has made it crumbling to such an extent that no fine compact Specimens could be found.

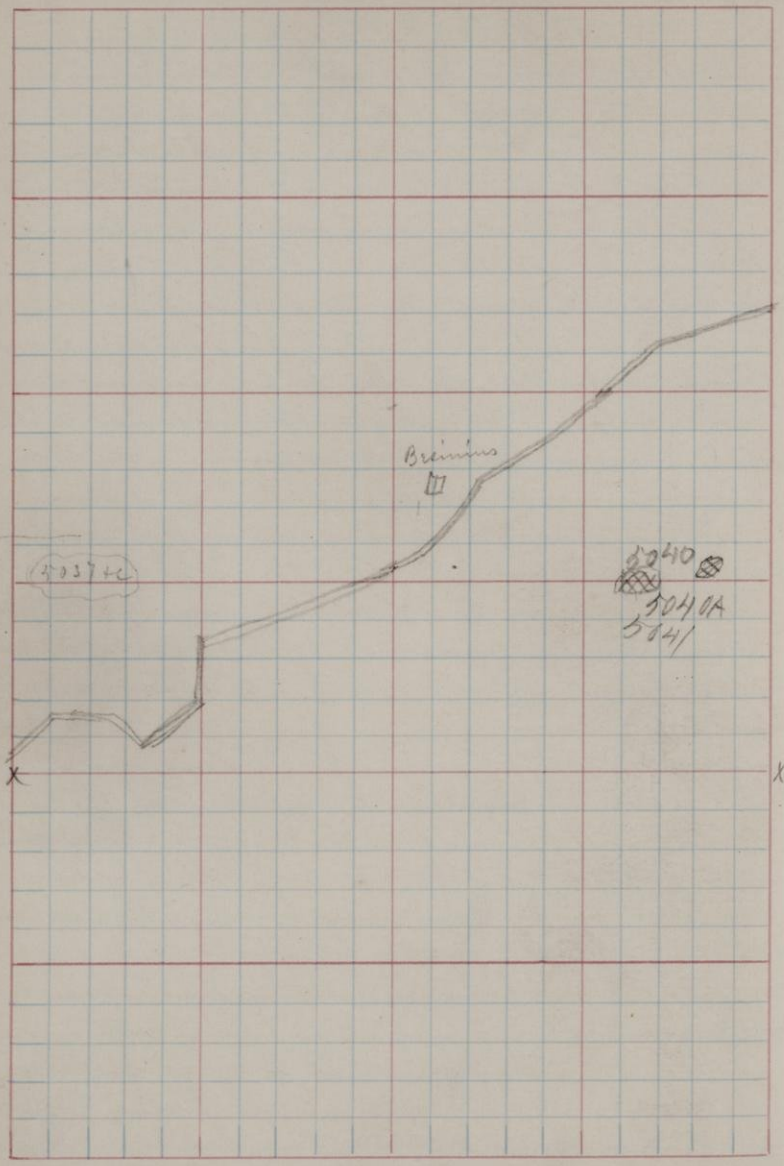
Mica appears here in much greater proportion than in the other localities Quartz is also a more pronounced representation mineral — in other words this appears to be a more representative Sample of Granite.

5039A

Masses of hornblende of Spheroidal or Elliptical Shape were occasionally seen but they occurred in such places that only chips could be secured. The mass was very firm & finely crystalline without a sharp boundary line separating them from the rock mass in which they were imbedded.

So too with the fine veins of a pea green mineral which occurs in the upper part of the quarry & which have been noticed in other banks in other quarries. These two hornblende nodules & Epidotic veins have been sent together as # 5039A

Sec. 19 T. 124 R. 28



5040;

5040 A is vein

500 ft; 400 W.

This Exposure 95' x 45' faces in Extent is low & partially covered. The surface is finely Shattered — indeed it is impossible to tell whether there is anything more than Superficial joints or not there is so little difference between them. But the following distances were measured; N 70° W; N 20° W.

