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## **Trip by Van Hise, North shore, Lake Superior: [specimens 23034-23233]. No. 180B 1895**

Van Hise, Charles Richard, 1857-1918

[s.l.]: [s.n.], 1895

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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 x 2½ x ¼ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of 3 x 4 x 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.

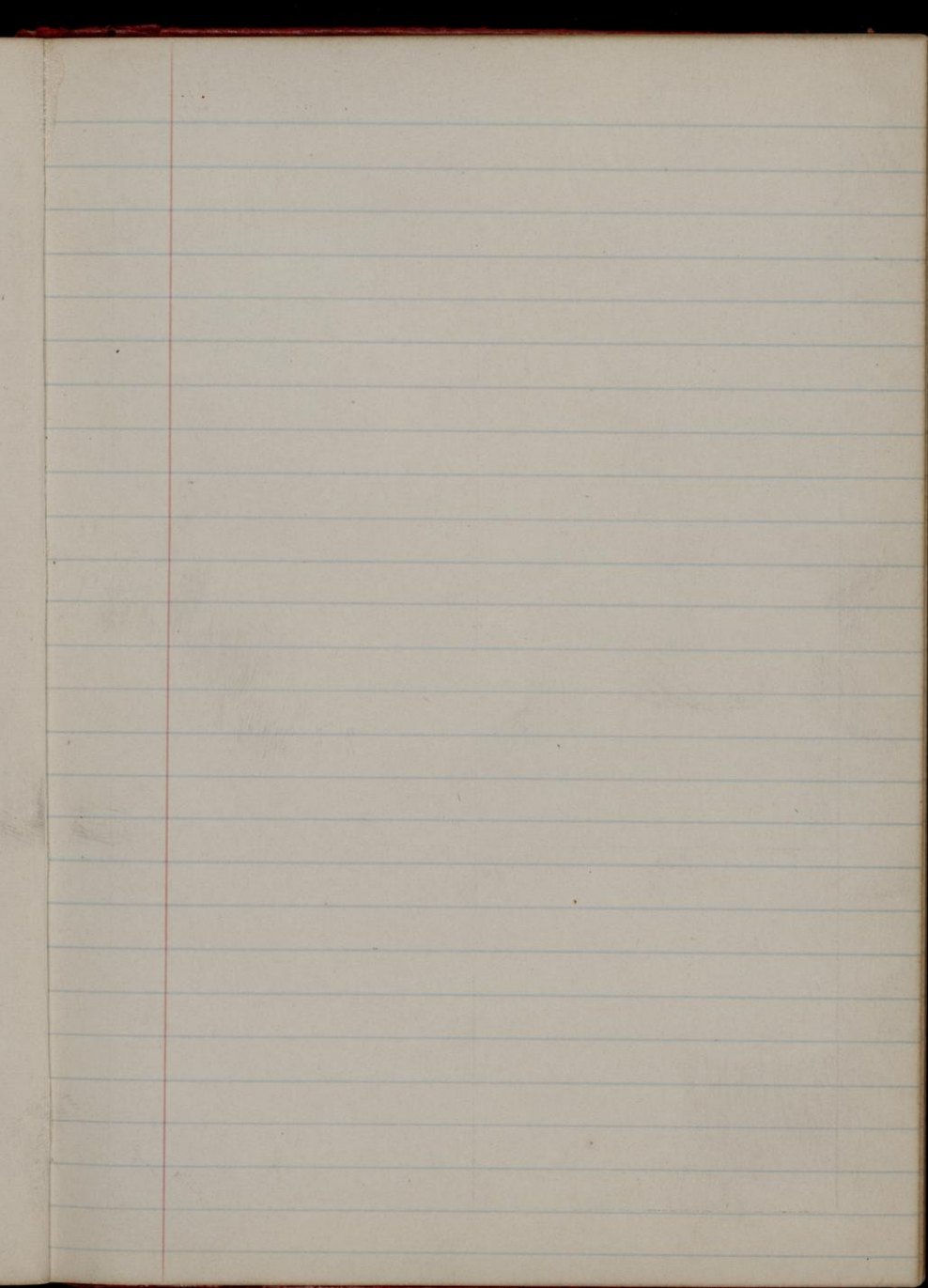
5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.



# 18013

Trip by Van Hise, North Shore,  
Lake Superior, 1895



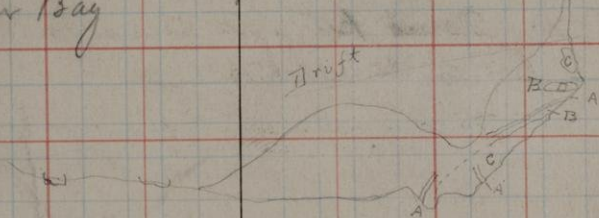


2 S.

T.

R.

Exposure SW of Magnus House South Pt-  
Beaver Bay



A Dikes of Granitic Red Rock

B Coarse grained Gneiss

C Fine Grained Pseud Amygdaloid

D Intermediate between Gneiss & Red Rock

490 3

The east face of this exposure shows incisions as already described. Whenever such is not the case the Grey Diabase shows a marked regular columnar structure the Pseud Amygdaloids does not show this structure to nearly so marked a degree yet it does approach that style of structure. There is no regularity in the direction of the dikes of red rock neither in the occurrence of the Grey Diabase Except when in contact with other Rock.

Looking at the exposure from the South Sketch on next page were on the right at A the Pseud Amygdaloid cut by much red rock in veins and dikes. Between the two dikes near the point the space is most of occupied by the coarser grained Diabase. However much of the Amygdaloidal Diabase appears especially in the lower part of the exposure. Then comes a depression in which there is a rather coarse dark brownish weathering Diabase holding noticeably 2 large specimens of Red Rock. And west of this comes an ascending by fine pinkish

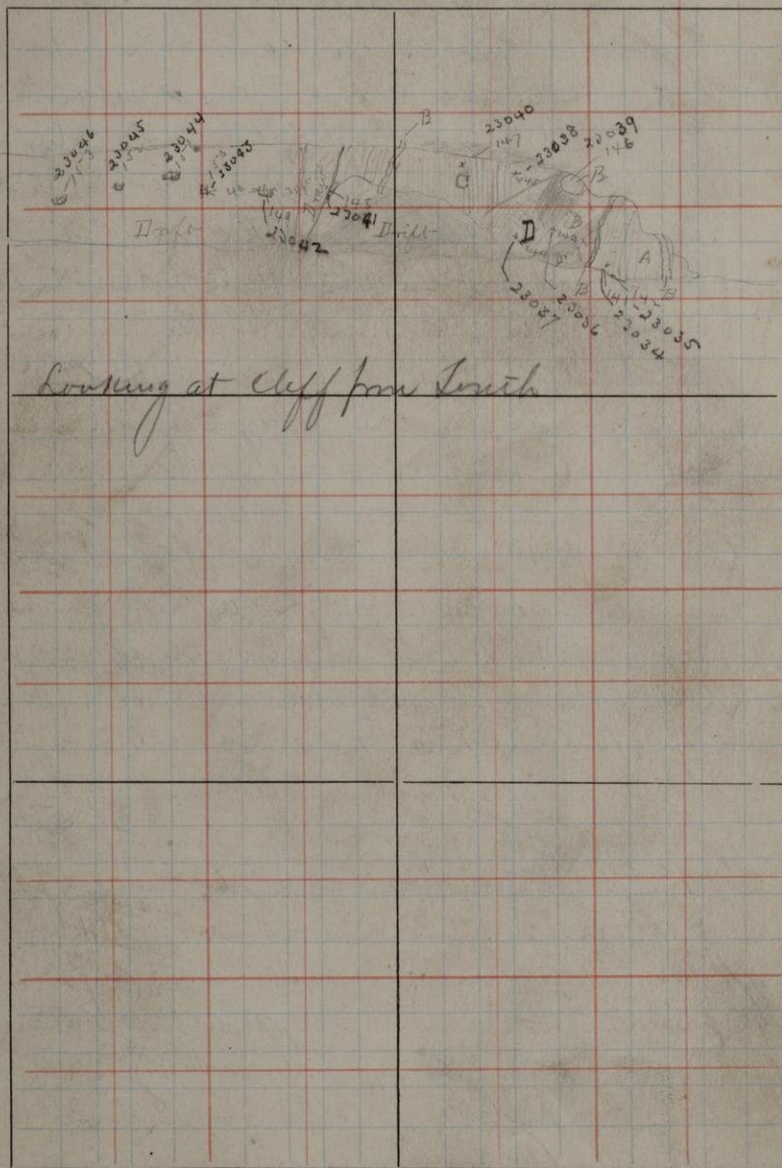


4

S.

T.

R.



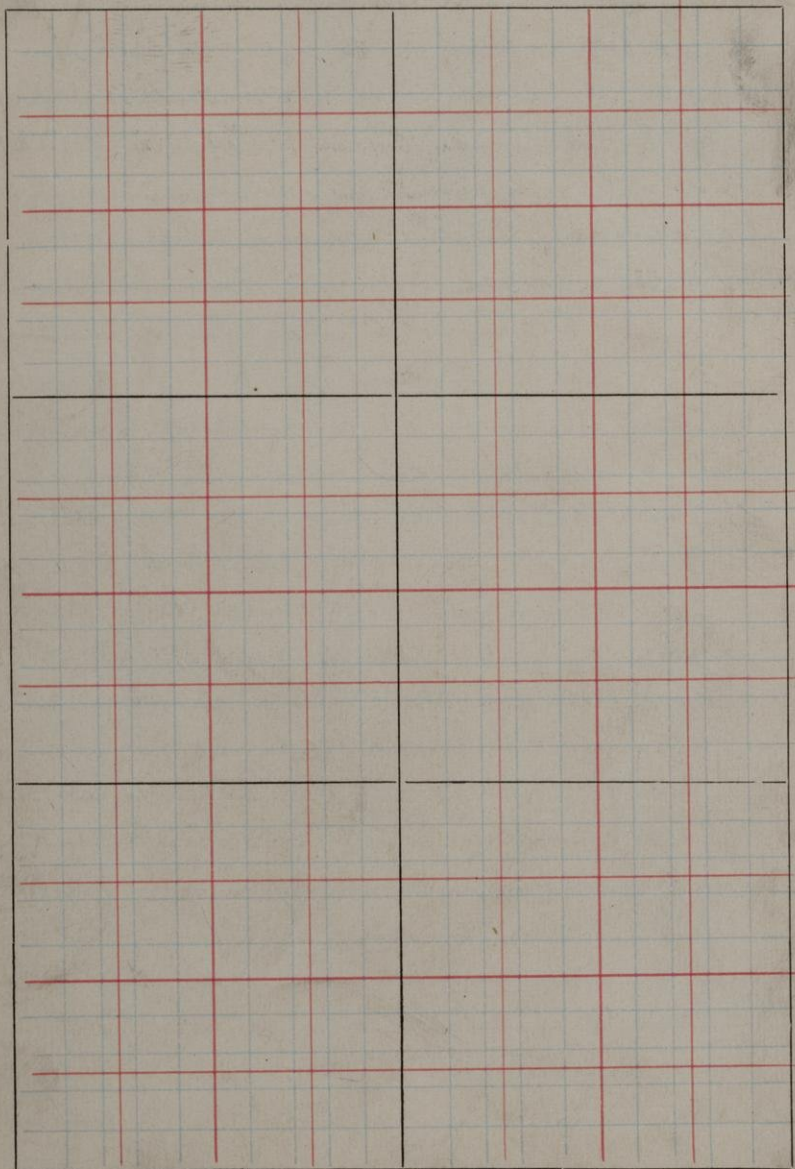
Black highly conchoidal Diabase which in the cliff side is compact and homogeneous but toward the top the weathering tends to crack it up similar to the usual feldspathic exposures and here and there the Augygdaloid appears but no diorite at this locality the two can be detected. In the situation of this mass the rock tends to be somewhat coarser and is with all not so different from some of the Grey Diabase. Yet there can be no doubt that the rocks are different and at the same time it appears as though the Augygdaloid was merely a phase of the Black Diabase.

