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Beaver Bay, Minnesota, part 1: [specimens 23075-23032]. No. 168 1891

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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

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

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

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

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

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

168

Mon July 9 1894

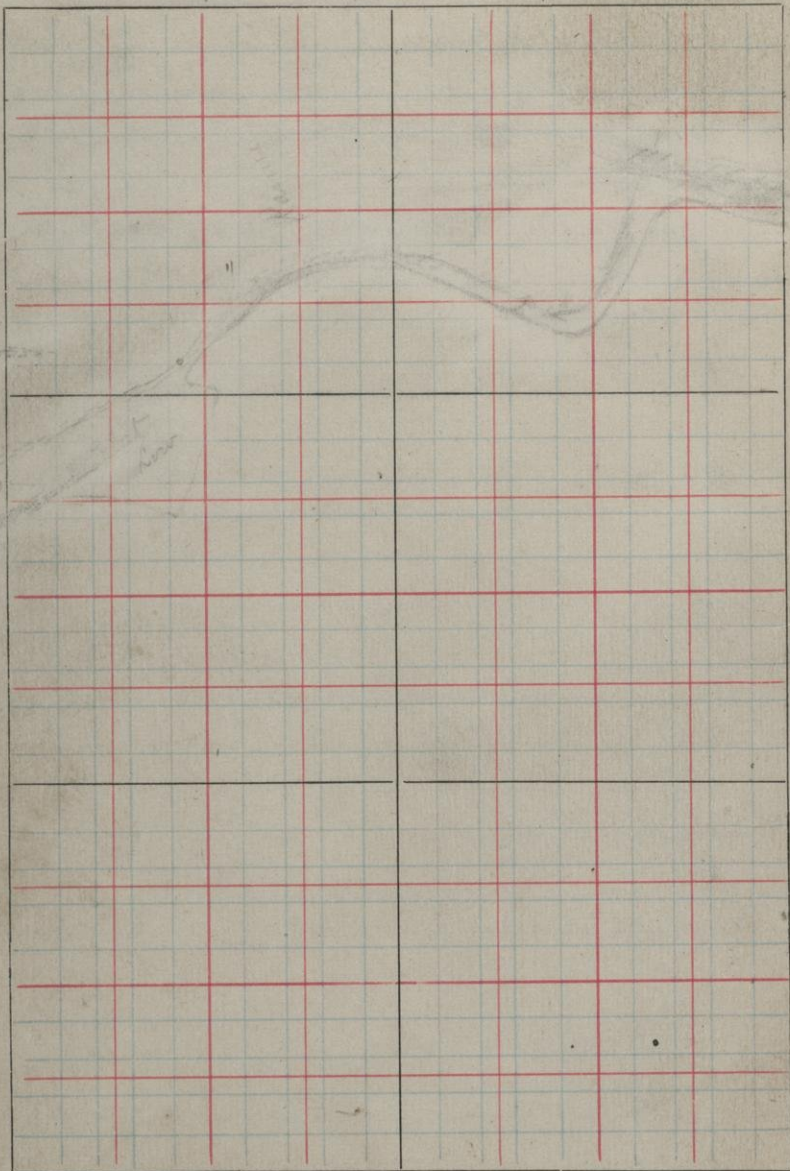
Went up shore $1\frac{1}{2}$ miles on reconnaissance
found nothing but Galbro described by Irving.

P.M. Looked over Sport Beach Bay

Tuesday AM

Looked in Rocks along side of B.B.

1. S.W. 4th T. 4 Sec. 13 705 R. 8 N.



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**Missing Pages
2 - 29**



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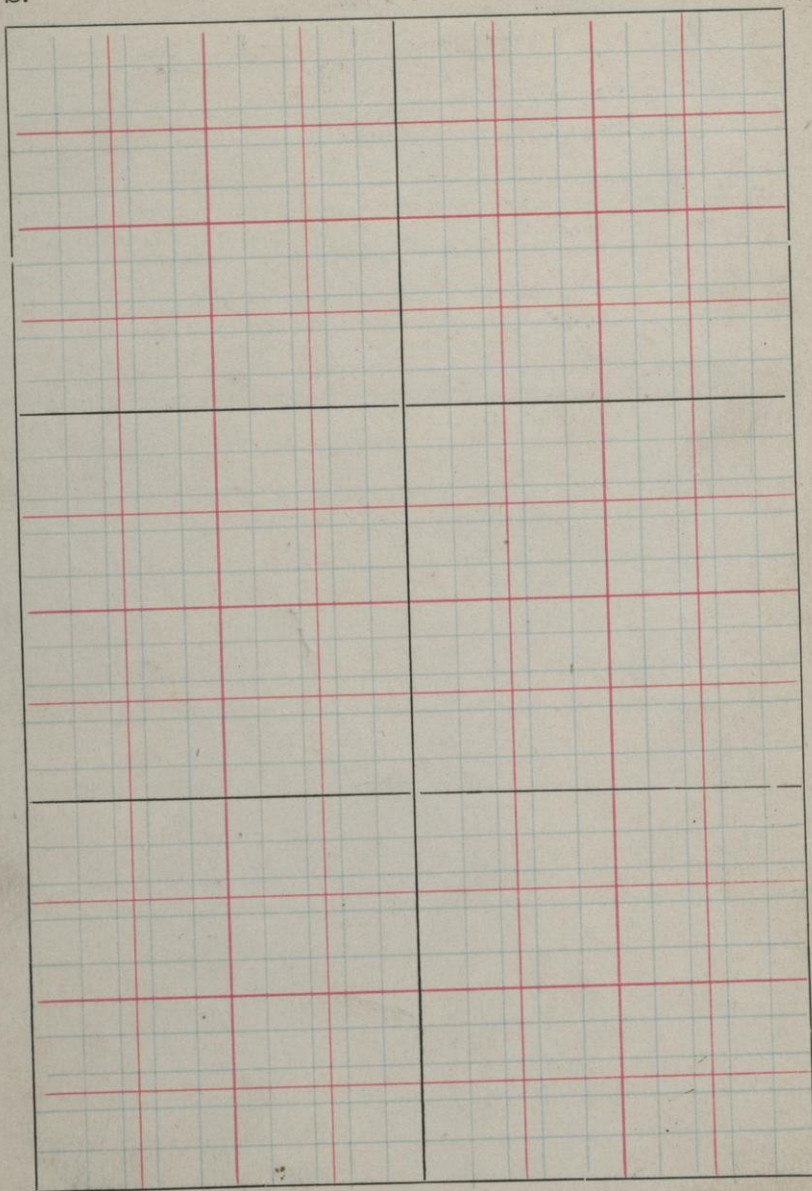
is on E line of S.W. of

31

S.

T.

R.



Rocks of the N. W. Side of Beaver Bay between
the long beach on the north and the Bel
croix mouth of River

The exposure is extremely complicated
and can not well be described in succession
from either end so since the plates have
been made with much care as to minor
irregularities I have numbered the diff
points from the north and shall refer
to them by these numbers in the follow
ing description. The plates are found
on pgs 234 & 5

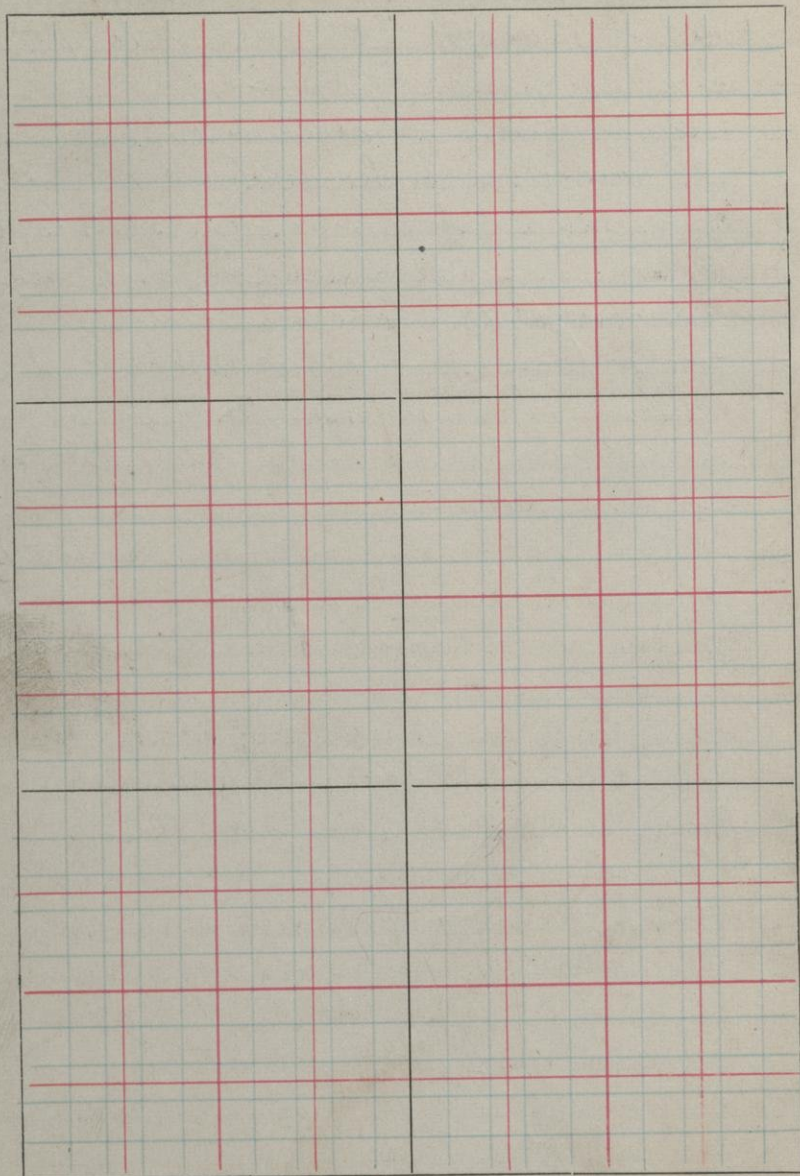
The exposure between the points 1-17
consists of smooth Rock forming the back
of the coves marked blue. Prof Lawson
describes them well and two of his cuts were
taken here. The bases of the coves seem
to be made up of the Rock in situ. Over
them comes a layer of a Diatomite
containing masses of the rock varying in size
from large blocks 10 ft in diameter down to
small pebbles and minute particles of
the smooth. In fact in places the
rock enclosing the larger smooth white
boulders seems to be a green more
stained phase of the smooth Rock and
resembles the banded layer south of

33

S.

T.

R.



the Shingle cone cited and described by Prof Lawson
 who ascribes the greenish tint to minute augite or
 pyroxenes. Prof Lawson states that he was able to find
 only two localities, one Split Rock and the other
 the Shingle Cone South of the South Pt of B B
 where the Sworthite Rock presents Shingle
 Points 18-20-21 an compound of Sworthite
 Rock and show a very marked nearly horizon-
 tal jointing also spots of vertical joints
 which in fact make the outcrop resemble
 decidedly the form of a dike. In 18 the vertical
 jointing is not regular neither does it
 pass the horizontal joints continuously
 along the vertical joints disintegration
 has gone on very marked by chipping off the
 corners of the blocks and giving somewhat
 the appearance of Ball & Socket Columnar Struc-
 ture. The rock is colored a dark greenish
 gray. Point 18 is flanked on the South side
 by a medium grained Diabase which
 is different from anything observed except
 in connection with significant exposure
 It flanks the point which has vertical
 side about 10 ft high but around and especially
 in front of this point is a low flat surface
 exposure of the diabase containing boulders
 of anorthite varying in size from 1 in to

S.

T.

R.

[illegible]

five feet in diameter. Especially here
does the weathered surface of the Diabase
present a perfectly smooth surface.

23075

21 B

23076

2 B

23077

3 B

Is a specimen of the finest part of the
Swarthite in the Point or rather cliff.

Same more altered

Swarthite from boulder in flat surface
before point.

23078

4 B

23079

5 B

Finest of the diabase

Altered Diabase

The mass with diabase and Swarthite
is cut by an irregular dike of a reddish
granular rock varying from 3 in. to many
feet in thickness. The surface and
cracks of the Swarthite especially on the
low flat portion mentioned above are
covered with an incrustation of bright red
material due I think to percolating water.
Possibly however connected with the dike in some
way. Near the dike the much altered Swarthite
shows a network of fine bright red inclusions.

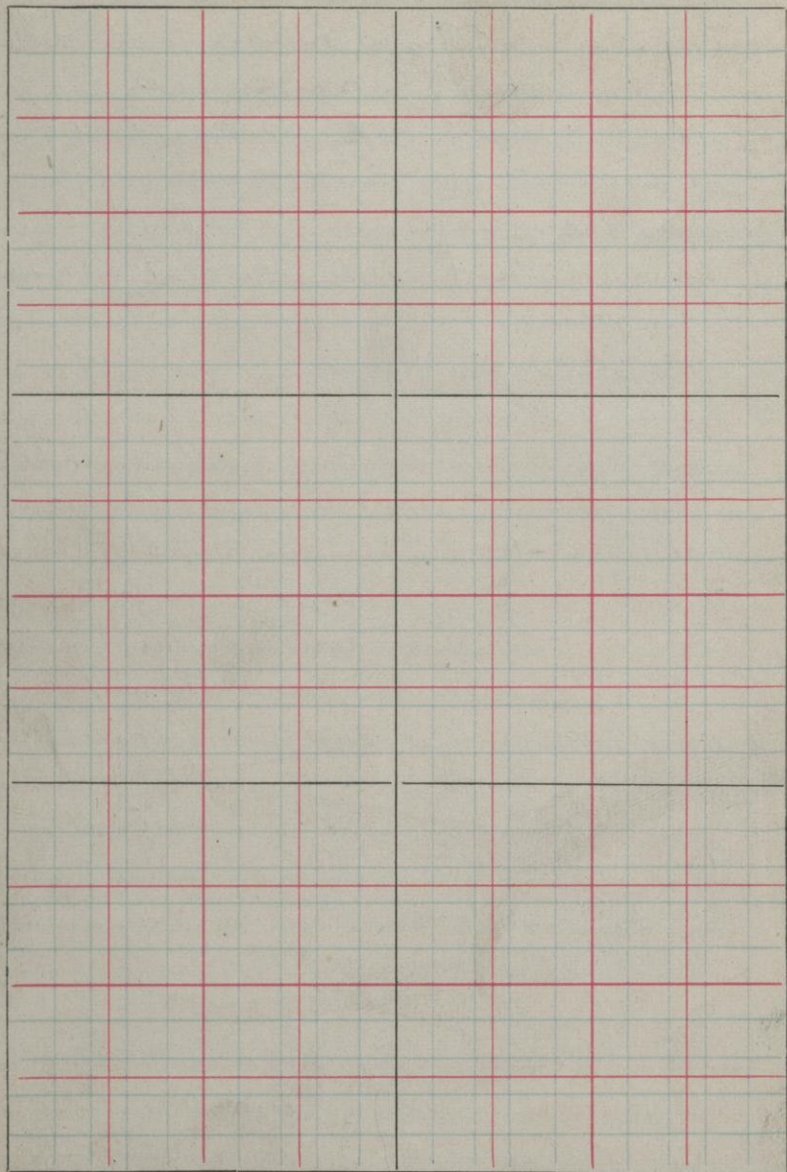
Points 20-21 may be only blocks of the Swarthite
Rk got it by hand much more the appearance
of being in place & especially showing the
marked jointing already described.

The Swarthite is here associated and in
contact with some of the Green Grey Diabase

S.

T.

R.



as at 18. With a red Porphyritic Rock
and cut by thin dikes of a dense spha-
ulic brownish gray Diabase.

The red rock seems to be merely a phase
of the Quartz Porphyry of which pt 19 is
composed. I will describe same later.