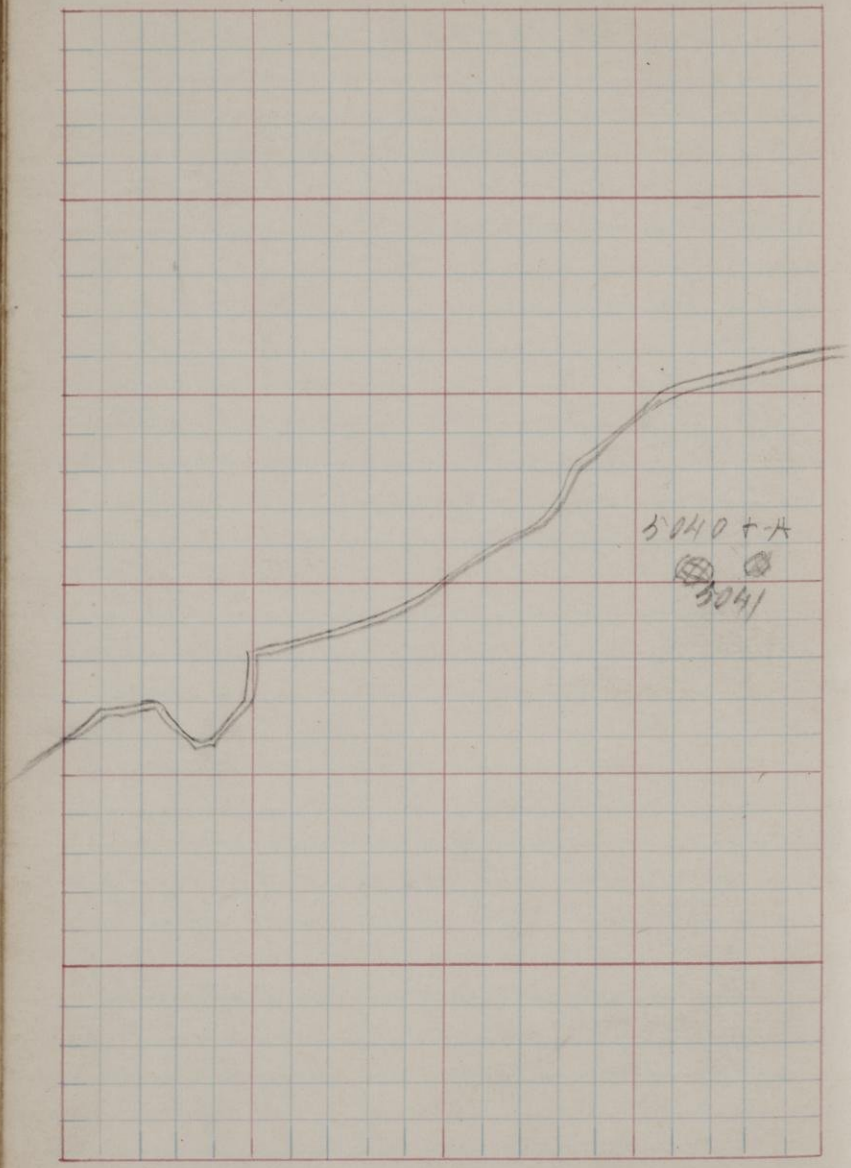
On the N E Side we observed the layers "pulling off" precisely as was observed in Schilfglas Quarry #5035. The layers varied in thickness from 6 inches to 15 inches.

Veins & dikes were seen upon this Exposure

This rock is a coarse, greenish, reddish, hornblendic granite. The leading Constituent is felspar, hornblende being the next in quantity as could best be judged.