The whole exposure has suffered a very marked jointing approaching the vertical. In C-folds most marked and rather in one direction making slabs standing on end. In D-folds most irregular. The upper boulder of red rock B is a quartz porphyry and appears like the base of the Porphyry near the mouth of the River.

6 S.

T.

R.





Passing westward C is seen cut by  
a large (3 ft) dike of Red rock  
\* & here is seen to assume the "curly"  
form quite fully described for the isolated  
exposure in the River

23034

141 B Diabase Gneiss (?)

23035

142 B " Pseudo Gneiss

23036

143-144 B "Gneiss" &amp; Diabase

23038

145 B Fine grained "

23040

147 B " " "

23039

146 B Porphyry from B

23041

148 B Curly Diabase This exposure is right  
near a draw which is now filled with boulders  
so that here another rock might have  
once existed to cause this structure  
The same structure is however observed  
E of the dike and no foreign Rock could  
be detected

23042

149 B about 20 ft N of 148 Fine grained D  
Rather massive in appearance only  
a few ft exposed

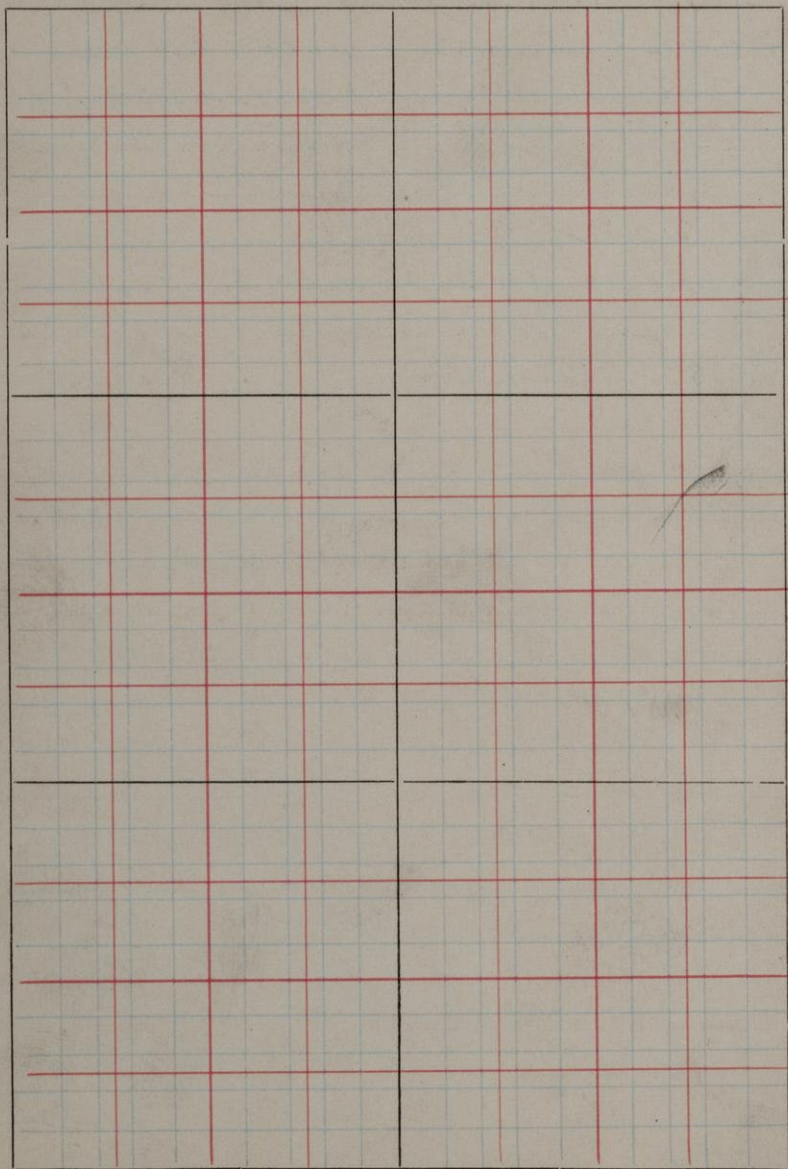
About 40 ft N of this a Black Gabbro  
suddenly appears which may again  
be seen about 15 ft farther N and  
at latter place its contact with the  
fine grained Diabase can be observed  
which here shows curly bands

8

S.

T.

R.



23043

9

150

B

Black Gabbro from East side

23944

B

from West

Also some pieces from the contact  
to help determine which is oldest  
The Gabbro is massive and jointed  
but not definitely

As was said like a few ft. of Diabase  
are exposed and same may be  
run about 20 ft. farther in  
while finally about 20 ft. beyond  
the latter appears coarse Diabase

23045

152

B

Fine grained Diabase

23046

153

B

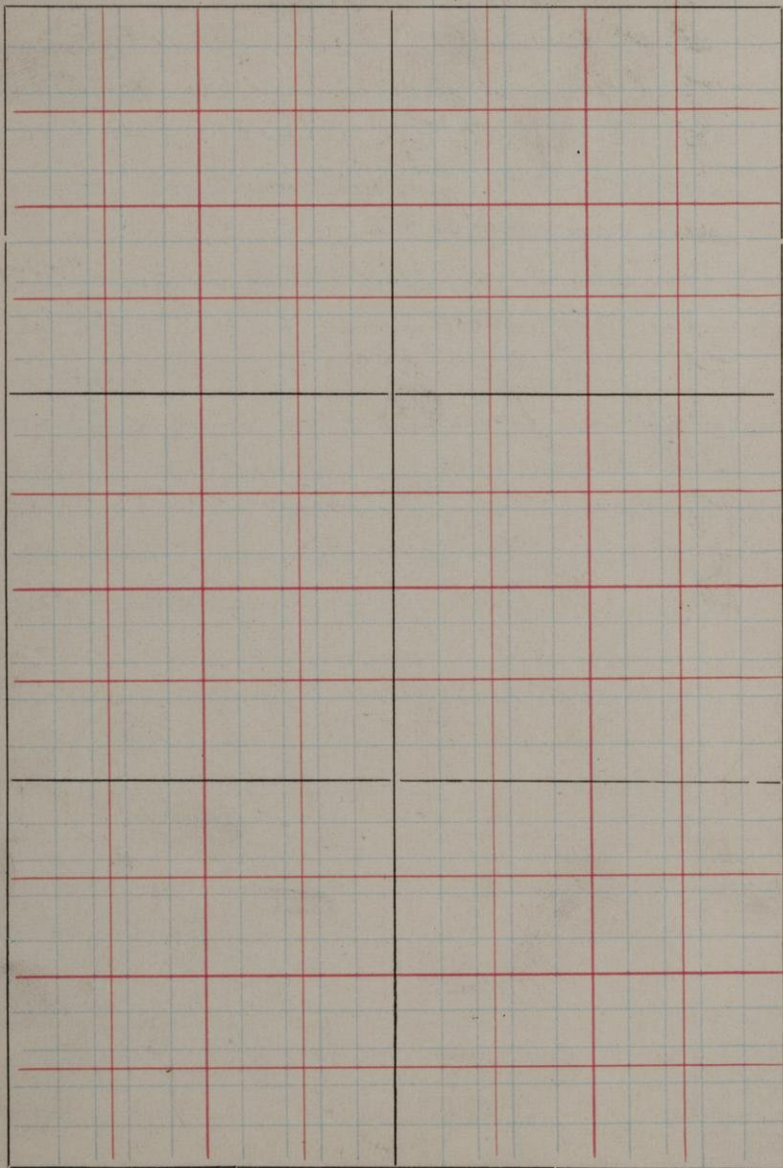
Coarse Diabase almost Gabbro but  
different from anything seen here before



10 S.

T.

R.



11  
N.W. Side of Bay N from pt 11  
Point 11 as indicated on plat XIII pp 25  
of Book 1 is a bold angular mass  
of Surochite Rock the front is vertical  
about 12 ft high with the top flat  
and the angles all well rounded  
On the N side there appears a block  
partially under this which appears  
to have been detached from it by a  
perfect plane and moved exactly  
parallel to its former position a distance  
of about 2 ft. It looks like the oceanic  
smith of the pt. described by Prof Lawson  
with the band of darker Rock weathered  
out. What the filling material here  
was it is impossible to say as none  
appears above water. All that is  
remarkable is the perfection of the planes  
and the parallelism of the sides now

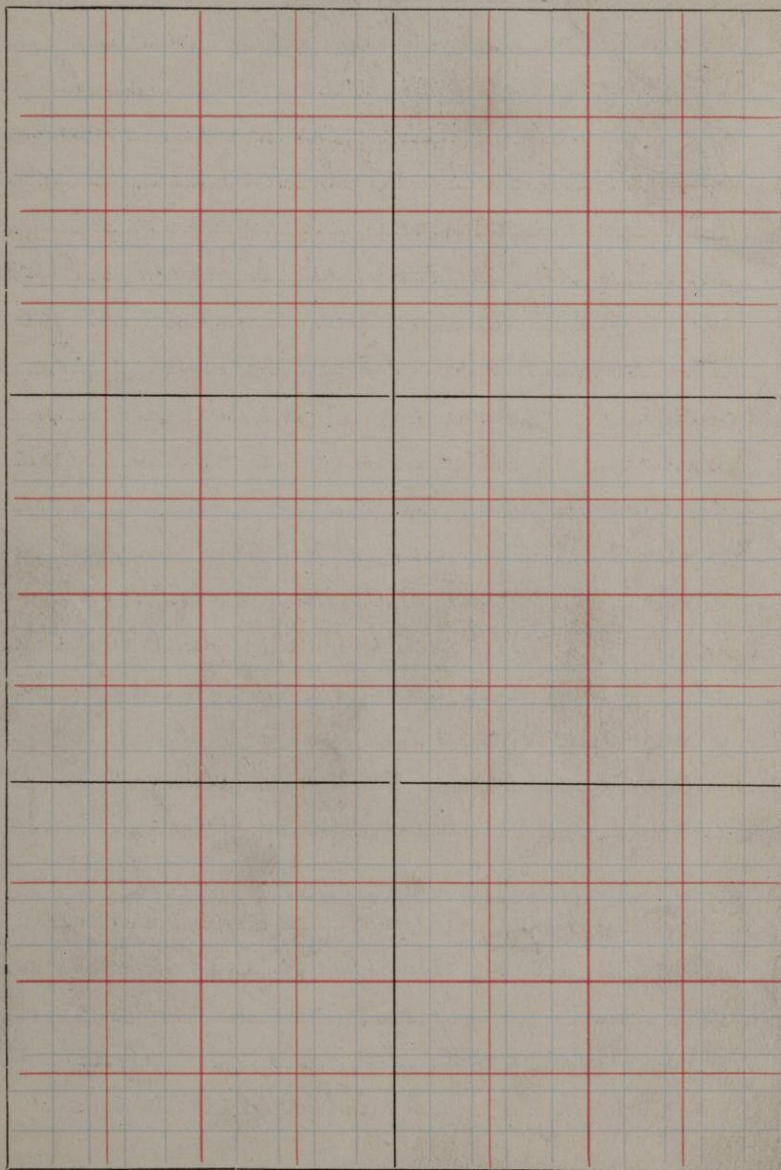
Point 10 is made up of a base of  
Conglomerate of Surochite in Diabase which  
is green weathering rather coarse grey  
on fresh fracture and in places has  
a porous amygdaloidal appearance  
This carries large masses of red wea-  
thering Xaline Rock different in appearance

12

S.