23080

6 B

Represents a contact between the Anorthite
& Diabase which appears here in exposure
about 2 ft square pt 21

23081

8 B

Phases of Anorthite Rock from pt 2
from Boulders of about 3-4 ft diam
imbedded in

23083

9 B

Diabase-like Rock or Fine O. Gabbro
from pt 1

23084

10 B

Slender form of above from pt 2

23085

11 B

Similar to above from cone bet pts 5-6
here as usual it is in close connection with
the Anorthite so close & united with
same that a specimen across the contact
can readily be trimmed

23086

12 B

Anorthite Rock from cone bet pts 9-10

23087

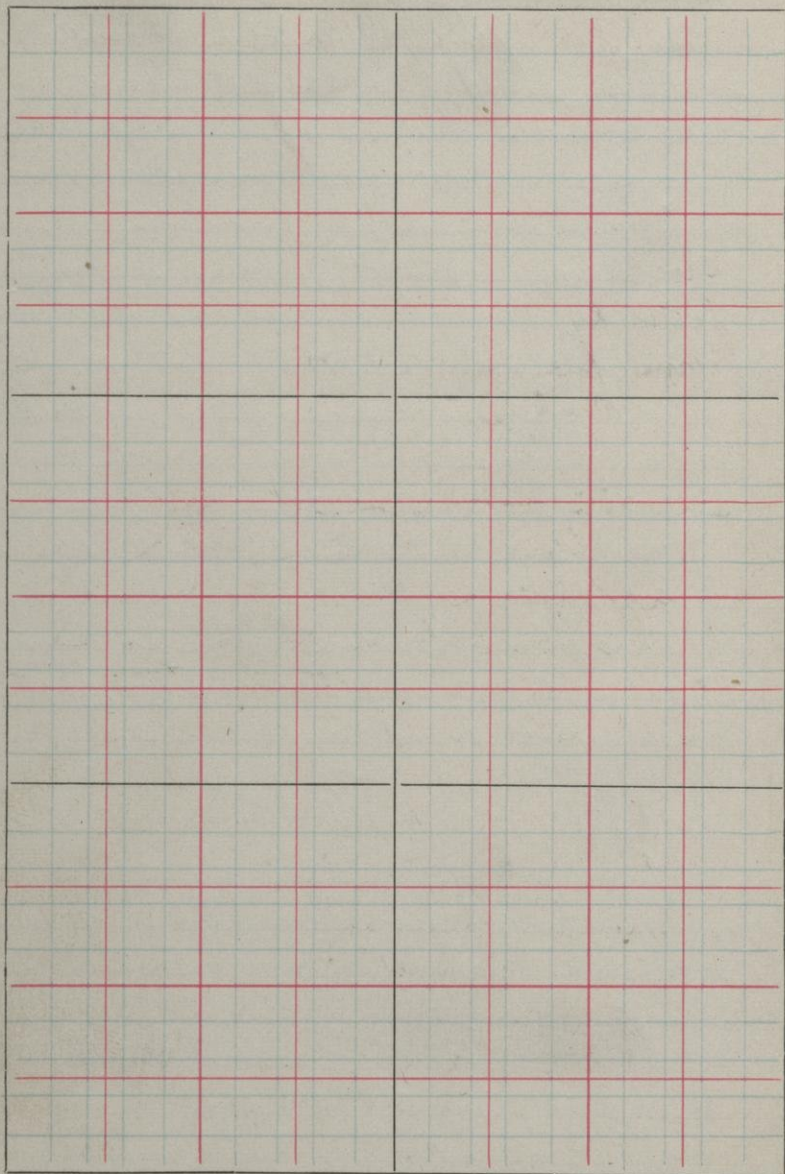
13 B

Same shows much red coloring on weathered con-
Diabase here associated with Basal Anorthite
Of all the exposures here this has the most
decided appearance of not being merely a
huge boulder Next to this comes the cone
bet pts 5-6 all of the rest might be huge

S.

T.

R.



boulders but are not likely to be.

The black rock very when associated with this basal anorthite seems to be the same as that Prof. Druggs found in the Diabase.

We find first in the bottom of the deep crevices as this one the anorthite in large blocks or in situ with the interstices filled by the black rock of which the above mentioned specimens were taken. This rock is massive and has in places somewhat of a columnar structure.

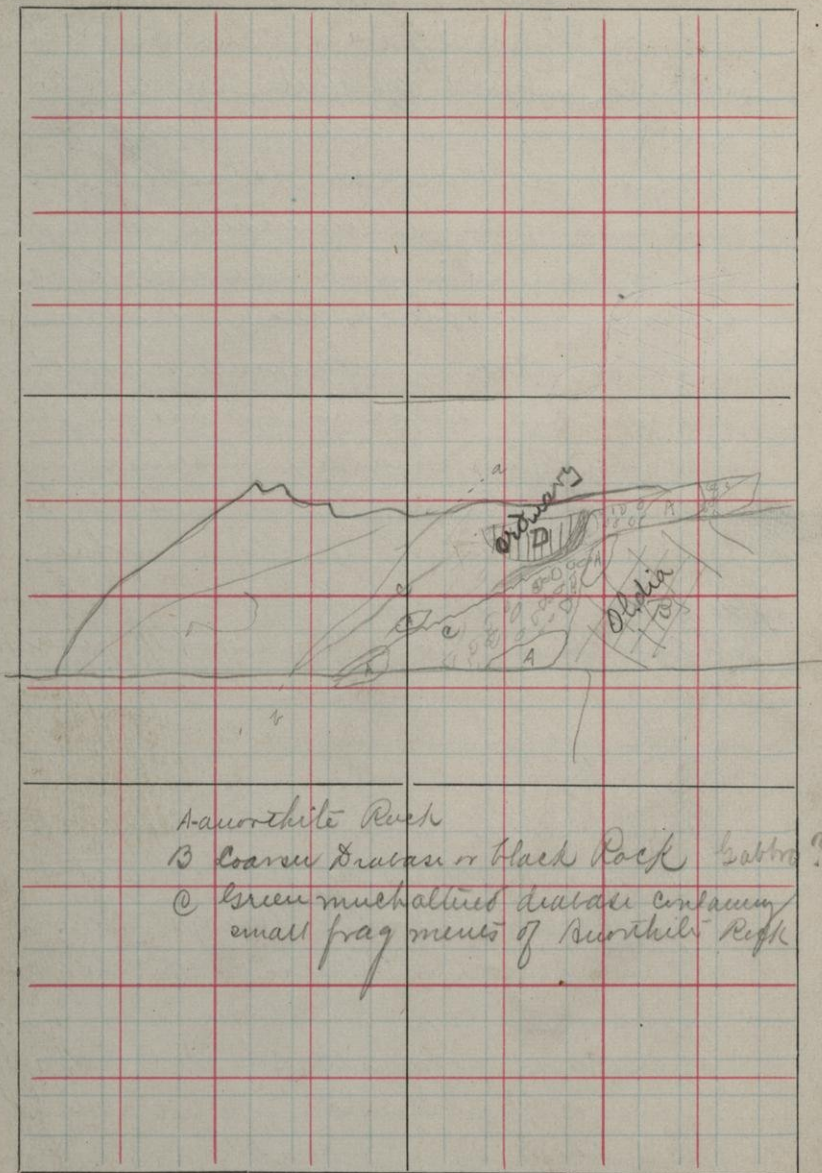
Over this basal zone (it can hardly be called flow since the upper surface grades into a zone of smaller fragments) is bedded in a rock somewhat of finer grain always much more altered and frequently on the weathered surfaces a much more decided green color.

I believe this to be the same rock as the first and altered by closer contact with the anorthite which also always shows more and more alteration as the fragments become smaller. In places making up a mixture of separate anorthite rocks in a sort of matrix of the greenish rock. This succession is probably best shown at Point 12.

S.

T.

R.



A-aurochite Rock

B Coarse Diabase or Black Rock bottom?

C Green muchaltered diabase containing small fragments of Aurochite Rock

In the sketch on opposite page which was intended to represent the North face of Point 13 line a-b marks the upper limit of anorthite. Inclusions beyond this the rest of the point is made up of what appears to be the same diabase as matrix holding boulders of a red granular Rock and much interbedded by thin (1 to 2 in) dikes of a similar red granulite. In places as $\square$ and smaller ones fine diabase is found both out inclusions and here it assumes a very marked vertical jointing bearing almost parallel to the trend of the shore.

In places the weathered Diabase has a porous open structure ~~resembling~~ honeycombed. But same can not be traced so as to prove distinct bedding. A sort of jointing exists which gives more or less the appearance of bedding but same even to cross thin clay zones rather than separate them while between the zone of Diabase containing anorthite and that containing the Red Rock inclusions no structural difference whatever can be detected, they merge right into each other. The structure the describes is repeated with slight modifications as to the amount of

S.

T.

R.

[illegible]

23088
14B

inclusions in every one of which the
base is Anorthosite
Coarser black Rock from B in sketch
I have about come to the conclusion
that the red Rock is all of a kind
and is intrusive through the Black
Olivine Diabase already described

The appearance of Boulder inclusions
of Red rock is due to a secondary
intrusion of a dense Aphanitic
Sphilitic Diabase which mostly flanks
the exceedingly irregular veins
& dikes of the Red rock. In places
cutting same as to give appearance
of boulders. It is true the Red rock
presents much variation in appearance
but this can easily be accounted for
by the varying amount of change it
has undergone due to its irregular
thickness and the great difference in
the amount of the fine rock it is found
with

15

The Rock at D appears in all respects
like that at B except that it is very fine
in grain and has a decidedly marked
vertical jointing
continued after above description

S.

T.

R.

[illegible]

Shore from Pigeon Pt up

46

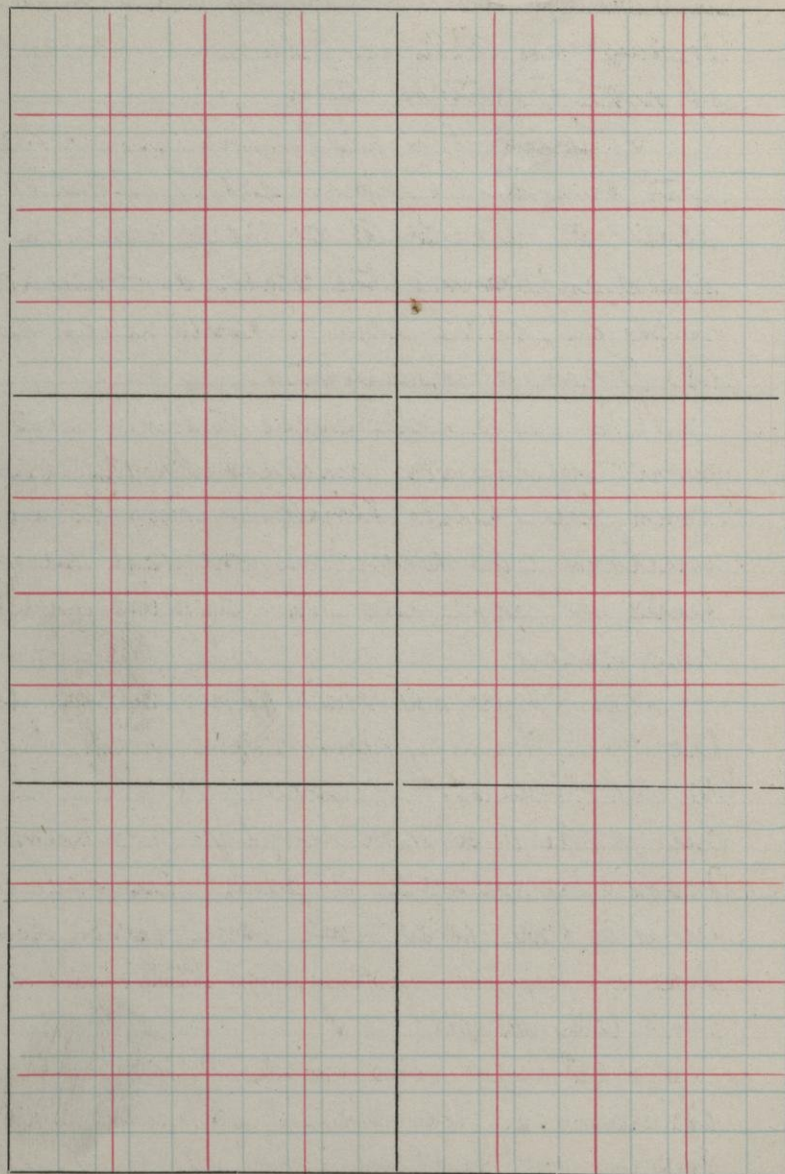
Aug - 1894

Off Pigeon Pt I spent 4 days getting out the specimens records. Had considerable trouble locating the red rock and the different contacts. They grade into each other and change so differently (sometimes quickly, sometimes slowly) that it is exceedingly hard to get good typical specimens of the contacts. Consequently I got only 1 contact and one intimate, each as nearly as possible representative of the middle member of its class. While some localities of definitely marked typical red rock seem to occur by far the largest amount of this rock exists in narrow streaks intimately interwoven with the contacts. I think of Bayley marks his red rock areas entirely too large. While from his Bullfinch I doubt his conclusion regarding the red rock as a contact phenomena of the Gabbro, my belief in same is much strengthened by appearance in field. Especially hard to locate

S.

T.

R.



and small in extent is the typical Porphyritic R.R. on the high Bluff west of Little Portage Bay.

I found it difficult to make out any thing that looked like a state to me. Or if (as Bailey seems to distinguish same), the black or gray varieties are state then I could not find the Pink or Quartzite.

While the exposures of R.R. on the point seem so indefinitely the same rock on Little Brick Island is very uniform and persistent no difference being noticeable in the different parts of the island.

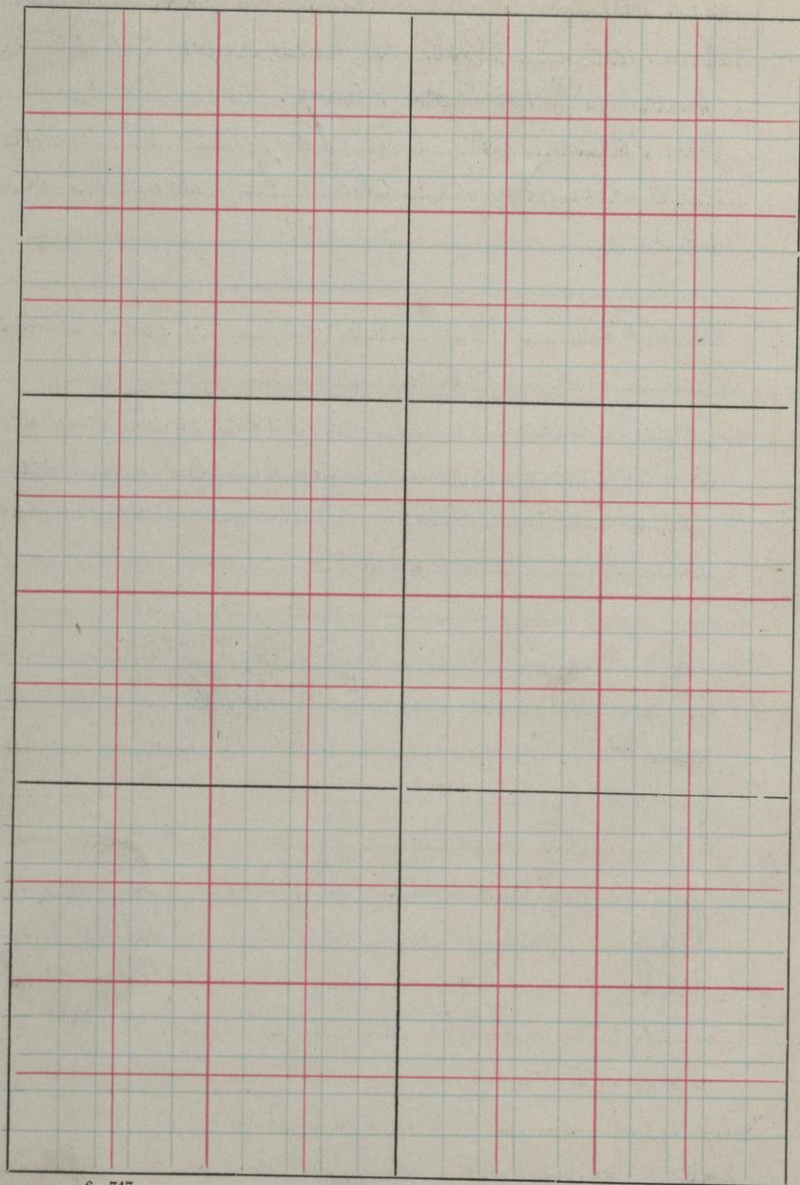
The Gabbro on Hat point in its appearance bears a remarkable resemblance to the flows of the Beaver Bay Group and in the absence of proof to the contrary I should regard it as a flow. In fact it seems to me that we have both flows & dikes of Gabbro cutting and interbedded with the Slates.

No attempt was made to obtain specimens of the siliceous varieties of the Gabbro or Diabase since I did not think them of sufficient importance.

S.

T.

R.