5040A Only one vein was observed on the surface of this exposure of any great Extent; this with a widths of some inches & with a direction N 10° E stretches over the whole Exposure. The material has a ring from top to bottom as compared with the main rock. Its general characters are the identical with what occurs as a vein or veins of this exposures thus far seen. Eg Rockville, #5015A &c

Sec. 19 T. 124 R. 28



5041

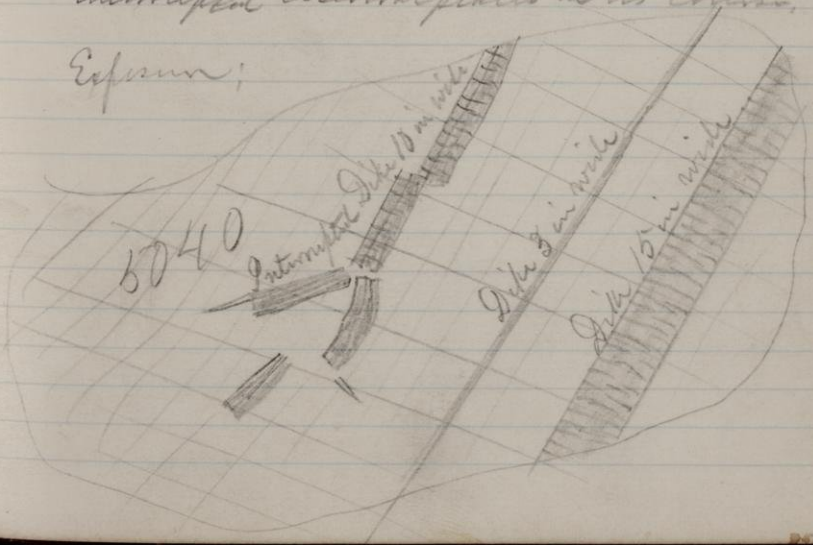
500 N; 400 W.

On the Exposure whose main mass is represented by #5040 were observed three (3) dikes. The narrowest one showed a width of only 3 inches, varying in some places to 4 inches, with a direction of N 40° E. The larger ones did not differ essentially in direction.

All are full of fractures vertical to the walls thus giving a distinctly columnar structure to the dikes.

The rock of these ~~dikes~~ dikes is porphyritic holding quartz & feldspar crystals standing out from the weathered & dirty looking surface & glistening on the fresh fractures of the rock. One of the dikes was interrupted in several places in its course.

Exposure:



Sec. 28 T. 124 R. 28W

5044,+c

5043

5042

5042; 1850 N; 1800 W

This is a low exposure of rock in the midst of a wheat field 70 paces from the road from St Clouds to Maine Prairie.

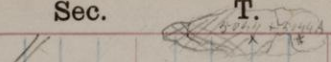
The Exposure is 30 paces long & 15 broad. No dikes were seen. Joints obscure & in all directions. Surface showed Evidences of Glaciation.

But little quarrying has been done & the samples are somewhat weathered.

Mica appears here also it may be only a small extent of rock thro' which it is so abundant. Quartz is in only occasional grains. The mica shows a gneissoid or a Schistose tendency in its arrangement as some of the samples seem to show; Feldspar also takes part.

A singular poverty in accessory minerals is observable thro' out this whole belt of rock. It seems further that hornblende is gradually taking the place of Mica as we approach the river. Whether it indicates the gradual transformation into the so called Syenite of the East Side of the Mississippi or not cannot even be guessed at present.

Sec. T. R.



5042 5043

Road to Bear Mountain

5043

1850 N; 1700 W.

Only 100 paces East of 5042 + 150 paces from the road + in the same field lies the Exposure 5043. The rock rises 8 or 10 ft above the field + is mostly covered with a growth of Shrubbery. Sign, 30 X 25 paces.

The rock at this place shows a lamination in weathering - the scales pulling off to the N E which is the direction of inclination of the Surface - the S W side being somewhat abrupt.

Masses of the rock seem to show a higher per cent of feldspar when looked down upon than when looked at in a horizontal direction.

Compare 5042 + 5035.

5042 + 5043 are no doubt two Exposures of the same bed or expansion of rock. They show in their fresher + unweathered parts the general characters of the Syenite of the Sault Rapids + Enot St Clouds granites.

Sec 21 St Cloud