T.

R.





from the dikes and yet blending into them by imperceptible gradation

In general the appearance is that of the diabase filling in around masses of the other Rock. It holds lenticular discontinuous inclusions or bands of Red rock parallel to the contact between the Diabase & Red Rock yet there are what appear to be undoubted dikes rimchuk of Red Rk cutting the Diabase. It is not clear however that this is the same Red Rk as the larger mass

Then too the Xaline Rock holds inclusions of Diabase and withall it is impossible to say from field evidence alone what the relation of these rocks to each other is

23047

154 B Long diabase

23048

155 B Red weathering Xaline Rock

23049

156 B Contact of same showing on an edge the porous nature of the Diabase

23050

157 B Same as last showing apparent inclusions of Diabase in Xaline Rock and too a fragment from a 2 in dike of Red Rock in the diabase which appears without much doubt to cut the latter.

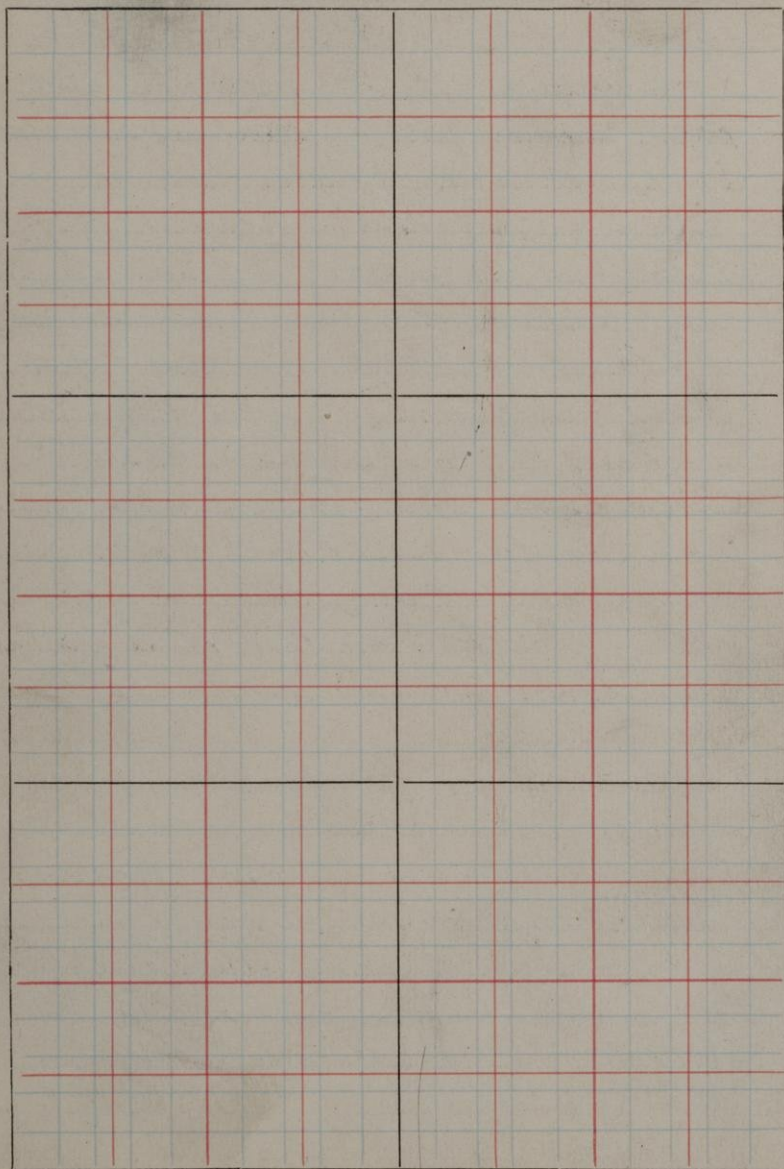
In the core between pits 9-10 we find

14

S.

T.

R.



abutting against the Anorthite Rock time  
medium grained Olivine Diabase with  
very marked "rustic mottling" The  
same becomes more coarse grained farther  
from contact with the Anorthite

23051

158 B

23052

159 B

"Rustic mottled" Olivine Diabase Medium  
Coarse " " " Both from  
near of Anorthite in core below 9-10

Point 9 is made up of Anorthite boulders  
in situ from 20 ft and down to 1 ft  
unbedded in what I have thus far called  
Coarse grey, green weathers Diabase but  
what-like is clearly the same as the  
Olivine Diabase ("Rustic Mottled") which  
I have just described from back of core  
bet- 9 & 10

23053

160 B Olivine Diabase

23054

161 B Same much altered

This Rock especially where much  
altered shows a porous appearance  
when mingled with the Anorthite it  
has little structure but where more massive  
it is jointed rather coarsely

The Anorthite inclusions suddenly  
disappear as shown in the sketch on

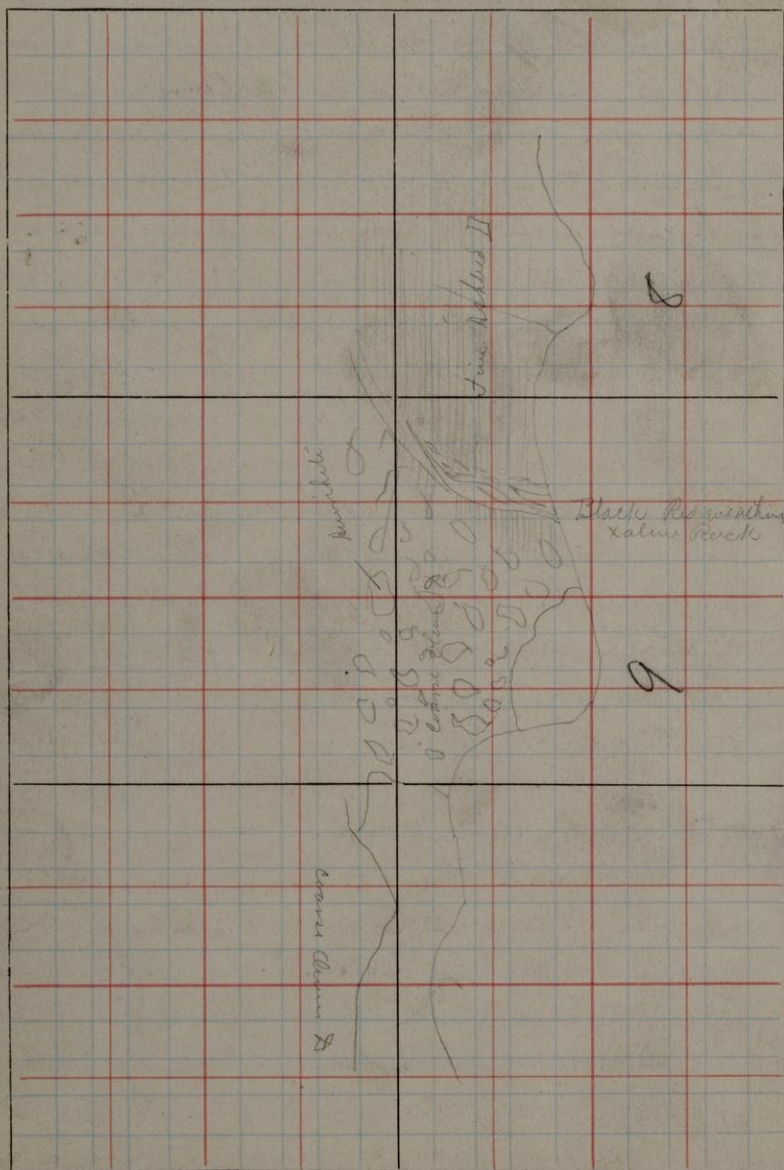


16

S.

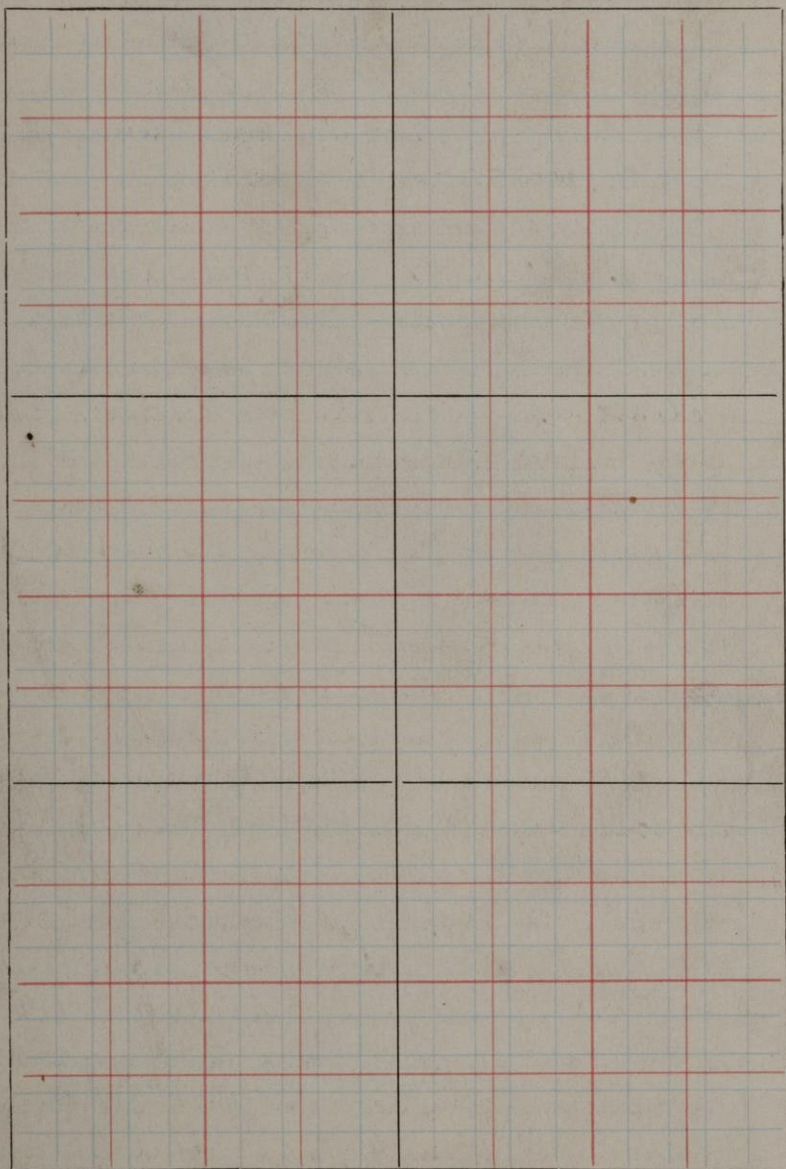
T.