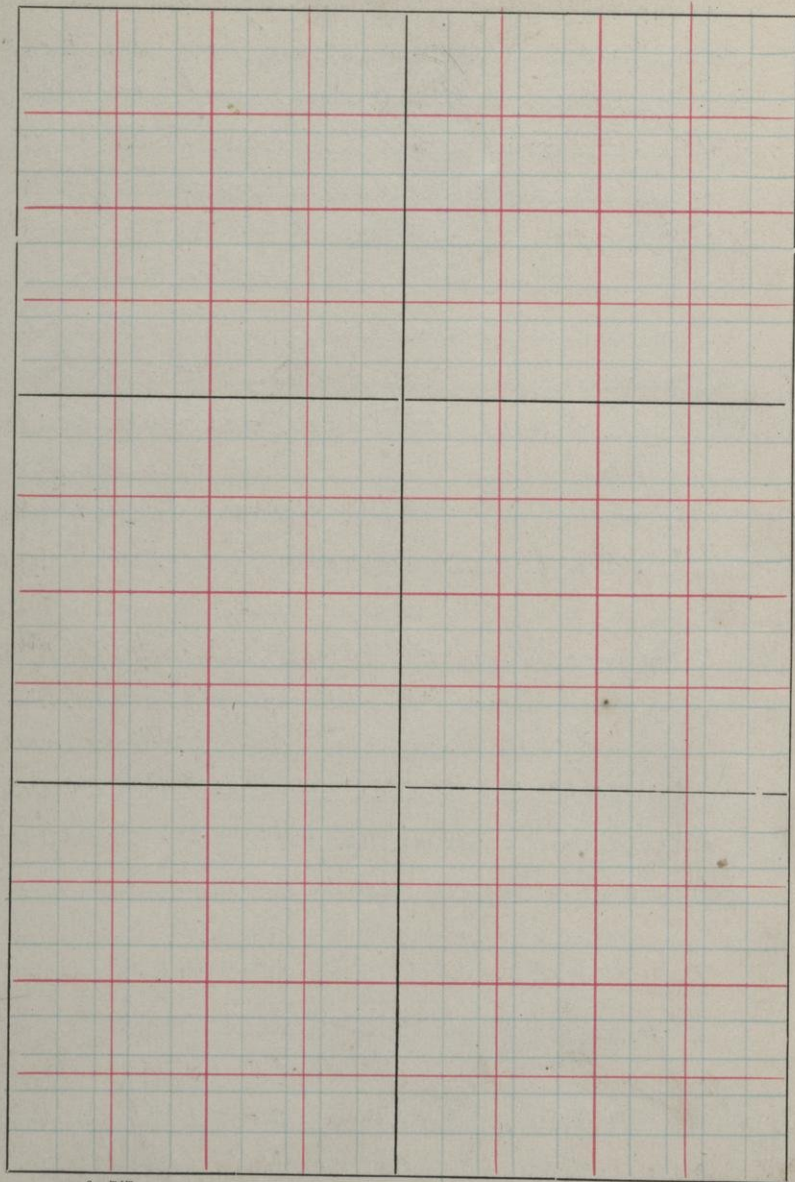
The raised Beaches on Pig Point and along the head of Nauyasagony Bay are certainly most remarkable and well it is not for their absolute horizontal might tend toward indicating a rise of the surface

- 13 Was taken from Bluff N of Grand Portage. According to Prof Irving this is Diabase but the weathered surface and general appearance of the dikes here as much more like the Gabbro Dikes than the Diabase dikes
- 1R From fine grained Diabase dike at South end of Bluff N of Gr. P. This dike presents a peculiar hacky, carved appearance on its exposed surface due I think to its great hardness and conchoidal fracture
- 14 Was taken from more massive layers of slate exposed on Lake shore on W side of Gr P Bay only small low exposure some of specimens show what appear to be fossils

S.

T.

R.



2R Light Grey Rock which is found in a layer about 4 ft thick exposed near water edge on N side of Gr. P. I. about 100 ft E of the late exposure

3R Is specimens of the thin, black slate from Bluff behind Gr. P. Village

15 Quartzitic slate from Last area on S W end of point

16 Diabase exceedingly dense and fine grained from Last prominent Pt below Red Rock Pt about 1 mile from same a large exposure exists here but the rock varies in color from grey to pink much is mottled pink and grey or brown Specimens are not quite fresh

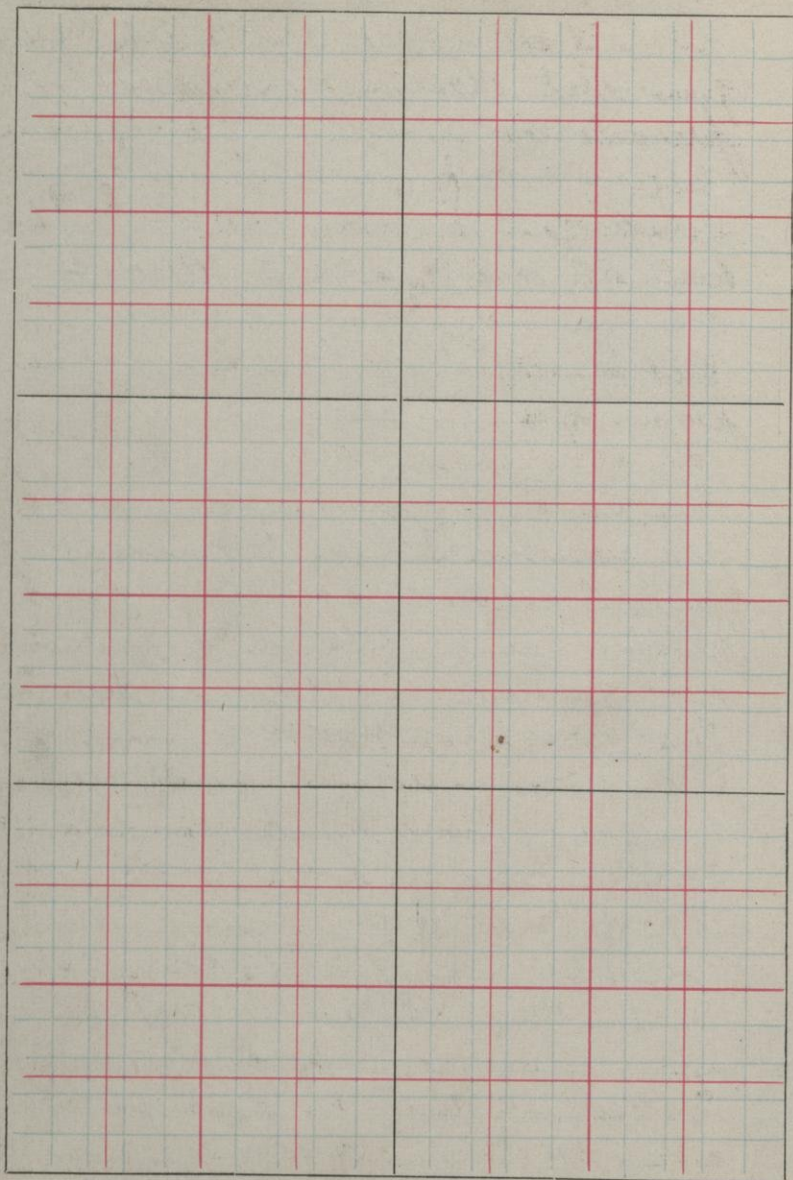
4R Grey Diabase from exposure about $1\frac{1}{2}$ miles above Gr. P. I.

Exposures are few and do not to me present distinct flows until a point between 34 & miles above the island is reached

S.

T.

R.

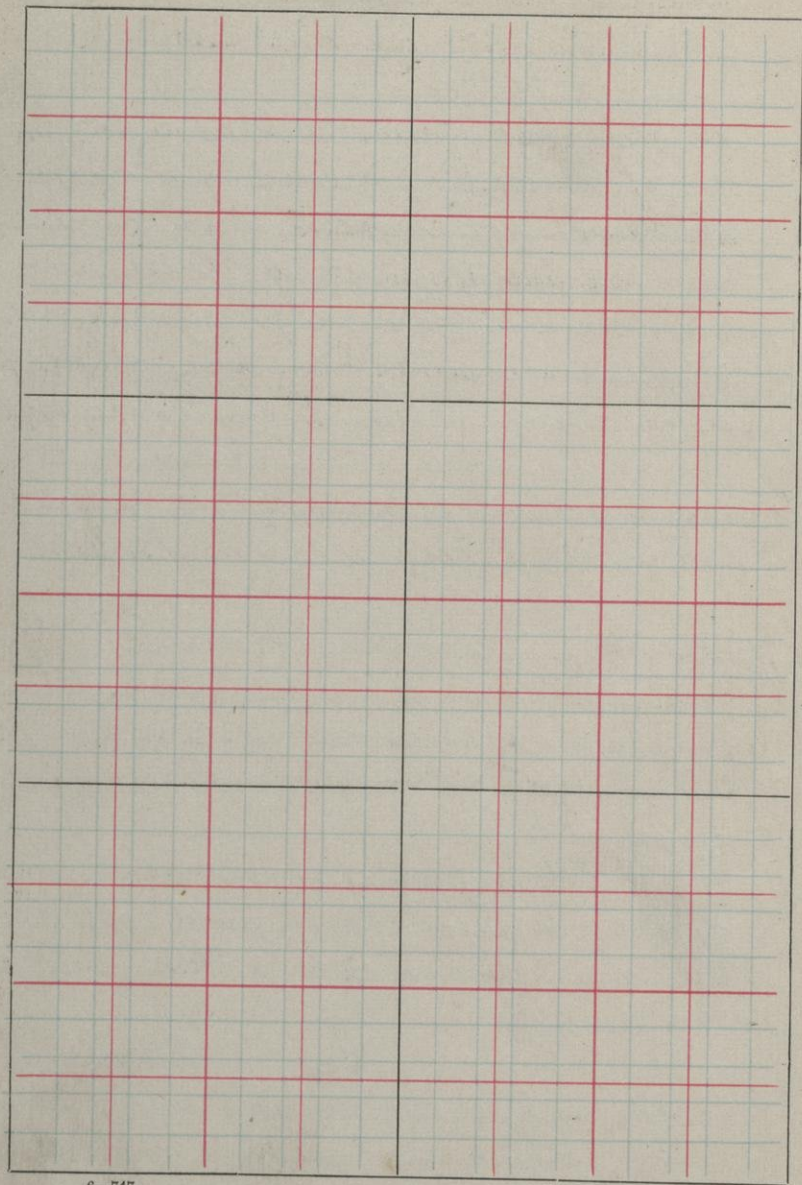


The last miles below Red Rock point presents an appearance very distinct from that above or below though beach prevails cut every 100 to 300 ft by ledges generally narrow points of rock extending to the water's edge. These rocks are mostly a very dense conchoidally fracturing brown to greenish grey. Ruddy weathering Diabase while in places there is a greenish amygdaloid. In other places there seems to be a mixture of fragments of this amygdaloid and every other rock of the vicinity in the most complicated manner possible. This I take it must be some sort of Volcanic Breccia since the fragments are not water worn and yet present more or less of a rounded appearance as if partly fused. As above stated the weathered surface of the Diabase all appear some shade of purplish red and the rocks on fresh fracture are from greenish grey to Ruddy and sometimes mottled with mixtures of these colors. Green mottlings are especially prevalent within an inch of any weathered surface.

S.

T.

R.



5- R Diabase from like Return R R Bay &
R. R. Point the one described by Prof Irving

At Red rock point I was unable to
get specimens on account of the fracture
the Rock is a quartz Porphy with
an exceedingly dense ground mass
which weathers easily and fractures
so finely on weathering that it was
impossible to get hand specimens

6- Several specimens of the Red Rock of
above, picked up on Beach as pebbles

17 Isatto-like Rock from pt on N
line of sec 12-62-4E described by
Prof Irving as containing feldspars surrounded
by needle like or spike like crystals of Pyroxene

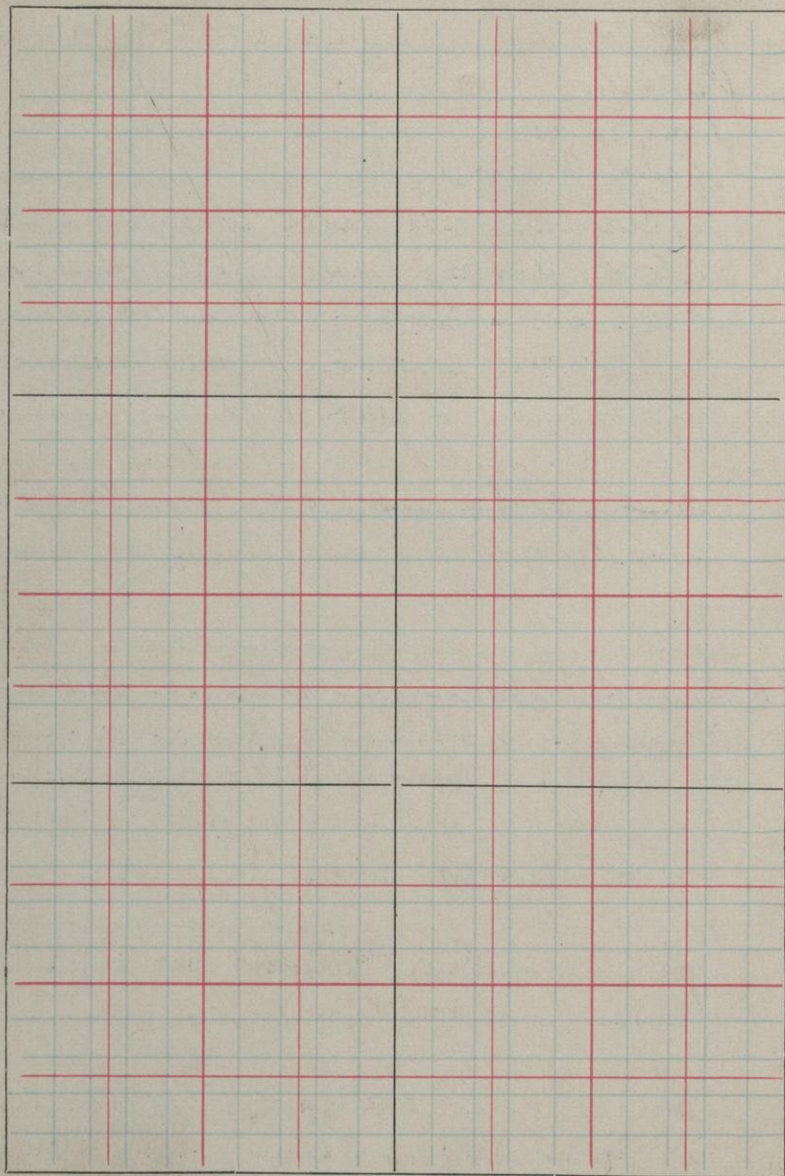
From Pigum Pt to here the shore makes
many bays and good harbors for
small boats for winds both from NE
& SW

Iron is reported as having been found
between the Reservation and Cleveland
I was unable to go out to the place

S.

T.

R.



But from description take it to be a
concentration of Magnetite in the
Prevalent Gabbro. The location is about
1 mi. N and 4 or 5 miles W of the S. W. cor
of the Reservation

Between the above and Brule River
Black Gabbro prevails. Just below the
Brule where Prof Brown calls attention
to the Gabbro containing much diorite
and O olivine I found a rock answering
this description but the same was so
much altered that good hand specimens
could not be gotten

8R Fragment of above

9R is a specimen found on the Grand
Marble Trail $\frac{1}{4}$ mi E of N line
of sec 12 T62 R4E and shows
a diorite with very large Feldspar
as porphyritic xals

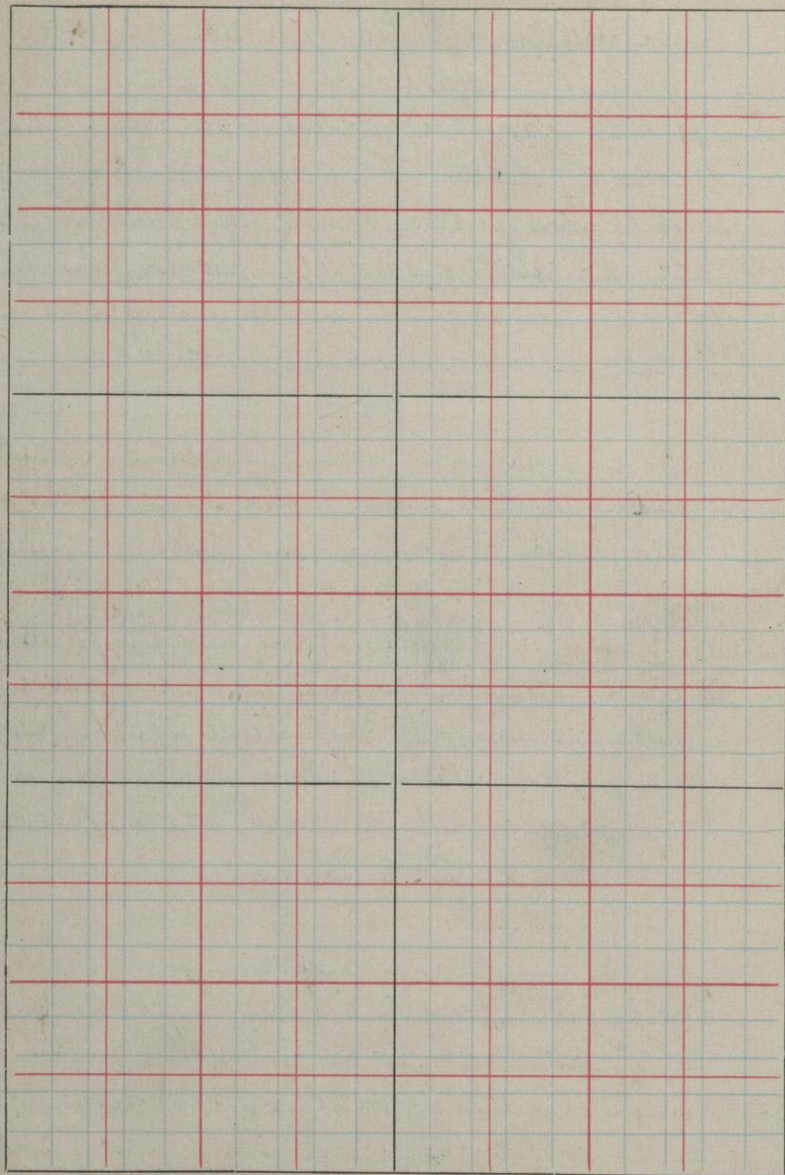
The Brule River affords good shelter
for small boat in any weather

Characteristic feature of shore here are
the long beaches mostly of red shingle

S.