R.



opposite page where a dike about 3 ft thick  
 at water's edge and rapidly running to a  
 point, cuts this rock. This dike is  
 composed of the Red weathering xaline  
 Rock mentioned farther back. It is  
 here distinctly cut by thin dikes & veins  
 of Red Rock (1-2 in thick) and is  
 mingled with the Olivine diabase  
 in a way that does not make it  
 clear which is the intrusive. And  
 beyond this the fine grained Aphanitic Diabase  
 (Ash bed or Diabase porphyritic) appears.  
 The two are separated by a not well  
 defined line. Rather by a zone about 3 ft  
 wide of lenticular bands of the red weather  
 xaline Rock. The bands are irregular and  
 ill defined & discontinuous. It has a noticea-  
 ble fact however that the Olivine D exists  
 on both sides of the larger dike.

The Red rock dikes like cut the O Diab-  
 ase but the Ash bed to the north is much  
 cut and in a peculiar way. A very marked  
 mineral boundary appears in the O.D.  
 within about 2 ft from the large dike  
 and same continues the fine Diabase.  
 Very little if any of the nodular stuff  
 appears at the contact of the two.









One system of joints which strikes across in all parallel to the coast and dips from  $20^\circ$  to  $60^\circ$  &  $80^\circ$  from the vertical in regular curved lines is peculiar and suggests the idea that same is in some way due to the aorthite which underlies all of these exposures as seen in the bottom of every cove.

Prof Lawson says these surfaces are beautifully slicken sided. This I fail to see their surfaces appear to me very like those left by the regular horizontal jointing. While I said that the trend of these joints was nearly parallel to the coast this is only true in part they are rather segments of the surface of a sphere generally convex outward but sometimes for short distances convex inward and it is this system of joints that the dips of rock well follow. They occur very abundantly in places in which mass varies from a fraction of an inch to a foot and even two feet in places. There are not numerous in 8 but very numerous in 7 and here also occur what appear



22 S.

T.

R.

[illegible]

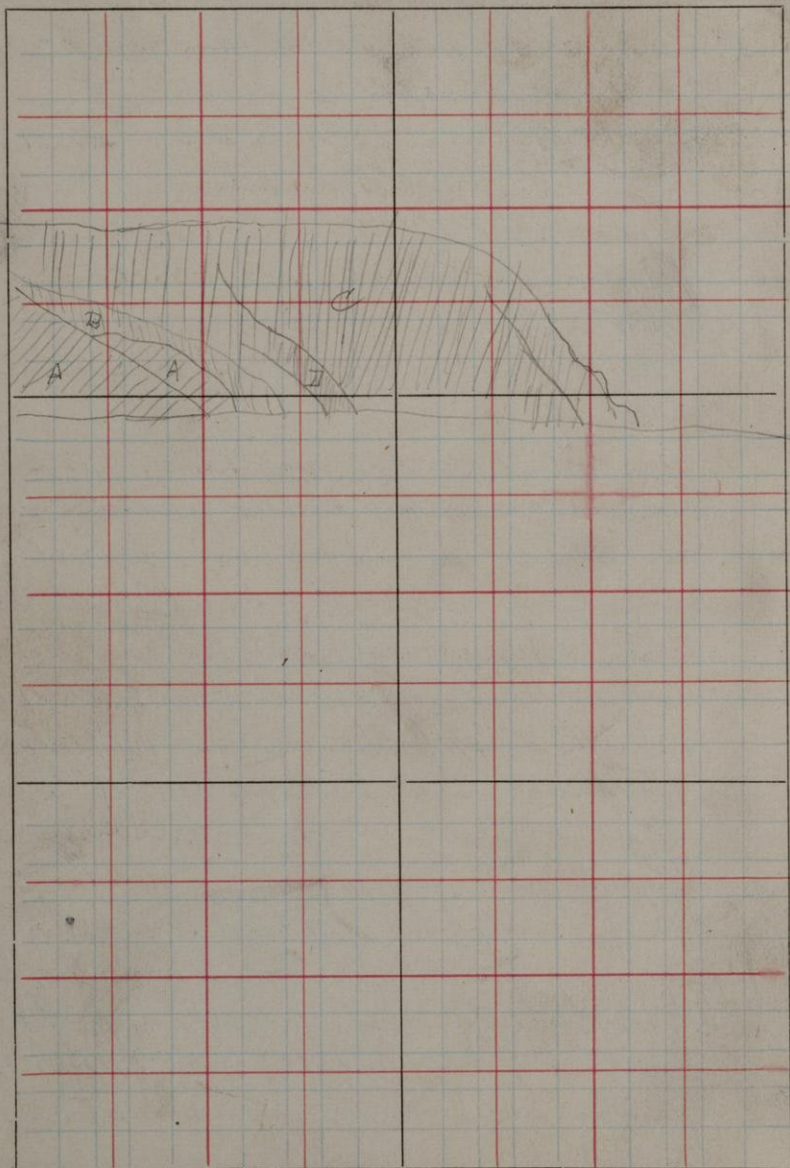
to be boulder inclusions but some  
 are not clearly such they may easily  
 be parts of the dike or veins  
 In the bottom of the cone bet 8-7  
 a small patch of hornblende is seen  
 Here also the Fine Diabase seems  
 almost in contact with the anorthite  
 Point 7 is very much cut by dikes  
 and contains very many inclusions  
 having some what the appearance of  
 boulders Some of the dikes are as  
 much as 3 ft thick while masses  
 not clearly dikes appear which are  
 6 ft across. Here most of all is  
 the Spheroidal jointing developed  
 and contains the surfaces which  
 I think Prof Lawson spoke of as  
 slicken sided between 6 & 7 Quartzite  
 appears and above it Olivine Diabase  
 which here appears to make a  
 nearly vertical contact with the fine  
 grained & which latter makes up  
 the whole of the projection, point  
 sometimes compact but mostly  
 of the somewhat curly nature  
 and always more or less of sand  
 being of dolerite at same should have

24

S.

T.

R.





been said for pt 7  
 23057 164 B Diabase fine grained somewhat "cong"  
 from point 6

23058 165 B Red Rock from a dike in pt 6  
 Dike about 1 ft thick

23059 166 B Diabase from dike in Granite on  
 South Point of B/B

23060 167 B Boulder inclusion in same

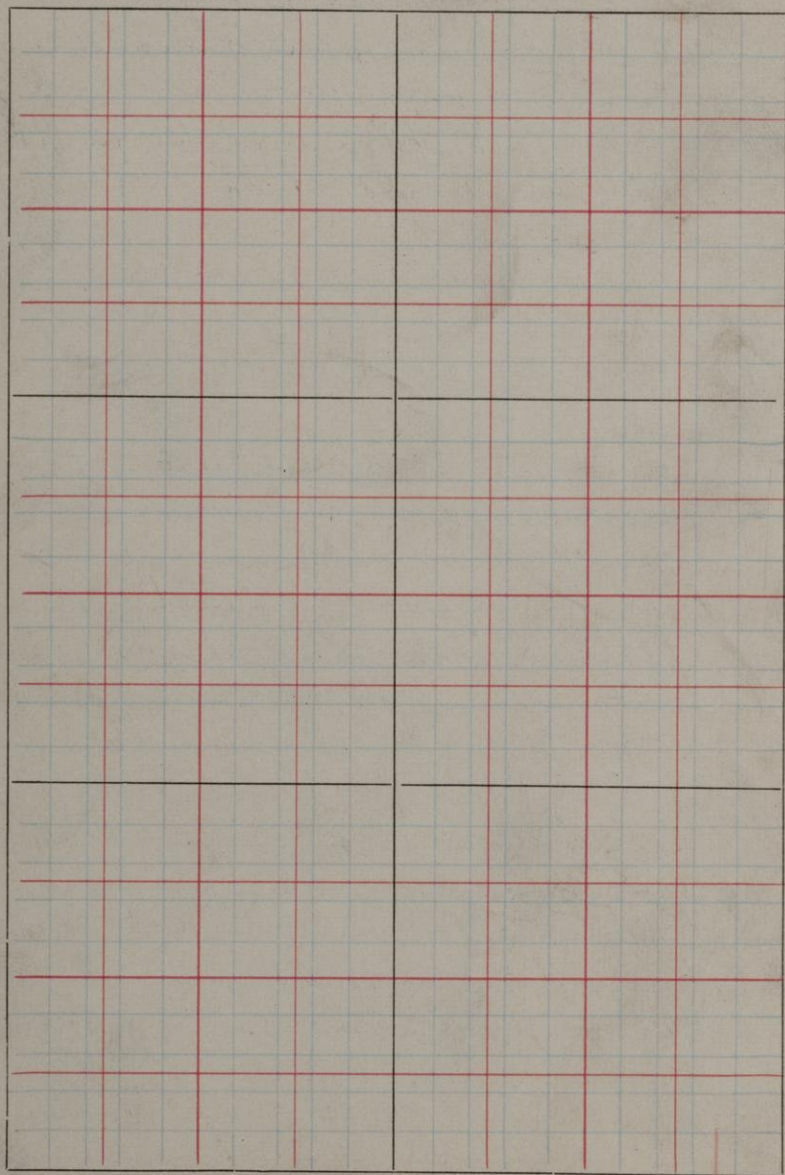
The smoothie in core between 5-6  
 present almost a perfect-Plane  
 sloping toward the Lake at 45°  
 usually exact & with the char  
 the 2nd with face of pt 5 is very he  
 reached on opp page. Some Diabase  
 appears but to only a small extent  
 The whole point is made up of  
 fine diabase cut & much commin  
 gled with Red rock. The only  
 peculiarly is the structure of the  
 fine grained rock it presents every  
 phase yet seen and in a compact  
 manner has been quite homogeneous  
 and coarse grained and then very  
 finely grained cong and some stuff  
 also ditto

26

S.

T.

R.



Here slicken siding is very marked and there can be little doubt that there was movement of some kind among the different parts of the exposure. Sometimes the rock is white on both sides of these divergent planes even the jointing being the same but in one or two places the rock underneath is very finely jointed or massive while that above is coarsely jointed and coarser in grain.

23061  
168 B From a fragment which has fallen from the N side of B-Rune about 30 ft N of bridge. Exact location looked by Drift.

23062  
169 B Fragment from top of hill about 100 paces N of pt 2.

23063  
170  
23064  
171 See pp 109 Bk I

23065 Red Fresh Heavy Porphyry from Cedar Island

23066 Grey O.P. or from Cedar Island

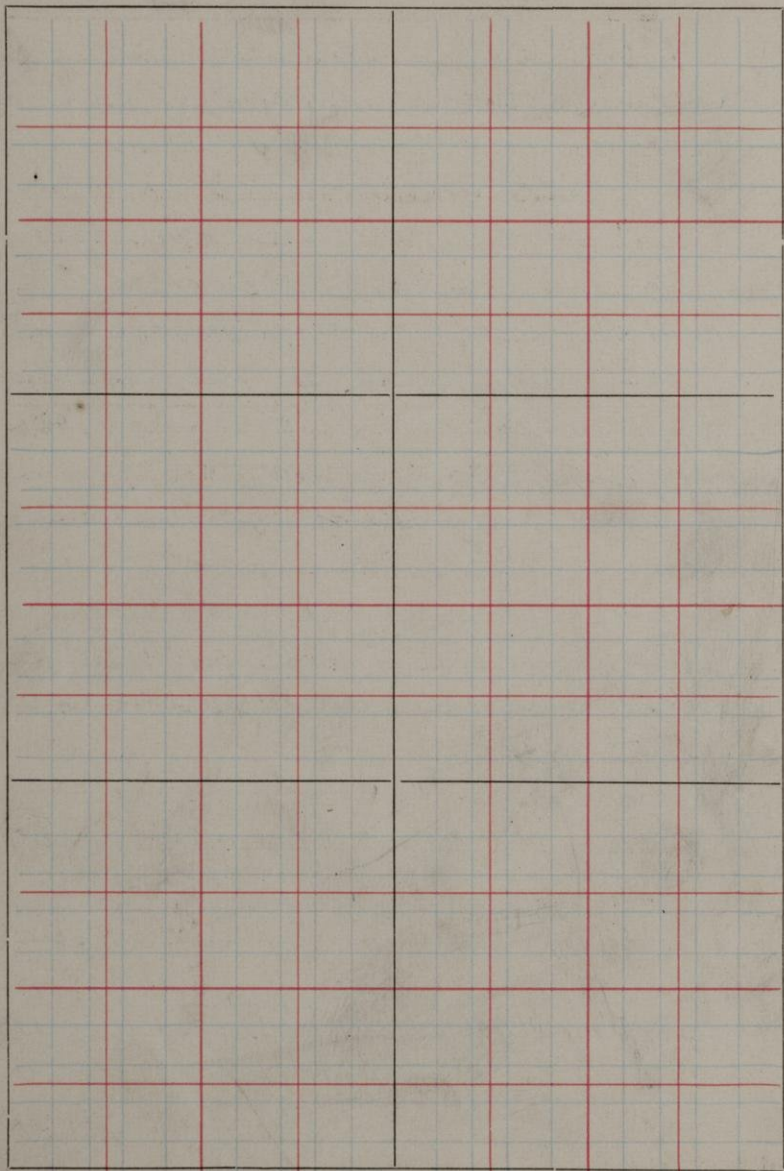


28

S.

T.

R.



The Rock at A pp 27 consists  
of Olivine Diabase and curly nodular  
Aegirine diabase commingled in a  
confused way with red rock both  
in boulder inclusion and veins  
and dikes. And over this this  
appears exposed to a height of 4 ft -  
in the cliff side a banded red  
feldspathic fractured so exceedingly  
much and so hard that it  
is next to impossible to obtain  
unmineralized Runo Specimens

Der Lehrer

- 23067 Altus Red Q.P. from Cedar SS lined  
23068 Red Granophyre from boulder line a  
with N of Pt 3  
23069 Banded Red teldsili near pt 3 see above  
23070 2 ft. det. of Red Rock N of Pt 3, Altus  
23071 4 in " " " " " " " " Fresh  
23072 Clinton's Gravel  
23073 Galena from near N line of sec 12 S5.E.  
on shore

23074 Lake in Same Location  
Anthracite Galley



# North Shore of Lake Superior

July 22 1895

Trip from Two Harbors to Baptism Run  
Prof Van Hise & O'Rourke

Dictated by Prof Van Hise

Diatase (Gabbro) On the west side of Beaver Bay is a remarkable series of exposures of basic and acid rocks. Of all the rocks here the Anorthosylt is the oldest. This occurs in at one place as the westernmost rock exposed having a smooth surface which dips steeply toward the lake. Besides this mass there are several other large masses running from about 90 ft to about 60 or 80 ft across. In addition to these there are innumerable small fragments varying from separate blocks of the Anorthosylt to those just described. The Anorthosylt is intruded in the most complex fashion by an olivine diatase. All of the smaller fragments mentioned are plainly inclusions with pebble or boulder like forms within the diatase.

Several of the masses of considerable  
size are just as certainly included  
within the diabase. The exposures  
are not sufficient to ascertain  
whether the larger fragments are  
thus included or not. In two  
cases no diabase was seen un-  
der the Anorthosite. But had the  
exposure extended farther the  
diabase might be found to pass  
under the Anorthosite. In one  
of these two cases the diabase  
passes up over the Anorthosite the  
latter having a "dome like" form  
which suggests a rounded shape  
for the whole mass the same  
as the included boulders. In  
all the other cases of the larger  
masses the ~~anorthosite~~ <sup>diabase</sup> was  
found to pass under the <sup>anorthosite</sup>  
greater or lesser extent. In  
most cases it passed farther  
under it than it does over  
it in the one case of dening  
just south of Beaver Point a  
large anorthosite showing lamin-  
ation was seen in the same way.



to have the diabase pass under  
its rounded form. At a distance  
nearly East of the diabase and  
anorthosite is a long line of  
outcrops running parallel with  
the shore of the Bay of a wholly dif-  
ferent character. The oldest rock  
of this set of outcrops is a porphy-  
ritic and amygdaloidal diabase  
or diabases for there may be more  
than one diabase in this ol-  
der division. The diabase is cut  
by a complicated set of joints the  
most prominent of which has a  
trend approximately with the line  
of exposures and are nearly vertical.  
cutting across these joints are less  
prominent almost horizontal joints.  
Still another set of joints dipping  
toward the lake cuts both of these  
sets. Whether other joints cutting  
all of these and being at right-  
angles or nearly so to the lake  
shore was not observed. That there  
is such a set of joints is prob-  
able from the fact that the  
rock breaks up into fragments



As a result of this jointing forms  
approaching right rectangular  
prisms. In places the joints are  
so close as to make the rock break  
into small angular masses.  
it approaching almost a breccia.

The ~~diagonal~~ joints are curved  
in places, <sup>app. perpendicular</sup> ~~and this~~ which gives  
movement before they have  
given "Shedden seds" surfaces.

Calling this diabase in  
a most imprecise manner is a  
<sup>red aged rock or joint</sup>  
~~red rock~~ which varies from a  
quartz porphyry to a completely  
siliceous almost granitic looking rock.  
The <sup>larger</sup> ~~larger~~ masses are left to be the  
porphyry and the dikes and borders  
to have a more siliceous character.  
The southernmost exposure north of  
the river is a breccia and appears  
to be the dikes vary from <sup>conspicuous</sup>  
to those several feet across. Instead  
of being of uniform width they  
vary in the most extraordinary  
manner. A dike may be wide and  
narrow within short distances  
so as to be many times as wide in

one place as the other. Not only  
so but the dikes may vary from  
a mere film to a rounded mass  
resembling a boulder. They vary  
from the size of pebbles to those  
a dozen or fifteen feet in diameter.  
The boulder like masses from 1  
to 4 ft are very common. They may  
cast these boulder like masses  
the string together by minute  
dikes which may be compared  
with a string of beads. The string  
like dikes may be used over work  
and the little bosses or laccolites  
be thought to be included in  
the diabase. From the larger lac-  
colite bodies a number of dikes  
may be seen to radiate. They may  
branch regularly or irregularly, a  
wide dike frequently passing from  
a narrower one and vice versa.

Both in the horizontal sec-  
tions upon the shore and the  
vertical sections at the water  
edge, and/or more dikes may  
be seen to have a circular front  
entirely surrounding a mass



of diabase. Cross sections at  
right angles to the shore show  
dikes with similar relations  
so they occur <sup>in at least</sup>  
thickness of planes at <sup>approx. angles</sup> right angles  
to one another. The diabase and  
red rock <sup>are</sup> immediately adjacent  
<sup>are often</sup> more leafy than the breccia  
or spherical included areas of  
diabase so that the center protrudes  
in one case the water follows  
along the Red Rock zone and makes  
a little island of diabase. Occa-  
sionally the central masses of  
diabase are cut by dikes. In some  
places the surrounding dike could  
be followed in more than one di-  
rection when it was seen to have  
a curved surface and it is believed  
that these areas are probably oval  
or spheroidal being largely and  
perhaps ~~partly~~ entirely surrounded  
by the felicit. It appears as  
though the diabase had developed  
its complicated set of points and  
perhaps a spheroidal parting  
before the intrusion of the Red rock.



Since this material permeates  
the diabase directly in proportion  
to its jointing when it is most  
broken there is most red rock.  
Although it might be argued that  
the intrusion of these rocks is  
the cause of the fracturing, however  
the former is believed to be far  
more probable. The more massive  
~~by nature character of the dikes and~~  
~~smaller masses~~

The first diabase and the  
red rock in places has been  
intruded by another fine grained  
dense black diabase, in places  
this material has so permeated  
the other rocks as to make them  
almost resemble ~~almost a~~  
conglomerate. Innumerable  
roundish inclusions of a felsite  
and diabase being included in  
a sparse matrix of the intruding  
rock. In magnitude the in-  
clusions vary from minute specks  
to masses several feet in diam-  
eter. This is especially true of the  
red rock for large fragments of

the first diabase were not clearly separated or discriminated (R)  
In one place at least one of the rounded inclusions of felsite was seen to vary from a porphyry in the center to a completely xaline rock at its sides.

South of the above set of exposures is another exposure of quartz porphyry which is cut by diabase in the diabase dike is a large inclusion which varies from a porphyry in its center to a wholly xaline rock upon its border also the quartz porphyry about 2 ft from the dike begins to change its character and grades into a holoxaline rock adjacent to the diabase. It is believed that the most probable explanation of these facts is that the diabase infiltrated the acid rock before it has xalized and thus allowed the borders of the inclusions and the larger mass more time to ~~be xalined~~ or before solidifying and thus allowed complete xalization.



Still farther to the south is a felsitic breccia. This and the porphyry above are probably surface material. The material of which was furnished by the plexus of dikes cutting the diabase. The more xaline character of the dike material as compared with that of the felsitic and porphyry would be explained by its being an intrusive instead of an extrusive rock. Also it is possible that the first amygdaloidal diabase was not cooled when intruded by the Red rock.