T.

R.



18 Red Feldsparite from NW sec 21 61-1 E 60
Immediately below Grand Marais

10R What Prof. Irving calls Olivine
Diorite at south end of shore
cliff of Red feldsparite. The same does
not present distinct dike features
to me. In fact in one place it
shows an amegdaloidal layer

19 Diorite from Grand Marais south
point of Harbor. Clearly a flow
with well developed cross columnar
structure. From here to Cross River
In fact all the way to Pelot Marais
the shore cliffs are high flat and
Rocky of the typical Red Diorites and
Amegdaloid

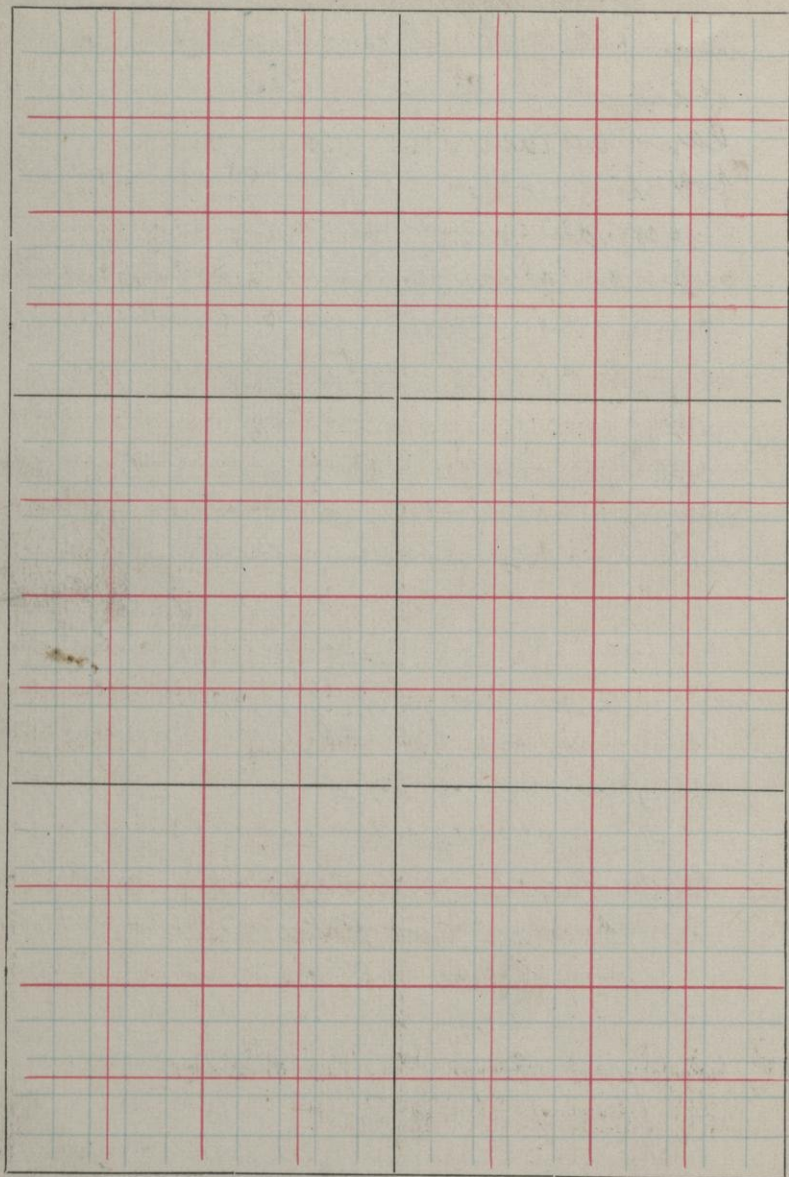
Good layers from all boats are few
11R Melaphyre from Gorge of Jump-
cane River

20 Black Melaphyre from E side of Pork
Bay described by Prof. Irving
as being representative of typical
Rocks at Keweenaw Pt. I am not
sure that this is the right Rock But
it is the blackest on the E side of this

S.

T.

R.



The entire Temperance River Group is made up of layers of Snyggdalsids of redish or Brown Diabase. Some layers are very thin ranging from a foot to 50 - 60 & 70 ft. But by far the greater number are 20 to 30 or less.

Snyggdalsids are developed to a very high degree often showing both Basal and capping shells. Especially well are these represented at the mouth and gorge of Temperance River. Manitoba River shows exposures in a large creek and presents a most Picturesque piece of scenery. The shores along the entire length of this Group are very regular and have exceedingly few beaches or shells for boats in times of storms.

Cross and Cascade can be entered in moderate seas by small boats. But Temperance and Manitoba can not.

Dolus seem to be very few indeed in this Group.

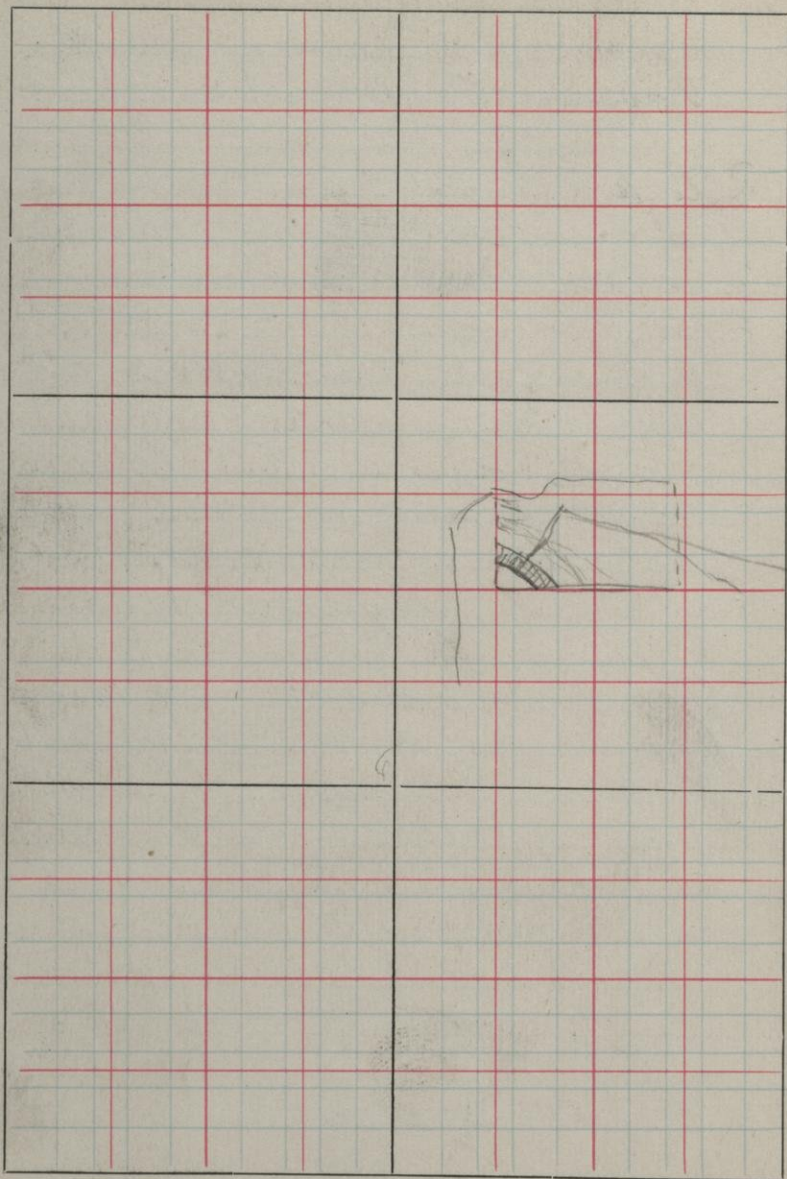
9(1) L

Typical Brown Shells Diabases
see 9 561 & R 2 E

S.

T.

R.



12R Is from the 3rd main bed of the ~~Lynce~~
Imperance River Group sketched by
Prof Irving. Brown bedded slate

13R Is second bed of above above slate

14R Is 1st Bed of above which as
far as I can see is the Quartz-
Porphyry of the Beaver Bay Group.
I fail to recognize the Aphanitic
Slate Porphyrite which he speaks of
Be it that or not the Quartz
Porphyry certainly does do beyond
the small Beach spoken of and it
appears in the North wall of the bay
the a length of at least 10 ft

20 Black bedded Feldite from Beaver Bay
South of Bay

22 Granodiorite from South point B.B.

23 Sawnite Rock fragment from Summit of Thugli
Cone South Pt of B.B. as described by Prof Lawson

S.

T.

R.

[illegible]

23089

15 B

23090

16 B

Specimen of Rock at II in sketch
 From core but pts 13-14 Right near
 this and grading shite it is the fine-
 grained like above or 15 B The finer
 grained predominates and in the bottom
 of this core has the marked vertical
 jointing. It is here cut by dikes of Red
 rock but these are few and regular.
 The ends of both points 13 & 14 are
 however made up of the most con-
 fusing mass of red rock green much
 altered diabase. Sphaeritic Diabase in
 small dikes and Diabase like 16 B.
 The lower much altered seems to be from
 of 15 B. The dikes of red rock here
 broaden out in to rock like masses
 4 to 6 feet in diameter and dikes from
 12 to 18 inches thickness can be seen
 under water running from pt to pt.
 Capping the N.E. tip of Pt-14 is a
 Fine grained Diabase subglaters -
 Only about 100 ft. are here left exposed
 and from its position it is not at all
 clear what it is supposed to represent.
 B Q Porphyry from Lake in L. corner
 on point 14.

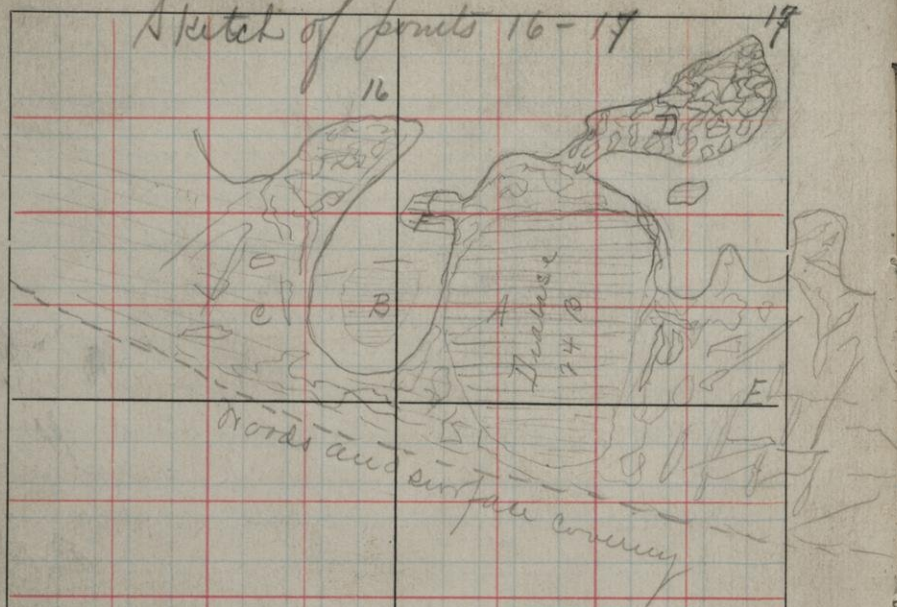
23091

17 B

23092

18 B

Sketch of points 16-17



A Medium grained diorite very marked but joint contains no Red rock except one dike at south point cutting corner. This mass stands about 3 ft above surrounding rock

B Similar to A but somewhat finer

C-E Intricate mixture of what appear to be boulders & small dikes of red rock and green much altered diorite with an aphanitic Diabase

At C some boulders of much altered and chert rock.

F Mass of fragments of Red rock with interspaces filled with fine grained Diabase

23093

19 B

68

Slightly diff phase of 18 B from
a boulder like inclusion a few feet from

23094

18 B

See also 18 B from an undoubted dike
on point 15

23095

21 B

22 B Red Rock as above from edge
of a mass about 4 by 6 ft. exposed

23097

23 B

Very fine Diabase from pt 15 Has in
structure the appearance of 15 & 16
but is here much cut by the red rock
Hence probably the finer grain

23098

24 B

Diabase from pt A in sketch on opp pp

23099

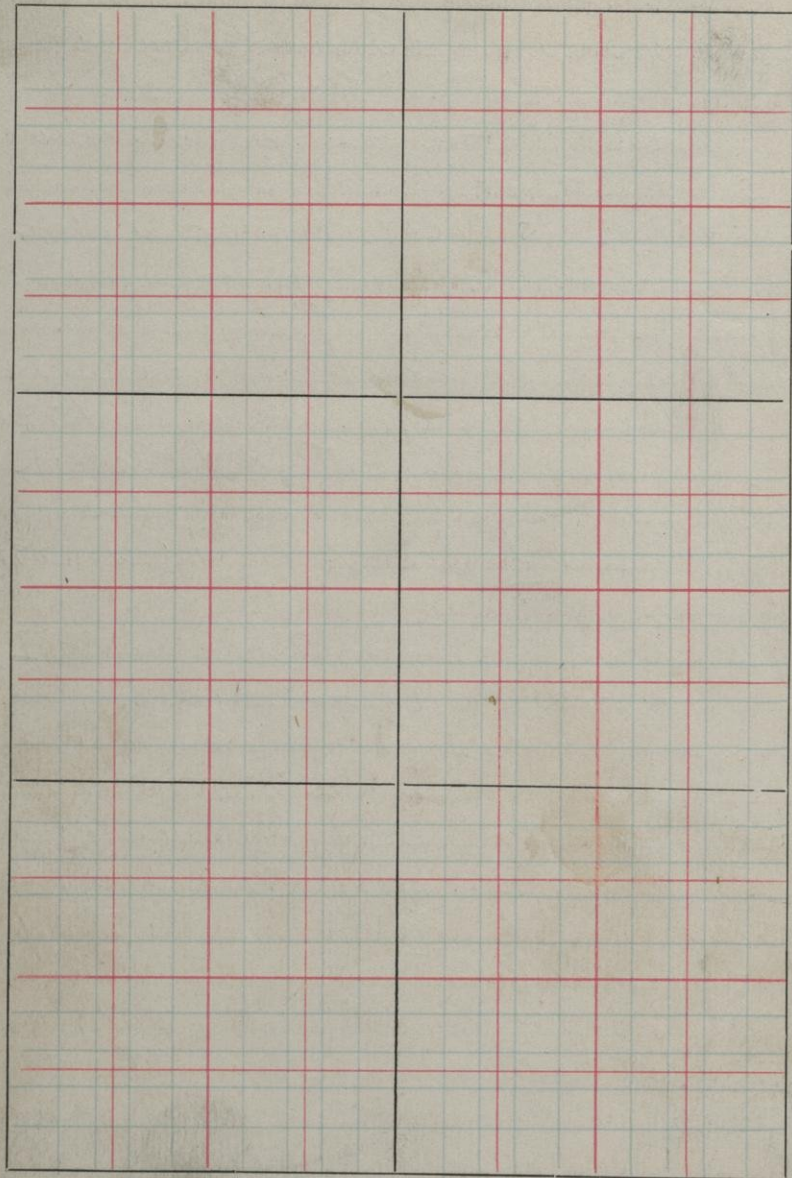
25 B

Quartz porphyry from fragment of D
Same is clearly Quartz porphyry the east
face of point D which has about 14 ft. sheer
presents the appearance of a volcanic Breccia
in which the intrusive material is a fine
grained Diabase. On this S.E. face very
little of the Diabase appears. This grades
right over into a mass on the west side in
which the Diabase presents a solid mass
and the red rocks appears in small boulders
& dikes. This Point is most confusing.
The Quartz porphyry of this point doesn't look
same as the larger mass further south.

S.

T.

R.



And at first sight appears to be a mass into which the Diabase has been intruded as undoubted dikes or veins of Diabase can be seen at the same time equally marked inclusions of Diabase in the red rock occur. Some of the small dikes of the red rock in the Diabase present macroscopically a very different appearance from the larger masses. The rock all except the Dikes of red rock in Diabase are much jointed and cracked and hand specimens can hardly be gotten so I shall endeavor to photograph the exposure. In some places the contact between the diabase and Q Porphy appears with knife edge precision while in others the Q por is deeply affected by the Diabase so much so that the thin shaly unaltered Q P and the thin clean cut Diabase veins there appears a third rock which weathers greenish on fresh surface looks little diff from Q P but weathers more red and leaves the Q P in the rounded boulderlike masses.