The general succession of rocks for Beaver Bay as worked out by Rober was confirmed. At the river section compared with the creek section just described and on the coast just south of Beaver Bay combined with Bear Point the same succession was observed as follows: - 1. Basalt - 2. Coarse Olivine diabase whether there are two diabases the finer being extrusive and the



coarser intrusive in it was  
not observed or determined. A rela-  
tion looking this way on the east-  
two or three miles N.E. of Beaver  
Bay suggests this possibility. 3  
Amygdaloidal and porphyritic  
diabase or diabases. 4 (Olivine class)?  
Gabbro which both in the stream  
and on the coast just west of  
Beaver point undoubtedly in-  
trudes the olivine diabase and  
at the river certainly cuts

The amygdaloidal diabase  
5 Red rock which occurs in  
the form of fragments and the part  
as feldite in the flume and  
as porphyry and breccia in the  
effusive rock. No reason was  
then for believing that the  
red rock was of more than one  
age its difference in crystallization  
appearing to depend upon  
many factors including ex-  
tension and whether cut by diabase  
6 fine grained diabase obsidian  
to include the amygdaloidal  
diabase and all forms of red rock

Coast between Beaver Bay  
and the Palisades July 22 1895

Detailed by Prof. Van Dine  
(Paicake Island). On this island  
is the largest mass of anorthosite  
observed anywhere from B B to the  
Palisades. This is a low dome  
rising at its highest point perhaps  
50 ft above the water and having  
its greatest length parallel to the  
shore it is fully  $\frac{1}{2}$  mi long and  
about  $\frac{1}{3}$  as broad. It is largely com-  
posed of anorthosite. However it  
is cut in the most intricate man-  
ner by coarse grained ol. diabase  
(gabbro) in all respects like that  
at the falls at Beaver River and  
on the coast between Beaver Bay  
and the Palisades. The dikes vary  
from those a dozen and even 20 ft  
broad to those a few inches wide.  
Some the larger dikes smaller  
ones frequently branch. The con-  
tacts between the diabase and  
anorthosite are in most cases  
perfectly sharp. In two places  
the dikes were seen to con-



slightly encircle anorthosylite which appeared to be like huge inclusions within the diabase. These great masses in their forms are identical with those observed at B.B. and which are probably encircled in the same manner thus explaining the dome like forms emphasized by Lawson which he however takes to have an entirely different meaning. For the most part the anorthosylite is without any other structure than the laminated arrangement of its calcine particles with which a foliation may correspond. This point was not determined. At various places lower the anorthosylite is intruded in a very complex fashion which it takes in an irregular structure where due to the inclusion. At one of the places where the diabase surrounds the anorthosylite branches are seen to break off from the diabase through the anorthosylite in a parallel direction thus



giving the rock a banded appearance. This banding strikes <sup>almost</sup> and dips in identical banding at a locality farther south on the east side of the island strikes and dips

This is at a place also where there are numerous diabase dikes. But the connection between the anorthosite and the intrusion of the dike was not so clear. It is therefore clear that the strike of the banding at these places is almost at right angle and consequently can have no relation to bedding. However this structure is identical with that observed on the south side of Beaver point which was taken as evidence of bedding by Lawson. Here also the striking diabase presumably including the anorthosite is also adjacent. At a number of places between TBB and the Palisades considerable masses of anorthosite were seen

which were included in the same way by the olivine diabase as on Paucake Island. Many of these masses as well as Paucake Island itself has dome like forms which however are plainly due ~~to the~~ <sup>to the</sup> most part to glacial action as shown by the grooving. These dome like forms may be further emphasized by the fact that many of the masses of anorthosite are great unfractured inclusions in the coarse olivine diabase and as this material wears away more readily the "turtle back" form develops. From the facts observed there can be no question that the anorthosite is the oldest rock in this vicinity and that it is intruded in the most complex manner by the olivine diabase. Possibly some of the larger masses as that at Paucake Island may be islets. But there is not the slightest



the anorthosite is a formation which has suffered a surface erosion before the intrusion of the olivine diabase. The supposed pre-Keweenaw domes and high rocky surface ~~over~~ <sup>through</sup> which the Keweenaw beds were intruded and over which they flowed is an undoubted illusion caused by the peculiar manner of the intrusion of the diabase resulting in the great rounded blocks in it combined with ice erosion.

The fine grained black diabase was found to dip on the east as figured by Irving. Below this were coarser beds and still lower down is the olivine diabase. Whether there is an actual transition between the places was not worked out. At the <sup>last</sup> other farther on toward the Palisade a fine rock appeared to vary suddenly into the coarse rock. Then appeared however a peculiar junction vein like and



rounded masses of the coarse  
appears in the fine rock  
whether this is an intrusion  
of the coarse into the fine or  
a segregation phenomenon  
was not decided. The regular  
lepping <sup>basic</sup> diabase flows mapped  
by Smith on the coast with  
before the ~~palisades~~ <sup>at least Bay</sup> which is an Indian  
were observed. These the olivine  
diabase coarse and fine and the  
basalt flows were all seen to be  
cut by the red rock just as at  
Beaver Bay. At the Bay near the  
cabin and at Point before reach-  
ing it exactly the same intru-  
sive <sup>intrusions</sup> of red rock into the  
~~diabase~~ <sup>diabase</sup> ~~was~~ <sup>was</sup> ~~observed~~ <sup>observed</sup>  
observed at Beaver Bay.

R.B. OK From here to the palisades no  
more than very general observa-  
tions were made. Except that N.E.  
of the mouth of Baptism River  
numerous exposures of Anorthite  
syte appear in the tops of Gabbro  
hills. These were observed only at a  
distance with a glass and not in  
detail.

Beaver Bay Mine 7/23/90

Additional observations on the rocks about Beaver Bay

The oldest rock in the Beaver Bay area is the Anorthosite. Its occurrences at Beaver Bay have been carefully mapped in the foregoing notes and sketches. The additional points observed particularly this time are the large number of cases in which the Diabase which surrounds the Anorthosite can be distinctly seen to pass under the same and completely enclose it. A description of the individual exposures is as follows.

South of Shingle Beach in Beaver point.  
The largest mass here is more or less broken up. The whole mass is mapped to scale in notes taken during last season. The one part is rounded on top while the other shows banding of lighter and darker material. The most prominent dark band is about 2 feet thick and trends  
Strike                      dip



The dark phase is said by Dr  
Lansom to be due to iron ox-  
idation by pyroxenic material.  
The highest part of the exposure  
is about 30 ft high and the top  
slopes laterally at an inclination  
of about  $30^{\circ}$  to the horizontal.

West of this exposure is Olivine  
diabase of medium grain which  
on its surface shows several ex-  
posures of anorthosite one about  
40 ft in diameter flat and rounded  
in out-line. No red rock is here  
seen to cut the anorthosite.

The large banded mass can be  
seen from the N.W. side to be  
rounded at its base and the dia-  
base can be seen to pass under  
the anorthosite for a distance  
of four feet. This has been pho-  
tographed. To the south of the  
ridge of Orthoclase Gabbro are  
two large masses of anorthosite as  
shown in the map. The one farther  
east south is cubical in out line  
with corners and edges much trun-  
cated while the inner one is irreg-



gular. The outer one measures ft through while the other is about ft long by ft through. These masses are beyond the sign of a doubt included in Olivine Diabase (Gabbro) the same but of a somewhat earlier phase as that northward near the beach.

North of Beaver Point and close to it as mapped is a mass of Anorthosite which is perfectly rounded and domed but the sides at the water's edge are vertical and it can be seen to be under cut under water showing conclusively that it also is an included mass though it is not possible to determine what the including material may have been at this place. To the west of this a few fragments 5 to ten ft across show just above the surface of the water.

The river section shows anorthosite at the lower falls and between it and the upper falls several masses one 15 to 18 ft across are

clearly inclusive while a few others appearing in the surface of the river Bed can not be proven to be inclusive owing to the fact that only their upper surfaces are exposed yet they can not be proven to be anything else for the same reason. Small inclusive fragments as along the N.W. shore are not seen here to any great extent here. The including rock at this place is the very coarsely grained Diabase (Gabbro) which continues up the river for several miles.

Going north from the mouth of the river along the shore of the bay the first exposure of anorthosite is dense very white and fresh and is included in a brecciated much altered Redrock commingled with diabase. Here the anorthosite is much cut and veined by the red rock and is clearly included in it. Going north beyond the point of Quartz porphyry marked 19 in plate of last year notes to 18 of same plate we find the whole point



made up of a coarse very dark green  
much altered phase of the anorthosite  
which shows three sets of prominent  
joints nearly at right angles to one  
another and cutting the rock into  
blocks from two to three feet on an  
edge. The anorthosite is here sur-  
rounded and cut by a medium  
grained diabase which is so much  
altered that its original nature  
can not be determined. The flat  
surface near the beach around  
this point is made up of this  
same diabase holding fragments  
of more or less fresh anorthosite.  
The size of the fragments varying  
from a few inches to a few feet.

At the next exposure north as  
shown on the map the anortho-  
site occupies the greater part of the  
tide bay. It here occurs in masses  
of varying size many from 5 to 10  
ft. thick, several 20 to 30 ft. and  
one 90 feet across and extending out  
of the water to a length of 15 ft with  
a flat top. One of the small expo-  
sures 30 ft long is the one photograph.



by Dr Lawson to show "domed struc-  
ture of anorthosite passing under  
Keweenawian beds" But he ignored  
the fact that the large mass which  
is not more than 100 ft distant  
is rounded and cut away at the water  
edge and underlain by diabase showing  
beyond a doubt that the diabase  
passes under as well as over the an-  
orthosite. All of these exposures have  
been photographed! The mass photo-  
graphed by Lawson projects only <sup>6 or 8</sup>  
feet above water. The wall behind it  
is made up of huge mass of anorthosite  
set in a matrix of diabase. One of these  
masses are 15 ft across and all are  
rounded and clearly melusian! Between  
the two large masses above noted one  
the diabase (Gabbro) wall is 40  
feet wide at the top and cuts under  
so that it is not more than 15 ft wide  
at the water's edge. The mass just  
north of the very large one is about  
12 ft through by 15 high and is under-  
cut on one side just as it is overlain  
on the other by diabase. This has  
been photographed to show this relation.  
Photo no

1 photo no

The rear of this bay let - as has been said is made up of massive medium grained to coarse grained diabase (gabro) set with the large masses of anorthite the north and south walls of the bay show nearest the anorthite a layer from 10 to 40 ft thick of a breccia of anorthite fragments from single xls to masses two ft through set in a matrix of diabase similar to that in the rear wall, but considerably finer in grain. The very large mass above noted is flanked to the south by a dike 1 ft thick of red felsitic rock. Same with it is small dikes and stringers.

Passing northward to the next bay let - we find in the bottom of the cove a low flat - lakeward dipping exposure of anorthosite about 80 ft long by 30 ft broad - dip about 2-5° from the horizontal, but flanked on the rear side by diabase. On both sides are masses of all sizes clearly included in the diabase - this exposure is again flanked to the north by the agglomerate of anorthosite and diabase.



The next cone has only a mass of 3 or 4 ft diameter exposed in its very deepest part.

In the second cone to the north however is a mass 60 ft long sloping toward the water at an angle of  $45^{\circ}$  and rising to the top of the cliff. Of all the exposures this is the one that looks most like a side or top of an underlying terrane and it is the only very large area that does not clearly show an inclusive nature.

Here also alvins diabase is found flanking it - but fragments of anorthite are scarce in it and the mantle of diabase is thin. Small veins of diabase and areas of some foot or a few inches to two feet in diameter may be seen throughout the anorthosite.

While in this cone the anorthosite is a solid mass with little breccia the reverse conditions exist in the next cone northward. Here is an agglomerate in which the largest masses are not more than 6 or 8 ft across and small ones are very plentifully set in the matrix of diabase. This exposure



of the agglomerate is about 40 ft across and 20 ft high

Immediately beyond a very short point there is an exposure of a width of 100 ft of diorite with somewhat well developed horizontal parting much impregnated with diabase. One large mass 15 ft across is still solid. The whole has more the appearance of an impregnated single mass than a collection of boulders or more accurately fragments set in a matrix. Again at the very end of this line of outcrops we find masses of a length of 30 ft and smaller to 1 ft. surrounded by diabase (gabro). These masses are conical and well rounded but the rounding is due not to pebbles or wave action but to recent glaciation. Ice striations show beautifully fresh on its surface. Some of these striations are  $\frac{1}{2}$  in deep.

This completes the description of the anchorage for the area immediately surrounding Beaver Bay with the exception of a few small isolated rounded patches which were found on top of the hill a little way back from the shore. In the light of the shore exposure, there can be no doubt that these also are included

It will be noted from the foregoing description that the only rock in association with the aegirine is olivine diabase or as I have called it gabbro. This diabase (gabbro) is found in very massive exposures 1/2 mi. south west of the neck of Beaver Point near the limit of the map prepared from last summer's notes 2<sup>nd</sup> just east of the neck on the south side of the point. Here it occurs in typical form very coarse in grain and cut by perfect joints at right angles which on weathering forms huge blocks 10 15 & even 20 ft. on an edge.

Similar red spots are here developed ~~from~~ the weathered surface due to the iron oxide from the decomposition of the augite. Beyond the orthoclase-gabbro dike this diabase becomes finer and finer and near the Great Bend loss of the Point it comes finally to I have called it olivine diabase. While the dike breaks the succession it is most highly probable that the exposure was once continuous and would here seem to give us a gradation



in the same mass from the very  
coarsely saline phase (Swings gabbro)  
to the fine grained phase (Swings  
diabase). On the south side of the  
point near the beach at the neck  
is a depression in the gabbro filled  
by breccia evidently a fault plane  
or at least a plane of some movement  
the same strikes about  $10^\circ$  from the  
vertical toward the S.E. and the  
up-throw as shown by the lamination  
of the breccia was in the eastward part

3<sup>rd</sup> - We find this diabase in the  
bottom of Beaver River beginning  
under the wagon bridge and ex-  
tending on up the stream. Between  
the wagon bridge and the foot of  
the first falls this diabase is interrupted  
at several places by fine grained rock  
diabasic in nature which seems  
to seam and cut the coarse in dike  
like fashion. At the foot of the first  
falls and from this place to the  
foot of the 2<sup>nd</sup> falls the diabase  
(gabbro) carries anorthosite as dis-  
cribed above and from here on the  
diabase is practically continuous from <sup>to</sup>

the limit of the area mapped Near  
the N line of section 17 on the north  
bank of Beaver River a small cone  
of androsy ti was found in the  
diabase Just above the 2<sup>nd</sup> falls  
a dike 3 ins in thickness of a red rock  
or felicit cuts the diabase. Beyond the  
turn about a quarter of a mile farther  
up the stream a similar occurrence  
was observed here the dike was about  
6 inches wide

While this diabase (gabbro) appears  
rather coarse and massive along the  
north west shore of the bay it more  
commonly is fine grained and corresponds  
to Grunpeltz and Drings oblique diabases  
Whenever such is the case the contact  
between it and the "mixup" of diabase  
and red rock to be described later can  
not be made out

### The fine grained diabases.

Fine grained diabases corresponding  
to Drings ash bed diabase and diabase porphy-  
rite as well as ordinary diabase types  
occur here in many places  
Along the north west shore of the  
bay several fine grained diabases



appear in so confused and intermin-  
gled a mass that it is almost impossi-  
ble to describe it. Specimens taken from  
these rocks and examined under the  
microscope last season showed that  
there were all phases of ash bed diabase,  
diabase porphyrite and ordinary diabase  
as well as olivinitic. In places a  
small area will be homogeneous  
throughout and not intruded by red  
rock while in other places the most  
intricate and confusing intermingling  
imaginable exists. Rounded  
boulder like forms of one diabase will  
be surrounded by streaks and twisted  
bands of another diabase appearing  
as a breccia of diabase in diabase.  
There again a sharp contact of excess-  
ively fine with medium to coarse  
will be seen, again excessively fine  
diabase will be <sup>seen to</sup> ~~be~~ in very irregular  
beds. The more intrusive portion  
One very fine pinkish weathering dia-  
base always seems to contain amygdulites  
elongated and arranged in bead like  
strings. In several places and always  
where the amygdulites are small.

This rock occurs broken up into small  
lathes <sup>1/2 to 3 ins across</sup> and the interspaces are filled with  
a banded twisted light green weathery dia-  
base for convenience I have called this "cherty"  
diabase. The structure may have been  
brought about by flowage after partial solid-  
ification of the mass or it may be due to  
impregnation of one rock through another.  
Many of doloids occur very frequent ly  
but always in such irregularly shaped  
masses that they fail to indicate <sup>their</sup> ~~their~~  
their ~~and~~ origin and their relation to  
other rocks. At other times lathes  
of rock will be homogeneous throughout  
and free from impregnation. One such  
area measures about 40 ft across and  
has a circular out line. Whenever these  
rocks are at all homogeneous they always  
show a very perfect parting or joint  
nearly vertical and trending approx-  
imately parallel to the shore line.  
This is generally true of the larger  
mass above mentioned of all of the points  
of the northern part of this exposure  
along the shore, of the small island  
to the north east and near Beaver Point  
and of the diabases south west of the



small beach are the south side of  
the neck of Beaver Point. Indeed this  
jointing has been observed every where  
of fine grained diabase olivine and  
may be observed to some extent even  
where the diabase are the most cut  
and intruded by red rock. A horizontal  
jointing is less strongly marked. And  
a 30° jointing nearly at right angles  
to the coast and vertical is present  
though not as strongly marked as the  
other two.

These Diabases as described along  
the north west shore are cut by red rock.  
At first sight the diabase seems to hold  
innumerable inclusions of red rock  
and be at the same time cut by  
dikes of red rock but on careful in-  
spection it is found that almost  
every mass of red rock is ~~connected~~  
connected at some point with a neck  
or vein like dike of red rock. The  
most careful examination and  
search failed to disclose any mass  
of red rock in the diabase which  
could not be traced to connection  
with some dike or vein of the same  
rock.

This intrusive red rock occurs in dikes from fine seams to boulders in thickness many attain a thickness of 1 ft and some 2, 3 and even 4 ft though the latter are very scarce. The small boulder like masses are usually from a few inches to two ft though white larger masses are quite common which attain a thickness of ten ft and even more. The smaller masses are always holocrystalline and very coarse grained.

Many are surrounded by a band of greenish material intermediate between the red rock and the diabase. With increase in size comes cross bedding approach toward a porphyritic structure similar to that of the small point of quartz porphyry north of the mouth of the river and only a few hundred ft distant from here. The greatest variation in structure of the red rock exists. Every phase from a typical quartz porphyry to a typical felsitic and to that completely holocrystalline rock is observed. This is caused by varying rock values



by more and more admixture of green  
diabase until its color is almost that  
of the diabase. Yet in all these cases  
it retains the coarsely crystalline structure.

The slope or exposure toward its south-  
ern end in the bay where this "mixing"  
and boss like impregnation of red rock is  
most complete is low not more than  
ten ft. high and presents much the  
same appearance through out but  
wherever a vertical section can be  
found there appears a sort of banding.  
Blocks of the same kind appear to be thrown  
up in thin layers coming down into  
the water. This would seem to indicate  
that the original rock at this place  
before its impregnation, was laid down as  
a flow. The numerous amygdaloidal  
areas and the brecciated <sup>and</sup> amygdal-  
oidal diabases would tend to show the  
same thing. On the other hand the  
areas of uniformly jointed homogeneous  
rock free from impregnation, with cir-  
cular out-line and a more or less surround-  
ing dike of red rock would seem to  
indicate a volcanic neck. The shape  
of volcanic neck would of course exp

lain the simplification readily since  
the disease of ~~the~~<sup>red</sup> rock could easily find  
access along the wall of the previous neck  
after the filling material has cooled and  
contracted Yet the same peculiar  
out-line and curving of dikes described  
for horizontal sections can at other  
places be seen in the vertical sections  
showing Spheroidal rather than cyl-  
indrical form for these masses  
and suggesting a spheroidal parting  
due to some cause or other as the cause  
of these curved forms. Again the  
marking parallel to the shore seems  
to be very persistent it can be traced  
though more irregular through even  
the most brecciated and impregnated  
portions of the diabase and in  
a few cases can be seen to affect the  
larger masses of Quartz porphyry. But  
it seems to have produced no effect  
whatever on the smaller dikes  
of red rock. Moreover the impreg-  
nation by red rock has gone on to  
its fullest extent much coarse & rather  
very light green weathering diabase  
is observed. in fact it here seems to



be are angled more or less in parallel  
ism to the red rock while whenever  
the intrusion of red rock is not so  
marked the diabase is more regular  
and shows much of a can more appear-  
ance. It is here a medium grained  
to fine grained dark to black diabase  
with conchoidal fracture and comes  
under the head of Irving's "Ordinary"  
diabases.

The northern half of the ex-  
posure of diabases along this shore  
shows less of the red rock like boulder  
like intrusions but is yet much cut  
by more regular dikes. The jointing, and  
especially the vertical one described before  
is here very marked. In addition one  
in curved spheroidal forms is very  
much developed this produces beauti-  
fully smooth surfaces cutting the  
vertical jointing at angles of about  $30^\circ$   
and this is what Lawson and some  
other observers have taken as "shear  
siding" and evidence of movement.  
But inspection shows that in no  
case are dikes of red rock found dis-  
placed the same almost always

Follow this parting and whenever  
sheets of amygdaloidal rock are  
found no evidence of displacement  
in them can be seen it is evident  
therefore that these are not "sticken-  
sides" but are ordinary joint cracks  
and are the cause of the peculiar  
shapes and curved forms assumed  
by the red rock dikes. Then in the  
northern half of the diabase outcrops  
occasional streaks are seen in which  
the rock presents every appearance  
of a dense amygdaloid but the  
form of these streaks makes it  
almost impossible that such can  
be true amygdaloids at the surface  
of a flow. They often incline  $70^\circ$  from  
the horizontal. If these are the tops  
of flows these flows must have been  
much bent and deflected by movement.

No facts have been observed which  
deserve a succession as follows

Over the Anorthosy to with its encl-  
ing diabase (whatever the origin of this  
may have been) was one or more  
beds or beds of fine grained amygdaloidal  
diabase this was cut in the Anticline



manner indicated by the fine  
acid rock and later came a  
second intrusive or impreg-  
nation of another fine grained  
diabase. The amygdaloidal struc-  
ture and the brecciated ("curly")  
structure would then be the  
tops and bottoms of the original  
diabase bed. It is true that these  
by their position do not now  
clearly indicate a bed but the  
great eruption through them could  
not have done other wise than  
much displace them and may  
thus account for their present po-  
sition.

It is true there are here two  
red rocks or only I have been  
unable to decide definitely. The  
point projecting to the southeast near  
the southernmost extremity of the  
"mixup" looks as if it had been a  
solid mass and had been impreg-  
nated by diabase. But this diabase  
is all of the densely fine grained kind  
and the one which is supposed to  
have been last injected there for

the red rock may still be a boss  
like mass which had been intruded  
into the first diabase.

The xaline condition of the red  
rock is very hard to explain in  
most of the large dikes it takes on  
a porphyritic structure closely  
resembling that of font in the  
granite plate. In these cases it also  
has the same structure throughout its  
mass and presents a clean cut con-  
tact with almost no transition phase.  
The narrower dikes are holoxaline  
and show no porphyritic tendency  
whatever. The same is true of the  
boulder-like little bosses which espe-  
cially have often a transition band  
a few inches thick and are usually  
holoxaline. Some however have a  
sharp contact and a dense porphy-  
ritic development while others  
and many minute dikes seem to  
have interfused with the diabase  
and formed an inter-mediate rock.