23/00

96 B

Boulder like mass about 10 ins diam
N side of II

23/01

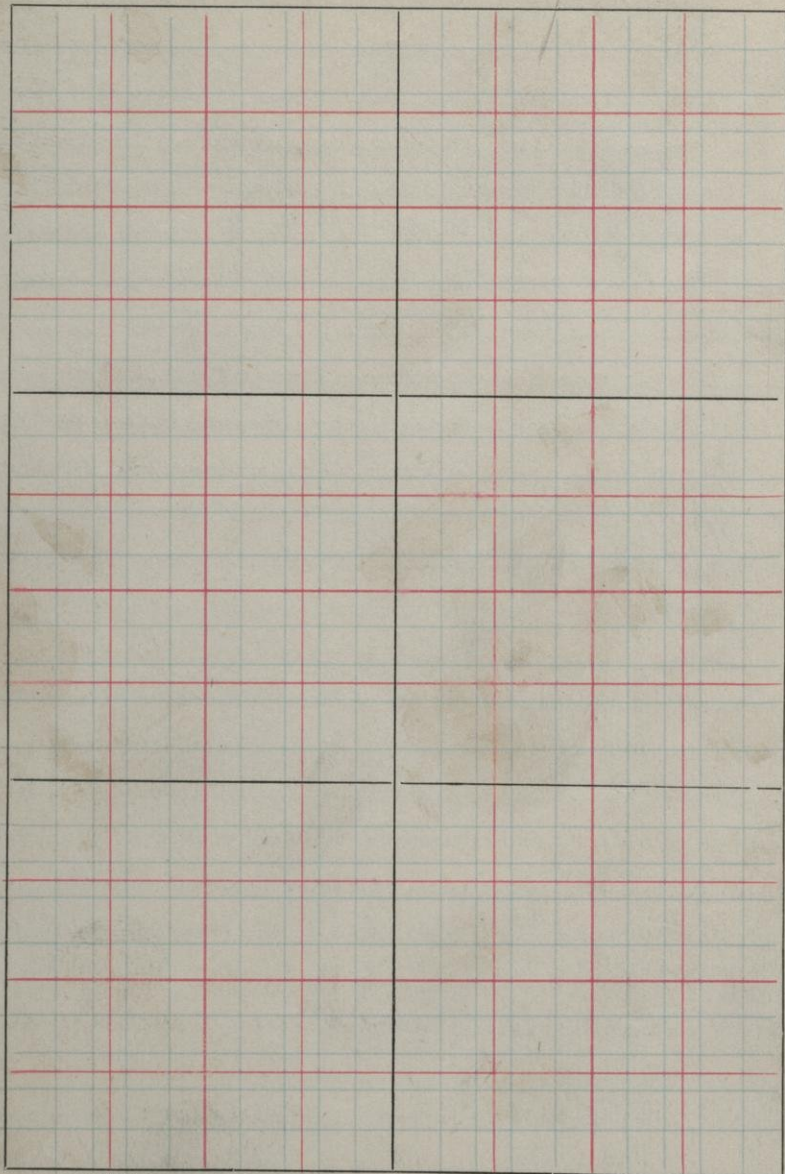
97 B

Fragment showing inclusions of Red Rk such are however rare. This was taken from boulder like mass 2 ft in diam in the neck connecting II to mainland

S.

T.

R.



23/02

72

28 B

Coarser Diabase from A with veins of finer Diab
zigzagging about in it. Such are seen to
a depth of about 3 ft on the E side of mass &

23/03

29 B

fine grained Diabase having appearance some-
what of an amygdaloid from the mass B
in sketch - E is same except more massive
The whole Baylet about B is same rock which
has a vertical jointing making slabs from 2-6
in thick and in trend corresponding to that
of A. No red rock is here mingled with the
Diabase either in dikes nor inclusions. All
around it however as indicated in sketch is
the mass of mixed Red rock fragments & dikes
and coarser Diabase. Here the fine grained
Diabase does not show the amygdaloidal
appearance that it does in the mass B
Pt has however everywhere the appearance
of being intrusive while the coarser
Diabase seems rather more blocklike fragments
north of this mass. The confusion described
begins description. While this statement ought
to be made to include all of the confused rock
indicated on the sketch it is probably the most
so at Pt 15. Possibly this may be due
to the fact that some inclusions of hornblende
Rock occur here. The difficulty lies in under-
standing the relation of the Diabases to

S.

T.

R.

[illegible]

each other. The fine & coarse kinds here seem to be of the same kind the only difference being the fineness of grain. Yet why they should be separated by such lines as indicated in —

23104

30B

Fragment showing contact of fine & coarse Diabase from pt 15. Coarse formed rounded & fine formed shell around a rounded mass about a foot in diameter — is hard to explain

Great numbers of red dikes can be seen in the water off these pts

23105

31B & 31'15

From fragments or boulder like inclusions in Diabase under point 19. Some of these boulders are little altered Q.P. These specimens were taken from outer edge

23106

32B

Fragment of the Diabase under Pt. 19. Same is so badly shelled or jointed that no full sized specimen could be obtained

23107

33B

from main mass of 19 at Contact with Diabase

23108

34B

From main mass of Porphyry near center. This point 19 is composed of Pink weathering Quartz Porphyry and is the mass

S.

T.

R.

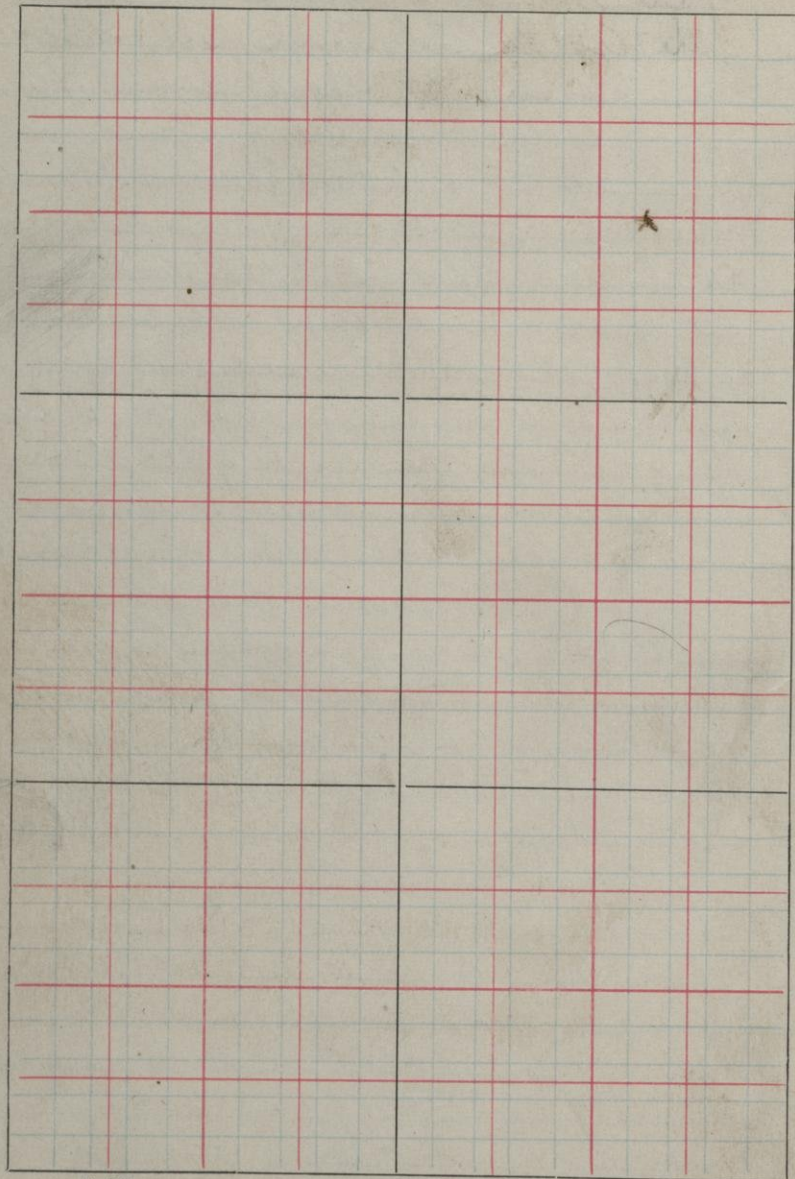
[illegible]

described by Prof Van Dine as being so much
 jointed that a trimmed hand specimen could
 not be procured. It shows no indications
 of being a flow in the way of laminations that
 I can see. Its walls are thin and it rises to
 a height of 20 ft. Its South & East sides
 extend into the sand of the beach but
 on the west side there is exposed about
 a foot of Diabase. On removing some of
 the earth to a depth of 3 or 4 ft. it was
 found that this Diabase very dense &
 Aphanitic near the contact is not so fine
 grained farther down although it would
 be classed as fine grained, and contains frag-
 ments in boulder like shapes of the
 Quartz Porphyry also at a depth of about 3 ft.
 from the A.P. an inclusion of Northwest
 Rock was found. At least the entire or
 weathered part of the Diabase shows a very
 marked jointing parallel to the contact -
 also a series of joints at an angle to them
 which breaks the rock into small fragments
 so much so that no trimmed hand specimen
 could be obtained. The contact is sharp and
 slightly dipping about 45° in direction
 $S 40^\circ E$. No inclusions of Diabase appear
 in the A.P. unless those in the specimens.

S.

T.

R.



If the boulders be regarded as such.

The QP has been much metamorphosed as will be seen by the specimen from the contact from which it will be seen that near the contact the QP presents much the appearance of the small dikes in the diabase N.E. of here the diabase of this mass shows the peculiar weathering in which rounded-bell like inclusions of apparent gneiss or unaltered Rock are surrounded by a mass of much altered material of about the same degree of decomposition throughout and separated from the unaltered by rather sharp lines.

Pts 20-21 are Soudanite Rock cut by Red rock similar to that of Pt-19 but redder weathering and not quite so badly jointed although even here it is very difficult to get a good well preserved specimen.

On the North side of Pt-21 there appears in connection with the red rock a grey medium grained Diabase.

Already described under 613

In contact or intermingled mass of this Diabase and the Red Rock pt 21

Red Rock from N side of pt 20

Only one very small dike of this rock was seen in this Soudanite. In general the

23/09

35 B

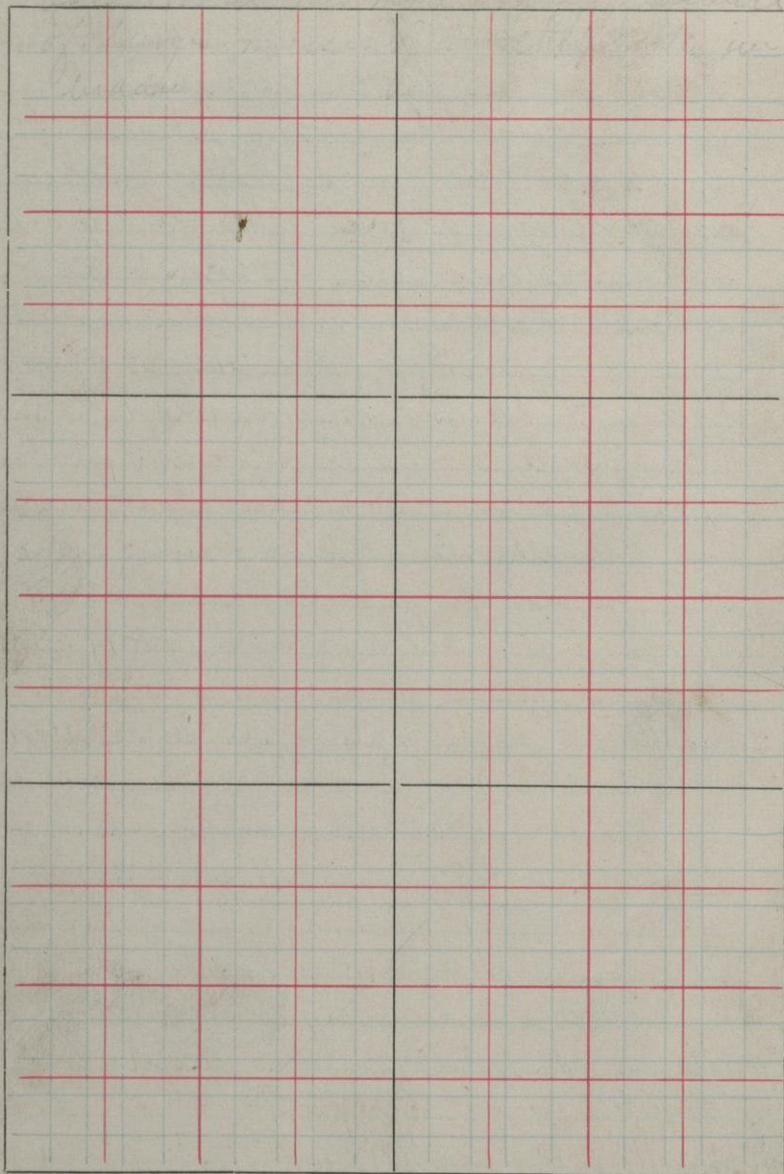
23/10

36 B

S.

T.

R.



occurrence has more the appearance of large masses of white Rock interbedded in the Red rock pt 22 pp 11 is made up of large white boulders in a mass of red Porphyry similar to that of pt 19 difference is undoubtedly due to fact that it is here associated with white. I should have noted that pt 19 is entirely without inclinations or culling dikes. Here on pt 21 the Porphyry has the appearance of having flowed in a thick pasty condition.

23/11
37B

More Q Por from N side of 22

On the South side 22 is flanked by Diabase of medium to fine grain regularly jointed and compact blocks of about 1 ft cubes

23/12
38B

More Diabase from South side of 22

Exposure 239 the East side of 24 are the same medium grained Diabase as on 22 but the N side of 24 is finer in grain very irregularly jointed and fractured and shows traces of red material similar to a band in pt 16

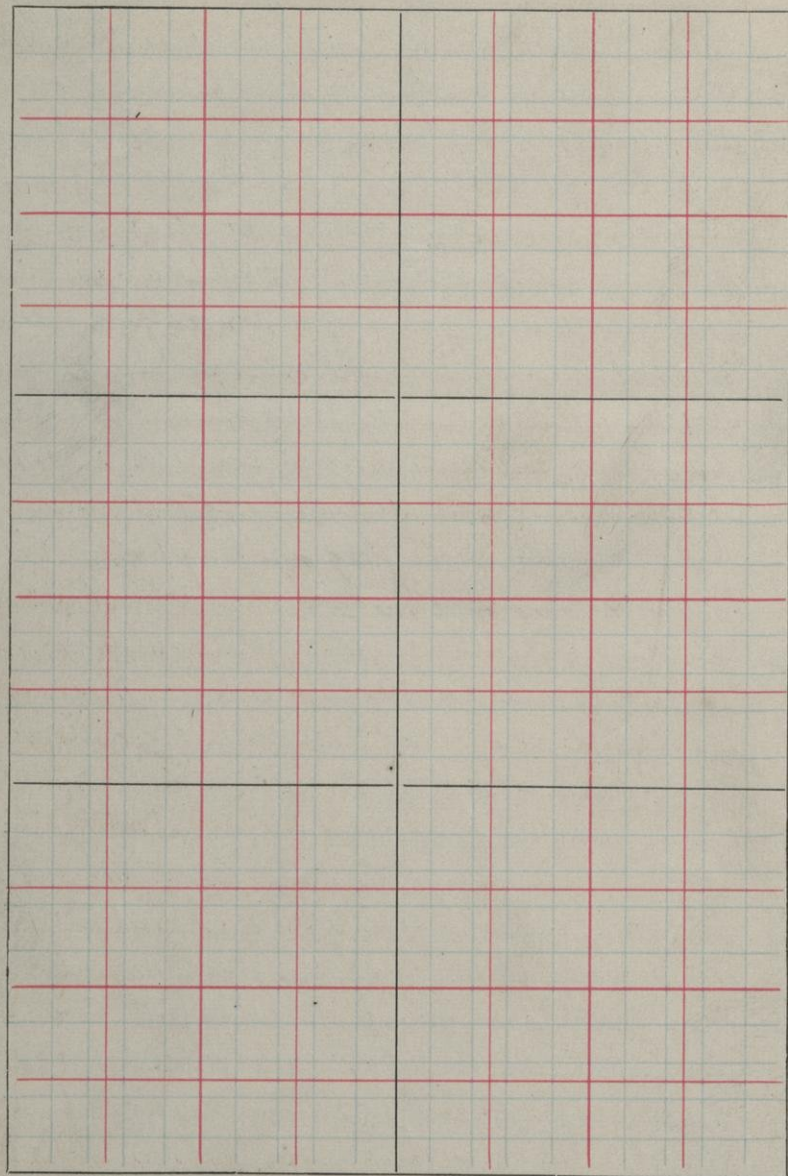
23/13
39B

Peculiar band making up western part of 24 Point 25 is made up of the exceedingly fine, splintered shenevally fracturing Diabase mixed up with red material exactly like pt 16 On east edge is a dike of Porphyry Specimens can only be prepared from the more compact portions

S.

T.

R.



23114
4013

Diabase fine grained from pt 24 Most
of this point is made up of much more
fine grained and more fractured material
from Red Porphyry dike in 24

23115

4113

Point 20 in the river consists of Diabase
of two kinds. On the r.r. side near the water's
edge and rising to a height of 20 or 3 ft is a
medium to fine grained homogeneous conchoidal-
ly fracturing regularly jointed gray dia-
base. Vertical jointing is very marked and
trends somewhat S of S.W. over this comes
what appears to be fragments of this lower
unbedded in a somewhat different diabase.
Part of this exposure has been blasted away
so that comparatively fresh specimens of Mother
Rock could be procured. This presents merely
a mottling of slightly pinkish gray & light-
green colors. The weathered surfaces however
present the apparent inclusions with dark or red
surfaces while between them is a light gray
matrix presenting streaks which mark about
the inclusion. Exhibiting vividly the fine struc-
ture described by Cooke. While the lower
rock weathers evenly and smoothly the upper
presents that wavy & irregularly frac-
tured honeycombed appearance seen on pt 15-16.