July 25 1895

Left B.B. in morn with Earl Huns  
got set of 50 specimens off Palisade Point Shind  
went up Baptism, N.W. from mouth of river  
about  $\frac{1}{2}$  mile is a hill about 300 ft high. The  
top of this hill is composed of nodules solid  
blocks of aurothosyite. The whole top is a  
series of small depressions from 20 to 50 ft across  
the whole exposure covers about 300 by 600  
ft. At various places dikes of gabbro may  
be seen to cut the aurothosyite in width  
these dikes vary from 2 in to 4 in nothing  
wider than this could be observed as a  
clear cut dike. Towards the N.E. side of  
the exposure a contact of the aurotho-  
syite and the gabbro can be traced for  
some distance. Here the gabbro which  
two inches of the contact is seen to be  
drawn out and streaked and to contain  
numerosous drawn out inclusions of  
aurothosyite. At one place larger inclu-  
sions of aurothosyite can be seen here they  
are sometimes 8 in to 1 ft across but  
are always irregular and at times look  
almost as if the gabbro had been in-  
truded by the aurothosyite. The aurotho-  
syite at these places is composed of large  
kals very much larger than the matrix  
mass of the rock and this was also noticed  
along the contact everywhere close to the  
contact line the aurothosyite seems to  
be coarser in crystallization.

About 100 ft south of this mass is an  
area of 60 or 80 ft cross section in which  
there is a diabase or gabbro containing large  
kals of aurothosyite or possibly Labradorite. These  
kals are very uniform about  $\frac{1}{2}$  by  $\frac{3}{4}$  inch

23190 Is a specimen of this Gabbro con-  
taining a number of xls from south  
side of Bluff or Hill  $\frac{1}{2}$  mi S.W. of the  
mouth of Baptism River. What the relation  
of this to the main mass of anorthosite  
was did not appear. Below this exposure  
in the hill side a mass of anorthosite  
about 10 ft in diameter was seen surrounded  
by diabase (Gabbro). Southeast of the  
main exposure which forms the top  
of this hill across the valley about  $\frac{1}{2}$  mi  
could be seen another mass in the hill  
near the top but this mass was not  
so large and was seen entirely sur-  
rounded by diabase (Gabbro).

At various places along the river  
masses of anorthosite 10 to 15 ft through  
appeared. But these probably were mostly  
drift. While near the bridge on the  
"county road" a mass about 15 ft through  
appeared in the bed of the river. It had  
the appearance of being surrounded  
by fine grained diabase another simi-  
lar mass was seen on the opposite  
bank a little farther down stream but  
nowhere could any extensive mass be  
found. A fact which is significant  
since such would necessarily be the  
case if this rock and the large mass  
on top of the hill were the "eroded  
top of a Pre-Keweenawian Lava" as  
supposed by Dawson.

The barrier over which the upper  
falls of the Baptism river descends  
is quartz porphyry or essentially like that  
of Pelicade Point. This may be  
seen for about 500 paces east of the falls  
forming a high cliff on the south.



side of the river. To the east of this valley  
Diabase from the head of stream until  
just near the mouth and here a felsite  
appears

23190 Specimen of Quartz Porphyry from  
cliff at upper falls of Babylon River  
about  $1\frac{1}{2}$  miles from its mouth.

23192 Band about 4 ft thick intrusive  
between layers of Diabase. It con-  
tains fragments of diabase

23193 Red Rock from small island  
near Indian's house south of Pales  
ade.  $1\frac{1}{2}$  is land toward south.

July 30 1890

Geopoint (v)? Has been repeatedly described  
as containing a very intricate mix up  
of red rock and diabase Prof Sawtuck  
was not ready when examining  
it to grant that there was evidence  
here of two red rocks yet on looking  
at the S.E. face from his boat he ad-  
mitted that to judge by appearance the  
diabase must have been intrusive in the  
red rock On re-examination to-day  
I was struck by finding that a large  
number of eff. from the top of this  
exposure had a very uniform & porphy-  
ritic appearance and the diabase  
always was very granular on tracing  
a dike into a boulder it was found  
that a sharp contact between the  
granular and the porphyritic rock  
existed. Also that the granular rock

3  
Contained fragments of diabase while  
the porphyritic does not. There is here  
then the best evidence that the  
fine diabase was intrusive into  
Quartz porphyry and that the whole  
mass of gabbro cut by a second red  
rock.

23194 From dike 6 ins thick about 2  
ft from where same is in contact  
with boulder of Q.P.

23195 1 Contact of Q.P. and dike rock

23196 Fragment showing fragments  
of diabase in dike rock and sharp  
contact with Q.P.

23197 Fragment showing inclusions of  
Q.P. as well as diabase in dike rock  
All from west side of pit (v)?

23198 from 6 in dike in diabase, just  
near corner of "neck" of homogeneous  
diabase

August 1 1895

The Point of Quartz Porphyry which  
was last year supposed to show  
a transition phase was examined  
again and it was found that a  
sharp contact between the Q.P. and  
the granular rock exists the gran-  
ular rock exists as a band varying  
from 0 to 6 inches in thickness.



between the diabase and the Q.P.  
near the diabase the granular rock  
is darker and is intimately mixed with  
same. Sometimes there appear to be  
fragments of diabase in it though  
this can not be ascertained for  
dikes or intrusions of the diabase  
would assume such forms at times  
toward the Q.P. the granular rock  
sometimes shows xals of quartz, etc.  
it has not at all the appearance  
of Q.P. and the contact can always  
be made out with considerable  
sharpness

23199 Contact between granular and  
diabase showing what seems to be  
an intrusion of Q.P.

23200 Contact between granular and  
Q.P. about 6 inches from contact of  
granular & diabase

23201 Specimen of granular showing  
diabase on edge

23202 Same as last a little farther  
up hill

23203 Contact between granular  
and Q.P. this contact 6 ins from  
diabase & granular

23204 Specimen of Q.P. 18 ins from  
contact

This shows either that complete  
fusion existed or that the granular  
was a separate intrusion

The latter seems most probable  
as such sharp contact between  
it and granular exist even  
though granular seems to be  
somewhat affected by diabase &  
sharp contact between Q.P. & it  
3 Inclusions of Q.P. in granular  
4 irregular in thickness and  
position of granular

23705 from small "Boss" 2 ft through west  
of "neck"

23706 from an irregular area of red rock  
about 4 x 6 ft just s.w. and adjoining  
with "horseshoe bay lit."  
This rock seems quite quartzitic  
but its out-line does not clearly  
indicate its nature

23707 from small (1 ft) boulder like  
mass. no connecting dike can  
here be found

23708 from 3 ft mass much rounded  
but connected 2 ft from last 20  
to from 2nd last and 10 ft n.  
of "horseshoe bay lit."

23709 from s. bank "horseshoe bay lit."  
somewhat appears to be a debris  
very irregular though and may  
be inclusion

23710 from 8 in dike 6 ft north of  
last



- 23211 from 3 ft "boulder" in middle of 1st  
bounding "horizon" bay on north
- 23212 from irregular mass 8 ft north  
of last
- 23213 from irregular dike  $\frac{1}{2}$  way  
to Snorkute Bay
- 23214 from mass about 2  $\frac{1}{2}$  ft in  
dike just S of small beach  
right near north end of exp near  
Rd flint
- 23215 small 5 in boulder like lue  
4 ft south of last
- 23216 from dike mass in 3rd ft  
south from S end of exp
- 23217 from 1 ft dike in 4th ft
- 23218 from much dike just east of last
- 23219 from 1 ft dike in 4th ft
- 23220 Enclosing diabase lue
- 23221 from above dike at contact
- 23222 Same 20 ft east here  
much jointed and laminated
- 23223 from one "curving" 3 in  
dike in 4th ft about 10  
ft from 23219

23224 From about 1 mile below  
above B.B. half way between  
meander point on W line of sec  
13 and small harbor bay

23225 North point of "small harbor  
bay" All of this "gabro" has the  
pyroclastic development of feldspar  
all of the red weathering crust.  
It looks quite different from  
that at B.B. nodular weathering  
does not appear but very perfect  
cross joints, producing flatter  
cubical blocks.

23226 from massive much jointed  
exposure north corner from  
south point of "little harbor bay"

23227 from Bluff of point small  
island about 3 miles above  
B.B. All the way from B.B.

this red encrusted diabase  
~~23228~~ (gabro) as shown by above appear  
shows predom in alt. It always  
has a distinct by glow app. luster  
the jointing is very perfect and  
the angles are always sharp  
much of the shore consists of low  
bluffs with vertical faces.

23278 from North side of "Black beach"  
about  $3\frac{1}{4}$  mi above is where this  
shows almost beyond a doubt that  
the red material is due to iron  
iron the red matter is more  
thoroughly mixed and gives the  
whole rock a red surface.



but very different from the rusty  
color of the previous rock

23229 From south side of this  
beach. This the grey weathering  
wavy gabbro which was last seen  
at Beaver Bay. It now shows very  
marked "luster mottling" the  
spots are about 1" to 1 1/2" in diam.  
Nodular weathering is common  
and the rock is very fresh.  
Its surface is distinctly grey. This  
rock continues in place, but  
dipping flat. Surface more  
or less broken for a distance of  
2 1/2 mi. It is much more massive  
than last. Then beyond a  
little beach come a cliff of  
stone which has a blacker  
appearance, nodular weathering  
and has exactly the appearance  
of the rock of the top of B.B.

23230 Specimen of this rock. A few  
hundred yards south of here is  
a cliff 60 to 80 ft high of this same  
rock in which, the jointing  
approaching the horizontal is  
obvious. A few sets of whiteally in the  
rocking would make the cliff appear  
very fine. The W. end of the  
red rock of Beaver point  
which runs from this cliff which  
is probably 600 ft long the bedward  
curved jointing again appears  
and the cliff becomes lower.

Beyond the point which the last  
spot forms, across a bay of about  
300 yards width there appears  
in the south side of the bay  
near the water edge an exposure  
of very coarse red rock.

23231 specimen of this red rock the  
same as the rock side of the point  
is seen in a very large mass

next to the east of this red rock is  
a fine grained basalt which  
at the end of the point gives way  
to a cone

23232 is this large mass from its E  
wall

23233 Long large mass of red rock on south E. side of Pt  
of the passage, the bay on the  
south side of the above point which  
bay is made up of the detritus  
and any debris we come  
to a point which is made up  
of an agglomeration of snoutlike  
fragments in detritus just  
like that at B.B. on the north  
west shore of same. This exposure  
here is however much more  
massive and extensive. It forms  
a cliff nearly 100 ft high  
with a face of probably 200 or 300  
ft distance. The passing around  
to the south one can easily see  
that it is under cut by schists.  
The south side shows streaks  
of darker rock. These streaks are  
a few inches wide and at a high  
inclination only, or not more  
than  $15^\circ$  from the vertical.



Ship is undoubtedly the place  
where Rawson thought he found  
the anorthosite in situ. But one  
can very readily see that it is like  
all the other anorthosite is found  
along this shore a huge hornblende mass  
the enclosing rock is not gabbro  
but is diorite just like that at L. P.  
except that the rock is absent.

From pt D to Island N 60° E