S.

T.

R.

[illegible]

The upper part of the lower Diabase
has an amygdaloidal appearance. The Amygdalae
being elongated and arranged more or less parallel
At the depth of a foot they are from
 $\frac{1}{2}$ to $\frac{3}{8}$ inches in length but decrease in
size and increase in number very decidedly
as contact is approached. The same are
probably Pseud-Amygdalae since they appear
more marked in the dissections of
the upper Rock. Seemingly to be rather due to
the contact between the Rocks than to
surface flow

23116

42 B

23117

43 B

23118

44 B

23119

45 B

from lower part of lower Diabase ft 25

Same near contact. With Dolomite Dike

Upper Rock fairly fresh

Fragment of upper Rk showing weathering

The dip & strike of the contact could

not clearly be made out. dip however

was in roughness line of 45° in $S 30^\circ E$

direction approximately

Point 16 consists of a very much weathered

diabase. The exposure is isolated & no

structural relations can be distinguished

23120

46 B

Much altered of Diabase from 16 showing

secular alterations

23121

47 B

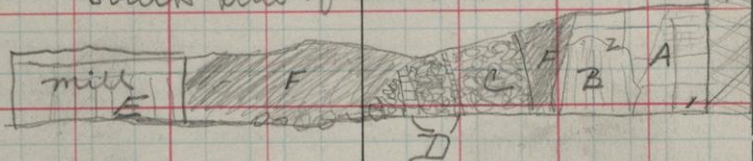
Freshest specimen procurable from 16

S.

T.

R.

South side of Beaver River E of Bridge



A Black Medium grained Gabbro & has
sometimes pink or flesh colored portions

B Fine grained dark Diabase

C Fine grained Diabase with that peculiar
microscopic structure

D Lenses of rock similar to A

E Fine Gabbro under mill

Fare Slab piles

The rocks here are much varied and hard to describe also being much alike and much mixed they are hard to recognize

The sketch on the opposite page represents the South wall of the river E. of the Bridge. Scale is not absolutely accurate and must be adjusted to the plat

The rock at A is massive and entirely black in places however it is mixed or mottled with flesh colored feldspar. I take it that this is the Orchoclast Gabbro of Prof Irving. The mottled & the black rock look quite different but are so closely associated that they must be different varieties of same body

23122

48B

From A at Pt. 1 Black Gabbro

23123

49B

" " " Pt. 2 Mottled "

Mottling is not nearly as coarse here as usual

23124

50

From contact - bet A & B

23125

Fine grained Diabase from B

23126

Diabase from C

23127

53

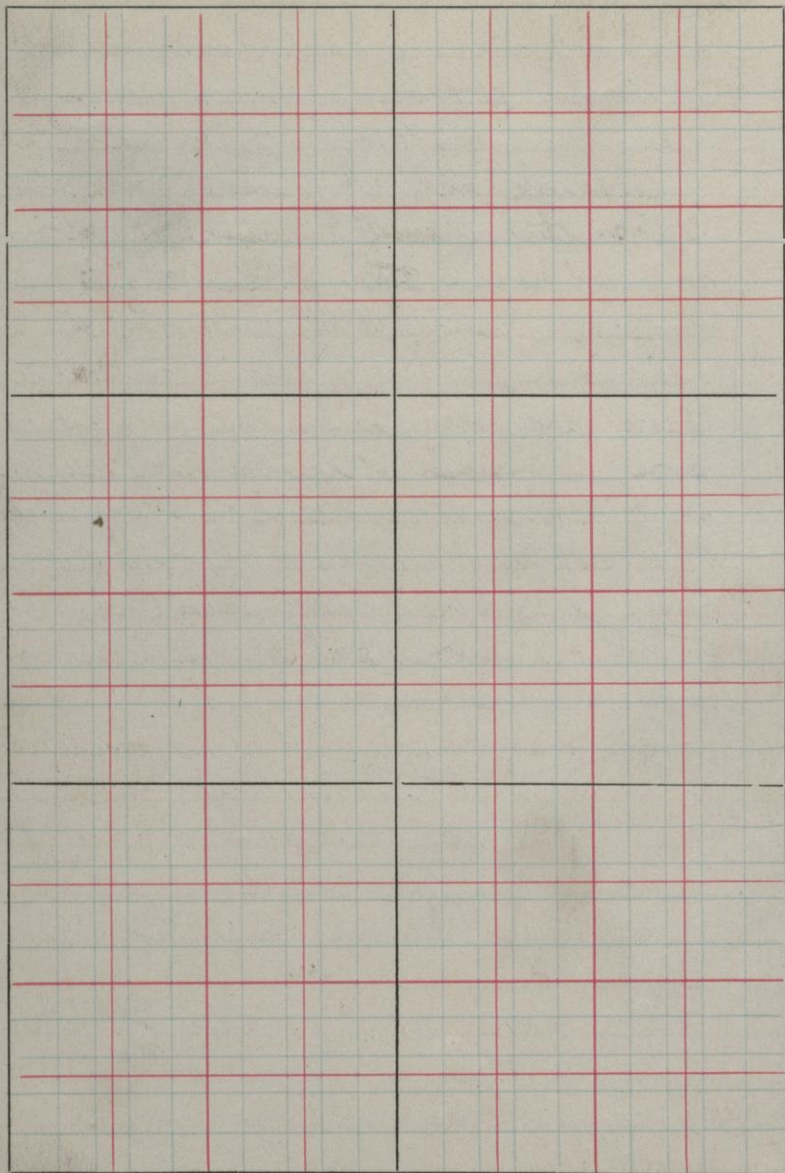
Like rock D

The Diabase at B is fine grained conchoidally fracturing but massive & homogeneous. Unusually the contact between it and the Diabase of C

S.

T.

R.



can not be observed. From the structure it is impossible to say which is of dr and which is intrusive. I hope the specimen from the contact may determine this by microscopic study. C is that same peculiar diabase as on opposite side of Riv at pts 25 & 16. here however seems to be unfractured with Dike rock.

Dikes are very irregular and are composed I believe of the same material as A. Their contact can not be traced. E is coarse diabase or fine grained Gabbro which is exposed under the mill.

It is massive & has conchoidal fracture in blocks of n. to 3 ft on an edge. It is same as that on south side of road opposite Bridge. The trend of the major joints is very nearly south.

23128

54B

23129

55B

Gabbro from under mill

" from south side of road opp Bridge. This is the Rock is same as in under mill is massive & joints into blocks

3 to 4 ft on an edge. One set of joints

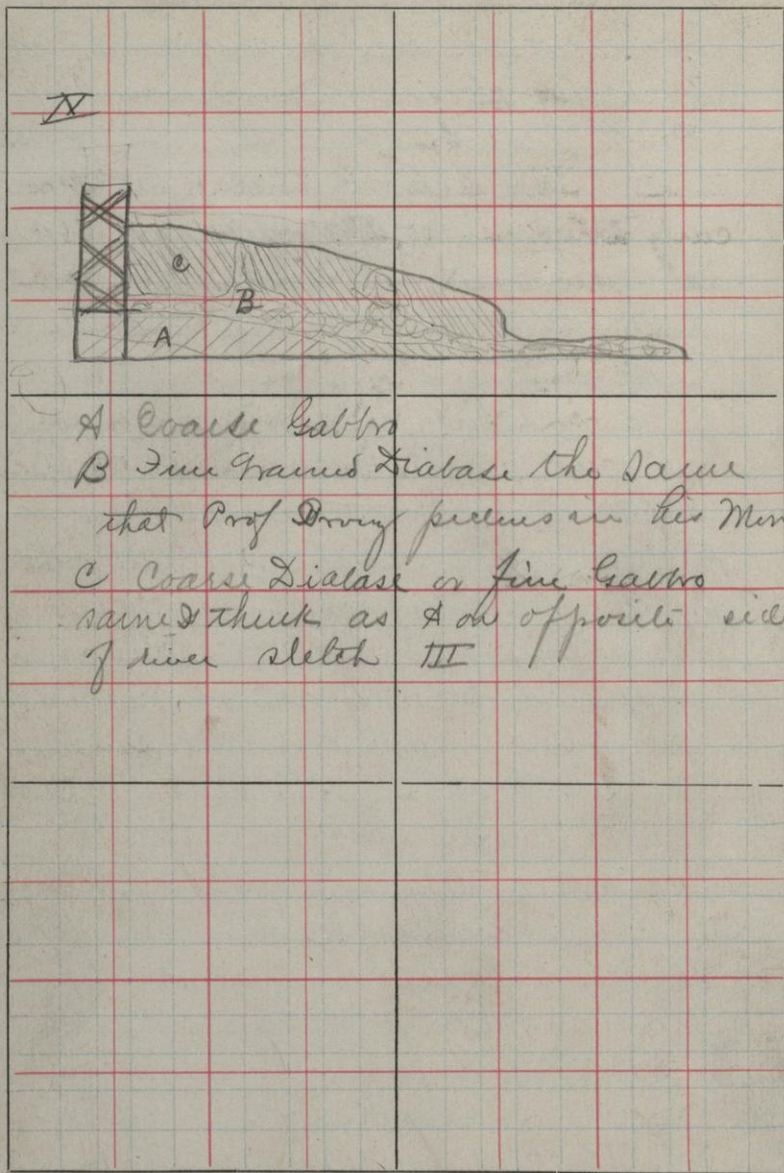
trends S30E in both locations

East of this exposure may be seen one of the Curly Diabases (this is

S.

T.

R.



low & flat in gutter of road. Just
like C of sketch on ~~the~~ preceding page
E as t of the Bridge on the south side of
the River the find conditions as sketched
in II The Diabase marked B is not as
curly structured as that of pt 27 it approx-
imates very nearly B of sketch III From
structure it is impossible to determine
the relation of the fine & coarse Diabase
to each other. What I just called coarse Diabase
is I think Prof. Dronkers Onchochian Gabbro
Point 27 of the flat is like same curly
Diabase as C of sketch 3 and being here
low and flat the dike of coarse Diabase
is seen in place or horizontal exposure.

23/30

56/3

23/31

57/3

23/32

58/3

23/33

59/3

Dike in pt 27

C of sketch on off page

B of same

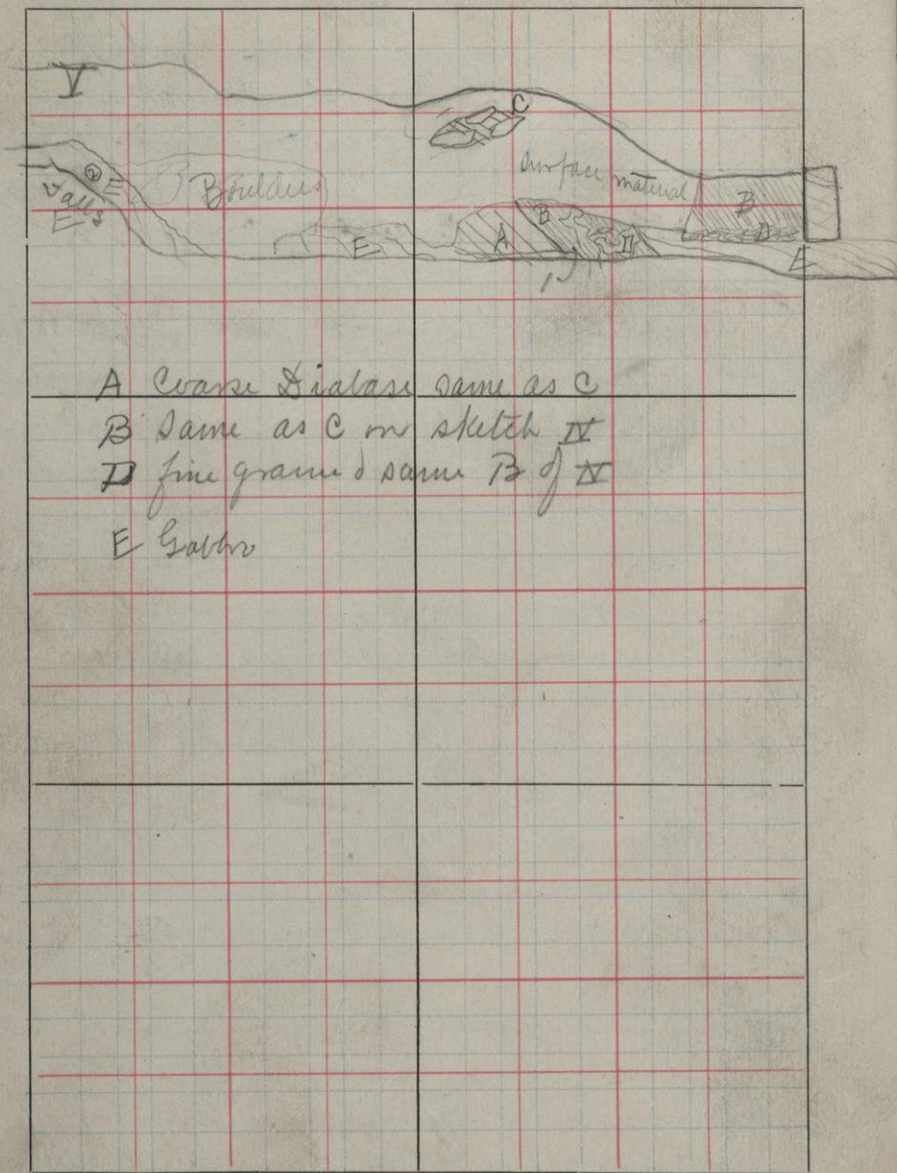
From contact of B & C

The Coarse Diabase of A and C on next
page VI is I think same as on top of hill
near road opposite Bridge also found
in south wall Here is nowhere seen
to reach the water edge it rests very
irregularly upon coarse Gabbro
It is massive coarsely jointed and does
not show distinctive flow or dike features

S.

T.

R.



at C it carries Auriferous Boulders

The fine grained basalt D is as irregular as ever and especially toward the N where it cuts & veins the basalt rock in every direction

23/34

60 B

Gabbro from E under Bridge on skulk IV

23/35

61 B

Gabbro from middle of Riv about 20 ft N of Pond

23/36

62 B

From B nearly a coarse phase of B of IV

23/37

63 B

Diatase from C of V

23/38

64 B

B of V at pt 1. Fine Gabbro

23/39

65 B

Contact of last with fine grained Diatase pt 1

23/40

66 B

Coarse Diatase from A of V

23/41

67 B

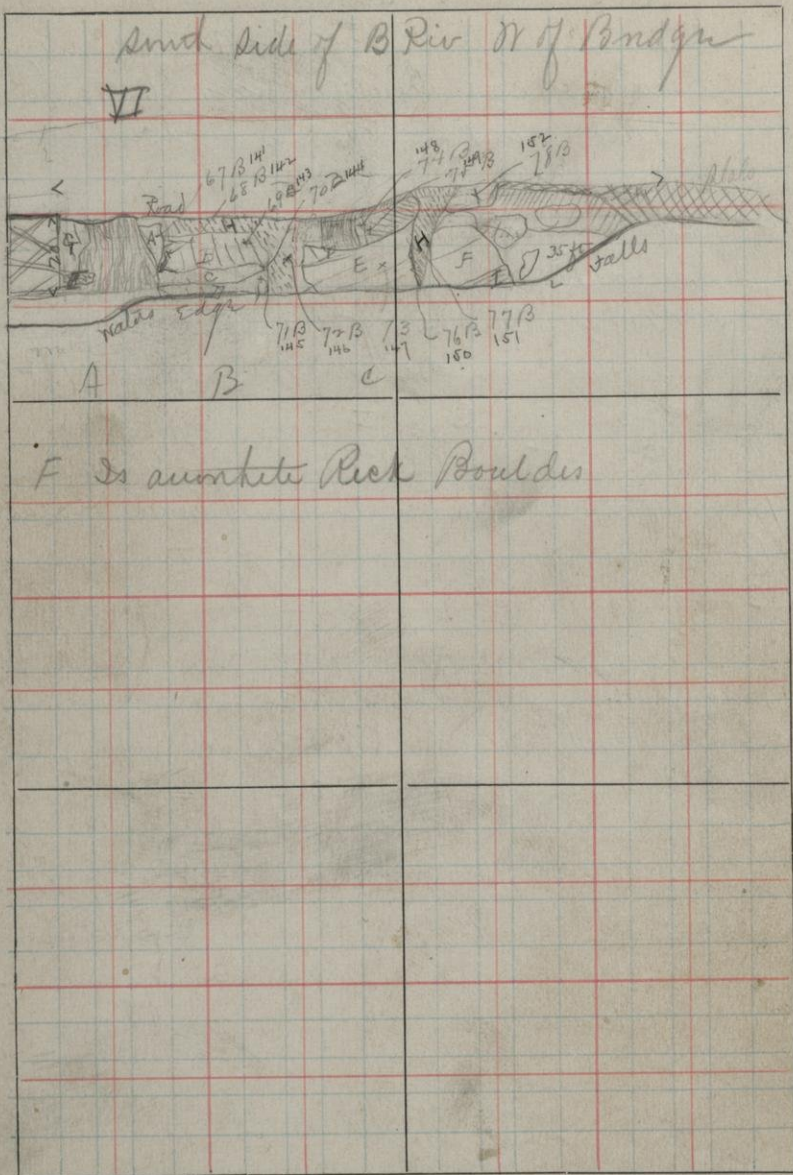
Gabbro from pt 2 E

While from the structure of features it is impossible to tell the order of these rocks the most plausible order is that the heavy basal Gabbro is one of the usual flows that what I have called subvolcanic Gabbro viz B of sk. I is intrusive & same as dikes E of Bridge & that the fine curly Diatase may be intrusive & may also be a bed. The coarse Diatase C while its relation is complicated has not much the appearance of a dike. Its complication is easily explained if B & D are intrusive and intersected.

S.

T.

R.



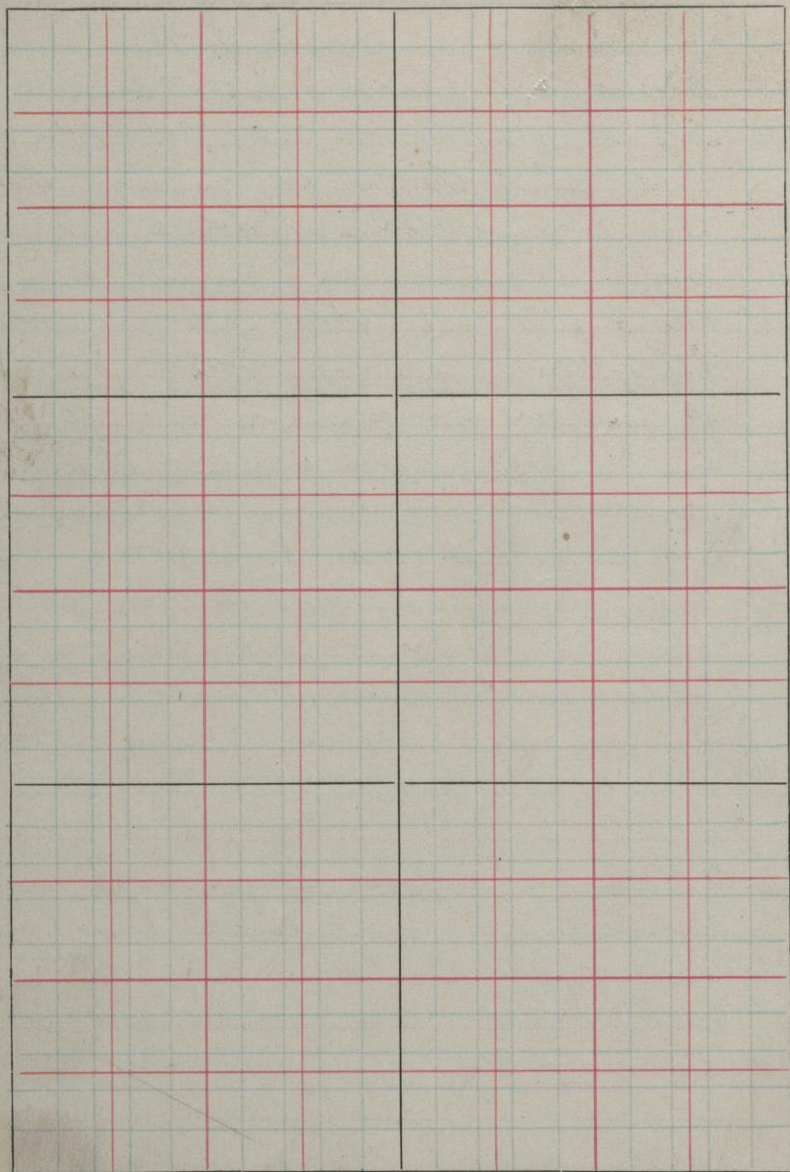
- 23141
67 B From A on opp page - Diabase
- 23142
68 B From Bas indicated in sketch
- 23143
69 B From B " " " " Both Gabbro
- 23144
70 B " C " " " " "
- 23145
71 B " D " " " " " Maybe alone or Chum Gabbro
- 23146
72 B Fine grained Diabase marked in sketch
- 23147
73 B From E undoubtedly same as 69 B
- 23148
74 B From what maybe a dike or by no means
distinctly so
- 23149
75 B From 13 ft N of above as indicated in
map seems to be part of a flow
- 23150
76 B From Contact
- 23151
77 B From Has indicated

As will be seen this exposure is some
what complicated. Probably, comparison
& microscopic study of the rocks may sim-
plify matters. The two vertical exposures
of A are peculiar and possibly each are li-
suspect faults on their eastern limits.
In both cases on their Eastern limits straight
& comparatively in one plane while the
Western sides are irregular. Both are wedge
shaped and seem to be underlain by dif-
ferent rock. The Western one has on its
eastern side a thick or even of reddish
tuffaceous material which stands nearly vertical
near the main lower curves Eastward.

S.

T.

R.



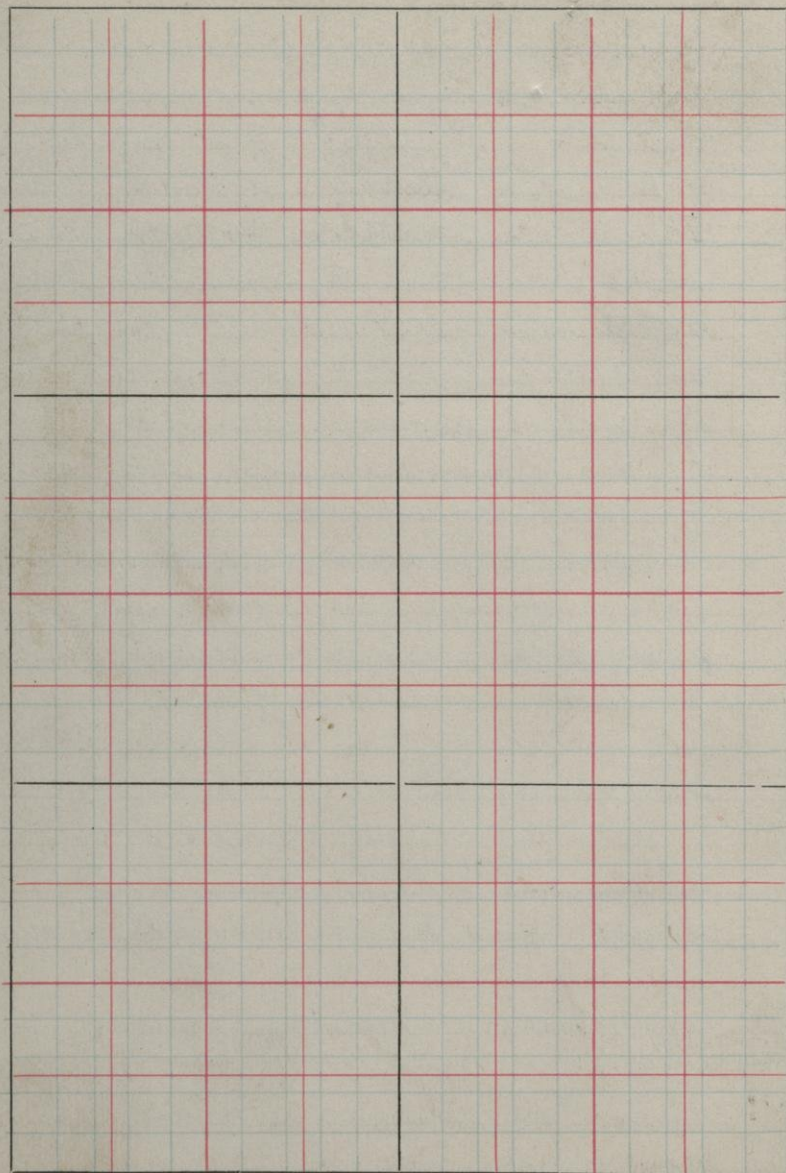
and can be traced no farther

The lower rock of the whole exposure seems different from the upper yet they grade into each other so far and so intimate the contact that the same can now be located. It is to be hoped that a further study of these rocks may throw light on their distinctions and a study of the specimens from the contacts help to determine whether the older and which of possible intrusion. The lower rock some specimens of seems much coarser slightly more greenish and seems more massive than that above. It is not at all impossible nor even highly improbable that faults exist at the points mentioned and thereby account for the repetition in sections A B & C of about the same succession of rocks while the same appear to dip from 12° to 15° to 20° & 35° E. Bedding is indistinct however marked jointing especially in the higher parts which dips in general as indicated. The lower parts are much more massive and coarser than the higher parts which are jointed quite regularly in 2 directions while in the western vertical exposure of H there are several sets of joints making angles with each other thereby producing triangular blocks.

S.

T.

R.



The Aurothite line has with few exceptions the appearance of Boulders. While some must be in place while the boulders are usually very fresh some of the larger exposures are much disintegrated. Such an instance is at the top of the falls on the left hand side of the river.

The dip is here very irregular the falls are caused by huge sheets of Gabbro with very steep dip (about $27^{\circ}30'$ & $35^{\circ}40' E$)

While the exposures below which holding the direction seem to be much flatter. I take it that the aurothite rock accounts for this.

I will try to represent the nodular irregular weathering of the Aurothite spoken of at the top of the falls on left side by a photograph. The coarse or fine gabbro on upper cliff face with on N & South side of River are beautifully worn and striated by glacial action.

The most beautiful examples of Pot Holes are very numerous here they are of two or three in series and have caused the breaking or detaching of huge masses of rock.

23¹⁵²
78B

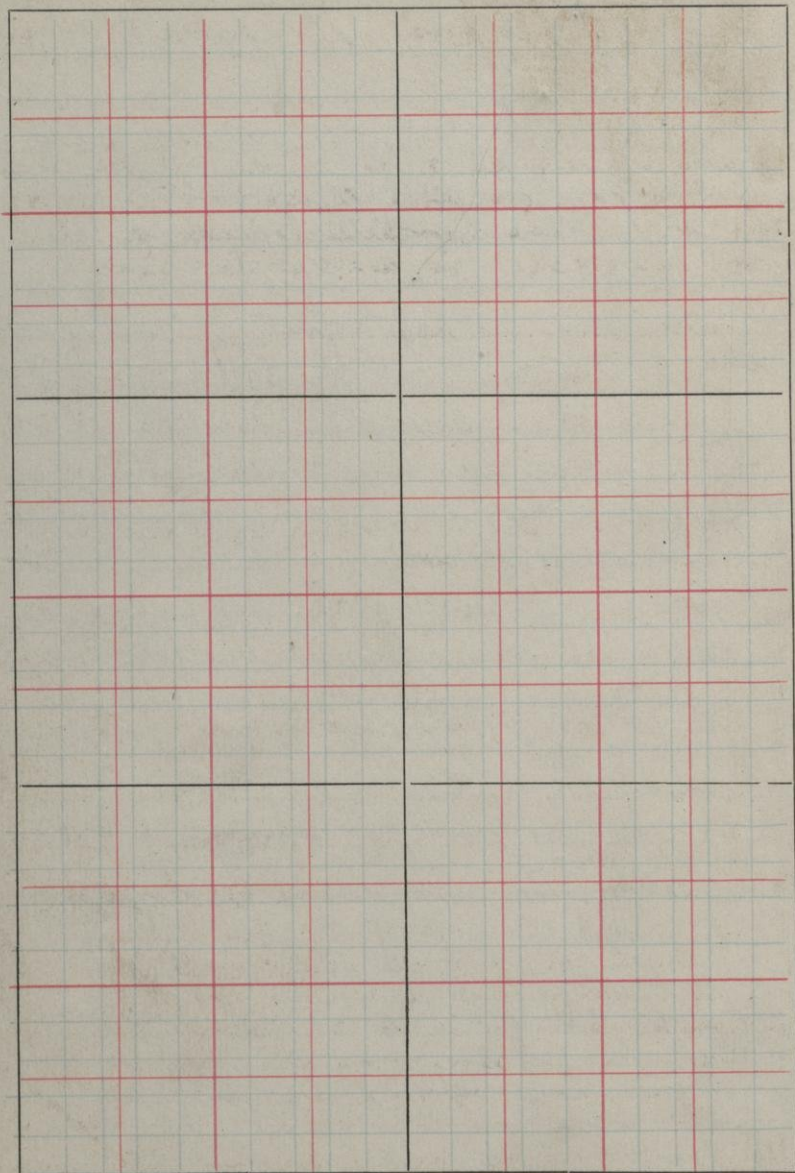
From contact of Aurothite & Gabbro I saw at point over F sketch D.

As before stated the falls occur over huge sheets of Gabbro which dip $27^{\circ}30'$ & $35^{\circ} E$ While on the east wall of the space

S.

T.

R.



between the falls which in the bed of the stream is covered with boulders the layers appear to be horizontal

Now it is not at all improbable that these layers are not so thick as usually represented and they for con form to the surface under them which the auriferous boulders at both falls would indicate is auriferous Rock

Between the points marked one & two in the plat on p 15 the bed of the stream is flat Gabbro exposures there dip not more than 8° or 10° E 35° 40° E though very irregular at times being level

23153

79 B is Gabbro showing characteristic weathering from top of 1st falls

23154

80 B is from foot of second falls & is somewhat flatter than last

23155

81 B Auriferous Rock location same as last

About 20 ft above the top of 2nd falls an irregular dike about 10 inches in thickness crosses the bed of the river

23156

82 B Finest observable specimen of this dike

At the small falls near the island as we proceed upstream a steeper dip is again observed but only for about 25 paces

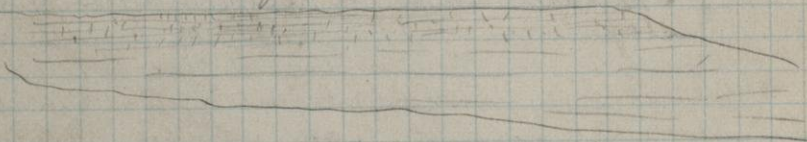
The weathered surfaces of the Gabbro except when washed by water appear brown

23157

83 B Gabbro from near Island

A very marked system of Joints here bears
 N 10° E

The face of the bank facing the Island on the E which is about 15 ft high shows the bedding or rather jointing almost horizontal and especially toward the upper part weathers into tabular forms



In places not more than 2 or 3 ins thick and even 1 inch thick this may in some way be due to the presence of very large bivalves which are here abundant

For about 50 paces N of the Island the rock in the bed of the river shows the most exceedingly irregular jointing. But down the small falls so marked on map - for a distance of about 50 paces it is more regular here we see a dike of Red rock about a foot thick running through the Gabbro bearing about N 70° E. The same rock is seen running the Gabbro very irregularly below the falls where the very irregular form was observed at this place. Between the small falls and the Lower island the Gabbro shows an unusual tendency to nodular weathering and is much pitted and lined with a reddish material which however seems more like an alteration

product in vein form than connected with 102
the cutting veins & dikes noted

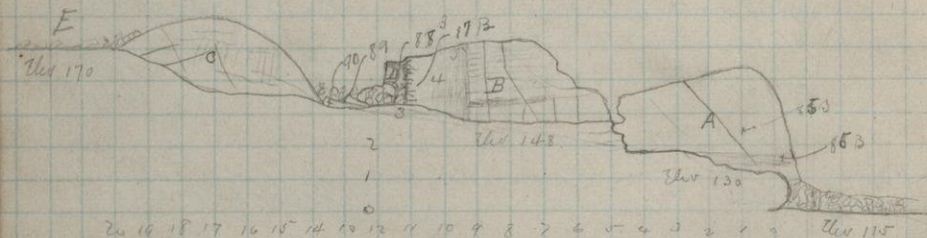
23158

843 Specimen of red granular Rock from
largest dike noted above small falls
Sample is from edge so as to show relation
between it and Gabbro

From here up to the large falls the bed of
the stream is covered with boulders & gray muds.
The east bank no longer is vertical but
slopes more & more as we proceed northward

Between the upper end of the island and the
falls the bed of the river is filled with limestone
fragments. In some cases 20 ft. from
edge

Second falls of the Beane River or on wall of Gorge



The stream here cuts oblique & across the strike of one of the Gabbro ridges and falls about 60 ft in 200

23154

85B

A is a massive mound of Olivine Gabbro. Olivine Gabbro from A which is undifferentiated as shown in sketch by a layer weathering to a red substance. Much red malpais spales seen on the fresh specimens this layer is much jointed in a horizontal direction. Notable at D jointing is carried over as far as the weathered surface that it assumes the appearance of a sedimentary rock. I am not sure that D belongs to the layer spoken of however the sharp angle between P & B certainly do and here the same is cut by dikes & veins of granular Red rock same as farther down stream and presenting a jagged profile as some of that at Lake shore. There, dikes have a thickness of from 5 inches down here also is interbedded by thick vein of Calcite 3-6 inches. B is much jointed especially horizontally. But only at D is the jointing so complete that it gives the appearance of stratification.

It has run very through it bands
which are fractured by chert
here. What the same may be due to
I was unable to determine.

A is exceedingly massive and looks
like one huge boulder and the blocks which line fall
from it measure as much as 20 ft on an edge.

23160

23161 B From reddish layers under A

23162 B From B. mar. layer which weathers red

23163 B From side of Red Rock in D

23164 B From calcareous vein

23165 B From concretion of red weathering beds

The dip can not be distinctly made out
the surface of C. Bows down and seems to pass
under B. Just opposite of stream seems nearly horizontal.
Over the whole the reddish layer seems to dip
South of East and the appearance as much
more of a member of these flows than one
thick one. No Swarthite Rock was here noticed.
The red dolomite veins as in D are seen
some what in C. on the opposite of stream &
in bed of stream they are very irregular in
direction & size.

At the turn E the bed is again covered with
fragmental material an exposure as to the
right falls. Near next turn or at A in
station pp 19 the east bank of stream becomes
bold cliff 20 ft high trending about N 20 E.

23165

23166 B Specimen of Galena from pt. A pp 19 E wall
of River River.

At the falls or at the bend N the River again cuts a Gash Ridge here the appearance is that of having once been massive. Jointing is very marked but irregular. One system dipping at an angle of about 60° S.E. Cleaving out large angular fragments on the cliff side. At the foot of the steepen south side of the stream there appears a fracture zone. Or at least a series of dozen parallel joints dipping toward the south at an angle of about 50° from the vertical.

In the way of bedding none can be made out and unimpaired deliquescences.

- 23166 Specimen of Gash from foot of same falls
 23167 Specimen from top of falls
 23168 Nothing in the nature of extensions appears here and no signs of anorthite Rk

From here for 200 paces N the Gash remains exposed in two cliffs (10 ft high) on both sides. While bedding can now be made out then does exist of marked joints which first runs here, and then toward the west. The exposure appears to dip N.W. by N at about 10° .

- 23168 Specimen from N side of River midway between falls & N section line of 12
 At this point the top of the ridge is found to be studded with rounded masses of anorthite boulders and altered by ice action. Also close accumulation of boulders were also found in brooks in the Gash in the bed of the stream. The cliff over runs to a height of 25 ft on the north side of the stream but not so on the south. It would thus appear that the anorthite

Henry Rader has up a roseau and made a
 mound around which the lava makes its way
 especially so since here the lava makes a
 low to the south

At the point A on pp 17 there appears a
 fine grained rock (described by Rader as a
 like blende. It is traversed by a marked
 system of joints cutting it into thin slabs
 which vary in dip from 60° to 80° degrees
 in direction N W. I saw it had a definite
 appearance this can hardly be said it
 has rather the appearance of a flow from
 the north to the N E. spoken of later
 23169 95 B from this fine grained basalt at Pts
 pp 17

The areas marked feldsite on pp 3, 11 & 13
 are composed of Black tinted banded felsite
 which shows the weathering characteristic
 of such rocks in this region to such a
 marked degree that it is only with much
 difficulty that unmineralized specimens
 can be procured the exposure is a
 gently rounded knoll that rises about 10
 feet above the surrounding surface
 Its contact on every side is concealed
 by drift on the N side it faces the lake
 with a bold ledge about 15 to 20 ft high
 The rock unlike most felsites exposure
 seems to be alike in every part of the
 exposure and in one place shows
 beautifully the flow structure the bands
 very fat times denuded almost - on to
 steep slopes

23076
96B

Banded Black tinted Feldspar
N side of exposure at 13B

23173
99B

Same shiny Flow structure

23171
97B

Granite from S. Port of 13B from
N side of exposure

23172
98B

Same from NE side of exposure

This mound of Granite Porphyry built
or single dyke as Porphyry being it
is surrounded by vertical walls of varying
heights as indicated in the flat. It is
possible for me to see how the same could have
been a flow the top is rounded sloping to
the N & South West as well as to the North
the highest wall (90 ft) faces the South
and is the only thing that points toward
a flow to me for it must have been sup-
ported by a soft rock which weathered
under. Toward the NE the surface slopes
down at an angle of about 45° to within 5
feet of the water's edge and the channel
between it & the Diabase island although
the latter is only about 50 ft dist. is 20 to
25 ft deep toward the E & South the
bluff falls off under the water to a depth
of 100 ft. In a distance not more than
50 ft. from the north side may be seen
a peculiar series of points approximately
parallel to the upper surface showing
down just as does this surface the same
are now filled by dikes of a very dense
Aphanitic black diabase about 3 in. thick
What these points may be due to I was
unable to determine.



Sketch of N wall of larger pt showing appearance
jointings

A is a mass of fine grained Diabase which is the same as that in the dikes following the jointings shown in sketch. In the N. Wall of this core Diabase veins & dikes run very irregularly in all directions but they are small and not very numerous. They appear to be the same as those larger ones which cut the point projecting just E of the Dock. Here the rock has a thickness of 243 ft. The N. wall of the core and especially the deepest angle shows a very much increased jointing and since this is opposite the Anorthite Rock Island it is not improbable that in some way it is due to presence of same. It is also to be noticed that on the south side of the point where the vertical jointing of several systems which intersect in depth shows up more plainly on account of the length of the cliff that the jointing was much increased near the water edge and especially so near the bottom and on the N. side of the angle seen in the plat. Here again it will be seen that this point is opposite and in range with the Anorthite exposure on this side.

The small island N.E. of the larger point is composed of Diabase cut by Dikes of A. Por.

This Island so close to the point makes it hard to see how it can be a flow.

on top of dam In fact it is impossible especially when it is cut by Ordovician porphyry in vertical dikes as much as 20 inches thick. It has a regular nearly vertical jointing mainly

In several places on its surface exhibits approximating like an amygdaloid with the amygdaloid fractured out except the N.E. extremity like a blanket dipping about 10° E.N.E.

23063

170

Dialase from Island

23064

171

A Porphyry from dikes in island

The North N & W sides of the Granite mound bow down suddenly in a way that seems to me can be explained in no way except that the same is an intrusive Batholith. Contact with the surrounding rock is everywhere covered by drift. But on the S.W. side at the Shingle cone we find the West side of this cone bordered by a wall of Dialase about 8 ft high and this dialase is exposed within 10 ft when the sloping wall of Granite appears. This is a very coarse grained Blush or light olive dialase which in the south west corner of the square angled cone has a marked jointing approaching the horizontal and looks in every respect like a flow. The other exposure near the Boss however shows a similar jointing in direction approaching parallelism to the surface of the Boss. On the south side of the cone this dialase appears and toward the east near the Batholith rocks assumes a marked vertical jointing and is what Prof. Lawson calls the 25 foot-dike of Dialase cutting the Batholith. I can not see this. It certainly cuts the Batholith but irregularly and has left

no distinct outcrop south of here there appears a medium grained diabase with much brownish feldspar that might be orthoclase though I think is merely a discoloration of the ordinary Plagioclase. In structure joints regular in to blocks about $3 \times 3 \times 2$ ft by a system of vertical & horizontal joints appearing like the 2.rr. exposure of Diabase in the cone and contact with this diabase can not be traced. In fact I am not so sure that they are not merely parts of the same mass they form a low flat surface between the Cratered Biers and the high exposure marked & in flat along beach this latter presents no cliff. In place of same a mass of fragments angular & irregular in size as above noted.

The aurochite here is that which Prof. Lawson describes at length and gives a photograph of as being one of only two exposures of Murree Rock showing structure. The dark bands are just like the aurochite which I found on the 1.rr. shore of the Bay marked pt-18 in place on pp 25 are to me the sedimentation of this block seems due to letting either by undermining of the water or by the action of the Diabase. Especially so since the much larger mass just south is massive with some jointing horizontal but no trace of banding.

23178

100 B Aurochite Rock

pp 13

23175

101 Diabase on side shingle cone

pp 13

23176

102 B Diabase South side of same cone

pp 13

23177

103-104-105 Cratered as seen on pp 13

111

- 23180
106 B Black Gabbro from alluvial part sup pp 13
23181
107 B Red granitic rock from incision pp 13
23182
108 B " " from contact of dike with Diab.
23183 B Gabbro from pt sup pp 13
23184 Diabase from incision pp 13
23185
111 Granite Porphyry from base of pt in angle

The sketch on the next page represents the south cliff of the Point that is from X to Y in plan on pp 13

As is an old lava gabbro of somewhat peculiar character, it is massive and cut by a series of joints which while not very regular in direction cut the cliff in to huge blocks sometimes as much as 12-20 ft on an edge. When seen in position in the cliff these blocks have their edges & corners rounded off in a manner that reminds one of the Ball and socket structure with the socket removed and only the ball left. The rock weathers peculiarly showing a nodular structure in which nodules are sometimes 4 inches in diam.

The weathered surface presents a blotched with red spots and dark ones alternately the red spots are usually from $\frac{3}{4}$ to $1\frac{1}{2}$ inches in diam but at times even 3 ins.

At B this rock is for some reason fresh. The fragments appear in place with sharp corners and here a fresh specimen is blotched with black rounded spots.

about 1/8 in diam which nears the ¹¹² weathered edge are cut by red strata and as the surface is approached become more and more changed to a bright red ochreous substance which on the surface has been removed leaving holes in the surface. This I take it was originally Olivine. It comes the nearest that I could find on the entire coast to the olive Gabbro described by Prof Irving as he says especially at the mouth of Bonle Riv at which place I could find nothing.

23/86

112 B. Freshest of Rock from A
23/87 113 B weathered showing red spots from A

23/88

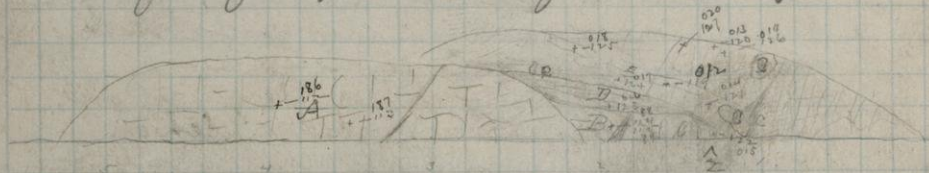
114 freshest from B
23/89 113 B weathered showing alteration from B

Above B we find a Rock which weathers a dirty yellow-green and which is much fractured especially horizontally. But the same on fresh fracture does not look unusually different from B and in one or two places shows traces of the red weathering displayed by A.

Yet the appearance of the surfaces in the cliff side is essentially different and no sharp line of demarcation can be found.

At the upper edge and at the surface we find the rock very fine and essentially a diabase while in other places again the weathered rock has the appearance of the coarser rock lower down in the cliff while the grain and appearance in the cliff varies so much in the cliff.

Face of Cliff on S Side of South Pt of BB



parts the absence of divisional planes would seem to indicate that the whole is a mass extruded or possibly intruded at one time and that differences are due to contact action.

Along E there is a very indefinite band of Reddish weathering material. While as I said that in a vertical section at the extremity of A no marked separation of the upper layers from the lower exists. It is equally plain that the lower rock is a "swamy" "mottled" "bluish" "green" "blackish" "red" "weathering" "galena" (possibly "Onchoclaste" "galena") and that the Red band is either a contact belt or is in some way due to presence of "swammy" rock which may sometimes be seen in small fragments in this belt. On the whole I am inclined to believe that the belt is a commingling of the two Rocks.

The dip here must be great 30° - 40° in direction N.E.

I have tried to get sufficient specimens

to work this up more fully in the Catalogue

23009 23010 23111
116-117-118 B Gabbro or Diabase much altered for location see plat pp 13

For location of following see sketch on opp pages

- 23012 B
- 119 B Reddish Granitic Rock from Band E
- 23013 B
- 120 B from near surface Gabbro
- 23014 B Olivine Gabbro
- 23015 B " "
- 122 B " "
- 23016 B " "
- 123 B " "
- 23017 B Similar to above
- 23018 B Isolated part of Band E
- 125 B
- 23019 B
- 126 B
- 23020 B
- 127 B

The Exposure S.W. of Nagrus House is - at A of flat on pp 11 is of Diabase and almost the exact parallel of the conditions existing at the mouth of the River. Diabase here exists in 3 principle conditions

- 1st Exceedingly fine grained containing what to me seems Placid-Smygdalites
- 2nd Somewhat coarser Vertically columnar or slablike without Smygdalites
- 3rd The Curly much fractured diabase dissonant as from exposure

Through all of this there are dikes of reddish weathering rather coarse grained Rock sometimes 2-3 ft. thick

The exposure here is on a grander scale than at the mouth of the River but unfortunately it is much covered with drift and broken fragments

This sketch shows South face or rather SE face of the exposure between the two beaches South of the South point of B.B.



A is an Aphantic Pseud-Synzyda
Loral Spade of a rather irregular
reticulate columbar structure

C is a dike of Granitic Red rock

B is a dike which into center is a coarser grained compact grey Diabase which weathers to a more gossanous grey while the rock in A weathers to a pinkish grey. This I state it is the key to the whole situation just as I supposed but was unable to prove conclusively to the N.E. of here.

23021

128 B

23022

17910

23021
128 B } From A ~~Point~~ Myggdalerdal Dulac
23022
129 B }

2302

13012

13013 Diabase Crum Gray from cut of B
has vertically columnar rather massive
conchoidal fracture

23024

131

23 p 2300

17

23024
131
23p 22

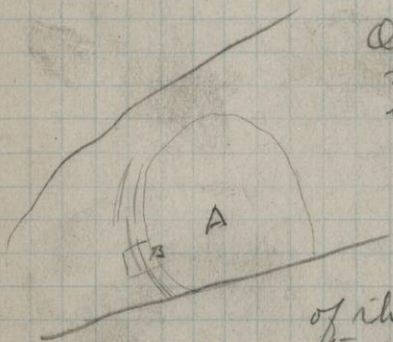
B Same near Contact with A
B from A near Contact there may be
placed together as they were broken apart
and show beautifully the significant
character of two gabbros which in this
exposed are beyond the sign of a
doubt from different masses of rock
and this also explains the confusion
that was noted in RR part of the
Bay

The rock of B becomes exceedingly fine grained near a contact - giving the exceedingly much fractured lumpy appearance especially where it contains fragments of both rocks the red & the other Diabase

The jointing of A is more irregular than that of B but it is cut & crossed with thin veins of the red rock

The Coarser Grey Diabase B holds numerous of the red rock of the most exceedingly irregular shapes in places drawn out into long bands which when they become thin appear to have a radial or sperulitic structure of Xals

2306
13313 From C Red Rock



On the N E side of the Bluff may be seen a dense black weathering rounded mass of Diabase (essentially like A of previous sketch) surrounded by coarse greenish Diabase like B and in latter a dike about 2 inches thick coming up out

of the sand and running gradually to a point bent parallel to the

surface of the inclusion besides this there are many thin discontinuous bands of red rock all with the rounded form shown

Then too there are black strips of same character

23027
13413 From A

23028
13513 From B showing character of bands

Pigeon Point Specimens

- I "mottled" Red Rock Little Portage Bay
- II Spotted Rks Beach near End of Pt
- III Porphyritic Red rock Top of Bluff N of Little Portage Bay
- IV
- V
- VI
- VII
- VIII

9 Red Rock from Little Brick Island in

10 Diabase from flow on G.P. Island
immediately above slate

11 Red Rock with inclusions of gneiss
1/3 mi from E end of Pt on S shore

12 Diabase containing feldspar and Pyrite
from dike at 3rd Shingle Beach point

13 Diabase Large Dike on N end of
Bluff N of Grand Portage

24 Q Porphyry from Gr Palisades

25 Red felsite from SE 1/4 2256-8

- 15 R Iron Gr Palisades showing kind-lamination
- 26 Ashes Diabase & Porphyry from point 8
 & R shore B.B. 24
- 27 Gabbro from Limestone Falls B.P. 25
- 28 Gabbro Large Bruce Dullage
 south of Smith Pt- 1212 29
- 29 Chlorite Diabase (has molyb.)?
 south of Wagner Hill 30
- 30 Q.P. from Adirondack 20 20

11 119 At D in the previous sketch there appears
a 4th rock of more coarse & rather
I nature than B with more pinkish shades
which the same is merely a contact effect
between the red rock & B. I am unable to say
II on the weathered surface it appears quite
different and is separated by a hair line
III and its straight edges give it the appearance
IV of a dike.

V 23029
136 B shows a specimen of the interior of
this mass which shows some gneiss
VI throughout

VII 23030
137 B shows weathered surface & contact
VIII from this it will be seen that the
weathered surface shows a marked difference
IX while on fresh fracture the
unaided eye can detect very little
difference

X from this there exists every gradation
of grain and color to the Red rock
of the larger dikes

At times it has the appearance of
coarse Gabbro with Red rock inclusions

23031 similar to

11 138 B from dike much metamorphosed

139 B same dike a slat about 1 ft from same

12 23032
140 B from Boulder type inclusion a
little higher up in cliff

13 All from NE corner of Exposure

24

25

Exp 45

Strike $\approx 25^{\circ} E$ Scurly ash joints



